COMPREHENSIVE QUALITY ASSURANCE PLAN

for

COMMERCIAL LABORATORY SERVICES AT
HERITAGE ENVIRONMENTAL SERVICES, LLC

June 2004

COMPREHENSIVE QUALITY ASSURANCE PLAN

Heritage Environmental Services, LLC
Commercial Laboratory Operations

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C. Steven Gohmann, Vice President
Heritage Environmental Services, LLC

8/25/04
Effective Date

Gregory A. Busch, Senior Quality Assurance Officer
Heritage Environmental Services, LLC

8-24-04
Date

Gary A. Klingler, Laboratory Director
Heritage Environmental Services, LLC

8-25-04
Date

Pauline K. Spence, Quality Assurance Officer
Heritage Environmental Services, LLC

8-24-04
Date

To Whom It May Concern:

In order to more adequately serve the needs of our clients, Heritage has adopted a Comprehensive Quality Assurance Plan (Comp QAP), also known as a Quality Manual. The QAP is written to meet the guidelines established in EPA document number QAMS-005/80, the Region V Superfund Model QAP; ISO 9001:2000, ISO 17025:1999, ISO-14001, ISO 10011 Series (Guidelines for Auditing Quality Systems), and the National Environmental Accreditation Conference (NELAC) standards. The relevant definitions from ISO/IEC Guide 2, ANSI/ASQC E-4 (1994), and the International vocabulary of basic and general terms in metrology (VIM) are applicable. This Comprehensive QAP will be implemented in the commercial laboratory.

This Comprehensive QAP covers such laboratory functions as data acquisition, review and reporting, and establishes QA objectives and mechanisms by which these objectives are measured, documented and reported. In addition, such functions as procurement of items and services, personnel training and qualification and safety are covered.

It is our intention that all who use our services be provided with the opportunity to understand the procedures used in acquiring, reviewing and reporting laboratory results.

It is our requirement that all laboratory personnel read, review and follow the procedures and requirements established by this document.

Sincerely,

HERITAGE ENVIRONMENTAL SERVICES, LLC
Commercial Laboratory Operations

C Steven Gohmann
Senior Vice-President

CSG/ps

Comprehensive Quality Assurance Plan

Prepared by Gregory A. Busch, QAO
Heritage Environmental Services, LLC
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7901 West Morris Street
Indianapolis, Indiana 46231

Issued to: _____

Company: _____

_____

Date: _____

Copy Number: _____

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3.0 Statement of Policy

3.1 Personnel

It is our commitment to use good professional practices and provide high quality environmental testing services to our clients. It is our policy that all who use our services be provided with the opportunity to understand the procedures used in acquiring, reviewing and reporting laboratory results. It is a requirement that all laboratory personnel read, review, have free access to and understand the procedures and requirements established by this document as they relate to their job function. This document is to be used as a basic reference in the laboratory. Each staff member is obligated to comply with the stated requirements of this Comprehensive Quality Assurance Plan (Comp QAP). It is the responsibility of all personnel and of management to achieve the necessary quality in all activities.

The laboratory shall have sufficient personnel with the necessary education, training, technical knowledge and experience for their assigned functions. All personnel shall be responsible for complying with all quality assurance/quality control requirements that pertain to their organizational/technical function. Each technical staff member must have a combination of experience and education to adequately demonstrate a specific knowledge of their particular function and a general knowledge of laboratory operations, test methods, quality assurance/quality control procedures and records management.

Laboratory management shall specify the minimum level of qualification, experience and skills necessary for all positions in the laboratory. In addition to education and/or experience, basic laboratory skills such as using a balance, colony counting, aseptic or quantitative techniques shall be considered. Management will ensure that all technical laboratory staff have demonstrated capability in the activities for which they are responsible. Such demonstration shall be documented.

3.1.1 Persons filling the following job functions must meet the associated minimum experience and training requirements as specified by the American Association for Laboratory Accreditation (A2LA):

1. Inductively coupled plasma-emission (ICP) spectroscopy: One year experience with satisfactory completion of a short course on ICP or an equivalent in-house training course.
2. Flameless atomic absorption spectroscopy: One year with satisfactory completion of a short course on graphite furnace atomic absorption (GFAA) or an equivalent in-house training course.
3. Flame atomic absorption (FLAA) spectroscopy: One year with satisfactory completion of a short course on FLAA or an equivalent in-house training course.
4. Gas chromatography: One year with satisfactory completion of a short course on basic GC or an equivalent in-house training course.
5. Mass spectrometry: One year with satisfactory completion of a vendor's training course, professional sponsored short course, or equivalent in-house training course.

6. Mass spectra interpretation: One year with satisfactory completion of a vendor's training course, professional sponsored short course, or equivalent in-house training course.
7. General chemistry and instrumentation: Six months.
8. Field testing: Six months.
9. Sample collection: Six months.
10. Analyst/Technician. Analysts/technicians shall have completed a training course (or an equivalent in-house course) in relevant analyses and have demonstrated ability to produce reliable results through accurate analysis of reference materials, proficiency testing samples, or in-house quality control samples. Their performance must be documented. Junior level staff (non-degreed personnel with less than 3 years relevant experience) must work under the direct supervision of the technical manager, or under the supervision of a senior technical person described above or under the instruction of an analyst/technician who has performed successfully over a period of three years in the relevant analyses using the same technologies being applied for the analysis of environmental samples.

3.1.2 Minimum Level of Experience Required for Independent Operation

1. Sample Preparation: 3 months per method used.
2. Routine sample analysis: 6 months per method used.

3.1.3 Requirements during Training

Analysts/technicians in training may perform work on samples submitted for environmental analysis as long as the following conditions are met:

1. They have demonstrated the ability to produce reliable results through accurate analysis of reference materials, proficiency testing samples or in-house quality control samples; and
2. Their immediate supervisor or instructor is readily available in their work area when they are preparing and/or analyzing the samples.

3.2 Regulatory Requirements

The United States Environmental Protection Agency (EPA) requires that laboratories generating data implement minimum procedures which assure that the precision, accuracy, completeness and representative of its data are known and documented. In addition, the laboratory must specify the minimum quality levels which data must meet in order to be acceptable for a specific regulatory program. Quality Systems include all quality assurance (QA) policies and quality control (QC) procedures, which shall be delineated in a Quality Manual and followed to ensure and document the quality of the analytical data. Laboratories seeking accreditation under the National Environmental Laboratory Accreditation Program (NELAP) must assure implementation of all QA policies and the essential applicable QC procedures specified in the Chapter 5.0, Quality Systems of the current NELAC standard. This Comprehensive Quality Assurance Plan is adopted to insure that Heritage meets these responsibilities.

The EPA has established specific requirements for the development of Quality Assurance Project Plans. All Quality Assurance Project Plans must address sixteen specific areas, which are outlined in QAMS-005/80 "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans". This Comprehensive Quality Assurance Plan contains those 16 points. In addition, this plan meets the NELAP, ISO 9001:2000, ANSI/ASQ-E4 and ISO 1011 standards.

This Comprehensive QAP is generic in nature and summarizes the criteria/procedures used under standard operating conditions. Different Data Quality Objectives (DQO's) may require a specific project plan utilizing the basic procedures set forth in this comprehensive plan. This Comp QAP covers all samples submitted to the laboratory <u>except</u> those samples requiring different DQO's as specified by the client. The Laboratory Director, QA Officer, Senior Chemists or the Senior QA Officer must approve all exceptions to this Comp QAP. The certificate of analysis should contain a statement to reflect this deviation from the Comp QAP.

It shall be the policy of Heritage Environmental Services, to work to minimize the use of data qualifiers, notwithstanding the requirement of certification programs. It is recognized that the use of such qualifiers makes reports difficult to use and to understand. The same shall be true in reporting the results of organic surrogate analyses.

3.3 <u>Scope And Summary Of Operations</u>

Heritage Environmental Services, Limited Liability Company, Commercial Laboratory Division is a commercial testing laboratory, organized in the State of Indiana. Heritage Environmental Services, LLC Commercial Laboratory Division is a privately owned company, specializing in the analysis of drinking water, groundwater, surface and wastewater as well as solid and hazardous wastes. Heritage's commercial laboratory is in Indianapolis, Indiana. Heritage also staffs service centers in Tulsa, Oklahoma; Lemont, Illinois; Charlotte, North Carolina; Kansas City, Missouri and Louisville, Kentucky. These service centers serve as a base for sample collection and receiving for shipment to our laboratory. All laboratory service centers operate under the same Standard Operating Procedures (SOPs) and are in direct communication with each other through a single Laboratory Information Management System (LIMS). All final data from the laboratory is accessible through LIMS to all other service centers.

Heritage utilizes a system of project managers. Project Managers will review all new work and proposed projects with laboratory management to ensure that Heritage has the appropriate facilities and resources before commencing the work. This requirement is to ensure that the laboratory has the *capacity* to perform additional work of the kind it is currently performing and also that it is *capable* of performing new work of a kind not now being done. Consideration should be given to:

a. Customer's requirements for accuracy and turn-around-time;
b. The range of tests normally performed;
c. Available resources including equipment, staff, and space;
d. Workload

Evidence of this review will be recorded and will vary in form, depending on the uniqueness and complexity of the project. The most routine projects (routine tests, routine turn-around time,

resources, quality objectives and workload) will be documented via a signed quotation and/or telephone notes. Refer to Heritage SOP GP-16.1, Technical and Managerial Review of Project Specified Analytical Laboratory Operation and Data Package Preparation, Effective Date February 17, 1998. As the SOP describes, Project Manager documentation consists of meeting notes, telephone logs, copies of proposals, contracts, signed quotes, etc. indicating that the specifications of the project were evaluated and accepted by the laboratory. All rush samples require approval of the laboratory director or the group supervisor in charge of the tests to be performed. This rush approval will be documented either by email or by use of a written form called an APF.

Each project manager is responsible for reviewing and approving completeness of final data reports relating to their assigned project. The Quality Assurance Unit is responsible for assuring that all final Certificates of Analysis are reviewed, meet the NELAC or other special requirements and are of the required quality. This system of dedicated project managers and quality assurance staff insures that the client's specific DQO's are met.

3.4 Confidentiality

Heritage guarantees the confidentiality of data. From consultation to reporting, Heritage takes the steps required to maintain the security of all projects. Heritage shall comply with any court order, subpoena or regulatory order.

3.5 Record Keeping System, Design & Control of Documents Policy

As outlined in the Heritage Statement of Operations and Quality Assurance Policy, procedures must be uniquely defined in operation specific SOPs. These SOPs are subject to change without notice, but will not be less stringent than the requirements of this QAP. Where appropriate, these SOPs have been referenced or summarized in this document. All SOPs and this QAP will be internally controlled, each document having a unique copy number. If controlled in electronic format, documents will be available on-line and can be printed only with a qualification to check the electronic version for the most current version.

The effective date of the Comprehensive QAP (Quality Manual) is the date signed by the Senior Vice-President of Heritage Environmental Services, LLC. This Comp QAP will be reviewed and revised as necessary and at least annually by the QA unit or designee of the QAO and presented to management for consideration and approval. Major revisions will be forwarded to appropriate holders of controlled copies.

The record keeping system allows historical reconstruction of all laboratory activities that produced the resultant sample analytical data. The history of the sample will be readily understood through the documentation, including interlaboratory transfers of samples and/or extracts. All records include the identity of personnel involved in sampling, preparation, calibration and testing. The record keeping system facilitates the retrieval of all working files and archived records for inspection and verification purposes.

All documentation entries are signed or initialed by responsible staff. The reason for the signature or initials will be clearly indicated in the records (e.g., sampled by, prepared by, reviewed by, etc.). All generated data, except those that are generated by automated data collection systems are recorded directly, promptly and legibly in permanent ink. Entries in records are not obliterated by methods such as erasures, overwritten files or markings. All corrections errors are made by drawing one line through the error. The individual making the error correction initials and dates the correction. These criteria also apply to electronically maintained records. Refer to Heritage SOP D-2.0, Error Correction on Laboratory Documents.

Records of testing will be maintained for a minimum of five years.

4.0 Organization and Responsibility

4.1 Introduction

Heritage Environmental Services, LLC-Commercial Laboratory Operations is an environmental analytical chemistry laboratory. Heritage can perform composite and grab wastewater sampling, surface water sampling, solid and hazardous waste sampling, and drinking water sampling for those clients desiring this service. Other types of sampling may be offered depending on the equipment required and the hazards involved.

4.2 Laboratory Management

4.2.1 The President

The president of Heritage Environmental Services, LLC shall:

a. Assure that the Senior Vice President, Business Line Managers, Senior Quality Assurance Officer, and Corporate Sales Personnel clearly understand their functions and responsibilities and have the authority and resources needed to discharge their duties.
b. Assure the laboratory is organized in such a way that its personnel are free from any commercial, financial and other pressures, which might adversely affect the quality of their work.
c. Provide adequate budget for equipment, facilities and people.

4.2.2 Midwest Business Line Manager

The Midwest Business Line manager shall:

a. Designate a Laboratory Director who has overall responsibility for the technical operation of the environmental testing laboratory.
b. Replace the Laboratory Director should such replacement become necessary.
c. Assure that personnel, resources, facilities, equipment, materials and methodologies are known and available as scheduled.
d. Establish, maintain, and enforce procedures for contract and purchase order review.

4.2.3 Senior Vice President

The Senior Vice President shall:

a. Establish and review HCLO Quality Policy.
b. Review and approve a Quality Assurance Plan (Quality Manual).

c. Assure there is a designated Senior Quality Assurance Officer.
d. Assure that any deviation from this policy reported by the Quality Assurance Officer is communicated to the Laboratory Director and corrective actions are taken and documented.
e. Assure that the quality system is reviewed at least once a year by the management (other than the Quality Assurance Officer) to ensure its continuing suitability and effectiveness and to introduce any necessary changes or improvements. Assure that all review findings and any corrective actions that arise from them are documented.

4.2.4 Laboratory Director

The Laboratory Director shall have overall responsibility for the operations of the laboratory and represents the single point of control for the laboratory. The Laboratory Director shall assure that:

a. Analytical procedures, including changes are approved, followed, and documented.
b. Test data are accurately recorded and verified.
c. Analytical procedures are performed as specified in the approved protocol(s).
d. Training and training records are kept up to date.
e. Raw data is appropriately archived.
f. Operational policies stated in this document are followed.
g. Laboratory waste is properly disposed.
h. Assures that the laboratory is maintained and kept clean.
i. All laboratory personnel clearly understand the functions they are to perform.
j. Systems established by management are used and enforced.
k. Approve Standard Operating Procedures as required.
l. Provide safety training and assure compliance with safety procedures and policies.
m. Ensure that all sample acceptance criteria are verified and that samples are logged into the sample tracking system and properly labeled and stored.
n. Supervision of all personnel employed by the laboratory.

4.2.5 Senior Quality Assurance Officer

The company shall have a Senior Quality Assurance Officer (SQAO) who shall be responsible for monitoring the performance of all groups in the laboratory. The QA Officer shall have documented training and/or experience in QA/QC procedures and be knowledgeable in the quality system as defined under NELAC. It shall be the responsibility of the SQAO to assure management that the facilities, equipment, personnel, methods, practices, records and controls are in conformance with this

policy, with NELAC and with the Quality Assurance Plan (QAP) then in effect. The SQAO is separate from the personnel performing analyses. The SQAO shall:

a. Recommend HCLO Quality Policy;
b. Maintain and ensure compliance with the QAP;
c. Serve as the focal point for QA/QC and be responsible for the oversight and/or review of quality control data;
d. Maintain the original protocols (Standard Operating Procedures);
e. Audit or arrange an internal audit of the entire technical operation of the laboratory at a minimum of annually to ensure systems and performance and maintain written and properly signed records of each inspection in compliance with the QAP;
f. Notify laboratory management of deficiencies in the quality system and monitor corrective action;
g. Evaluate data objectively and perform assessments without outside (e.g., managerial) influence;
h. Submit to management annual written status reports on the laboratory noting any problems and corrective actions, and report to the SVP any ongoing quality issues or problems as well as any awards or citations within seven (7) calendar days of discovery;
i. Determine that no deviations from procedures were made without proper authorization and documentation;
j. Audit (or cause to be audited) suppliers of services and supplies for conformance to quality requirements.
k. Have a general knowledge of the analytical test methods for which data review is performed;
l. Promptly notify management if any issues arise relating to work-related undue pressures which would compromise the quality of work;

4.3 Quality Assurance Policy Principles

Several principles underlie the Quality Assurance Policy. These principles are:

- Defensible Data
- Documented Analytical Methods
- Sample Control
- Equipment Calibration
- Training and Training Documentation
- Internal and External Assessments
- Data Integrity

4.3.1 Defensible Data

Data shall be generated, recorded and archived in such a way that it will withstand challenge. All reported information shall be accurate and properly documented. By correct use of traceable calibration standards, verification standards, blanks, method blanks, duplicates, spikes and spike duplicates, the Company shall obtain and record data necessary to demonstrate that analytical systems remain in control for all sample data reported.

4.3.1.1 Computerized data records must follow strict guidelines for security and defensibility. These guidelines are established in the Good Automated Laboratory Practices and NELAP standards.

4.3.1.2 Defensible data includes the use of analytical methods which are appropriate and adequate. Analytical methods used will be strictly adhered to and any deviations will be documented and reported; these deviations are subject to approval of the QAO and the Senior Chemist(s).

4.3.1.3 Defensible data includes adherence to pre-analytical holding time requirements. Wisconsin Administrative Code NR149.11(s) specifically requires flagging of any holding time violation. The State of Wisconsin further considers "recommended" holding times as required holding times.

Heritage will adhere to the requirement for the flagging of any holding time violation for those states or organizations requiring such flagging.

4.3.1.4 Defensible data includes the laboratory analyst's demonstration of their ability to generate data of acceptable precision and accuracy, in addition to the laboratory demonstration of detection limits. MDLs must be approved and performed at the required frequency and kept on file. See Section 11.0, Figure 11.3, IDL/MDL Reporting Form.

4.4 Organizational Charts/Job Descriptions (Appendix E)

The managing member and majority owner of Heritage Environmental Services. LLC is Heritage Environmental Services, Inc. Heritage Environmental Services, LLC was incorporated on April 14, 1998 in the State of Indiana. Heritage Environmental Services, Inc. is a privately held corporation and was incorporated

on March 6, 1970 in the State of Indiana. The Federal Tax I.D number is 35-2044218. The officers of Heritage Environmental Services, LLC are:

Dr. Kenneth S. Price, President and Chief Executive Officer
Jeff Baetzel, Vice President Finance
Gary F. Lindgren, Vice-President Compliance

Job Descriptions of all key personnel within Heritage –Commercial Lab Operations are contained in Appendix E. Company Organizational Charts are provided in the figures listed below.

Commercial Lab Operations	Figure 4.1
Indianapolis--Lab Operations	Figure 4.2
Operations Management	Figure 4.3

4.5 Deputies to Cover Absences

In the event of the absence of a key person, the authority for that position will generally rest with the next in line, the staff member with the most seniority, as per the Heritage Organizational Charts.

Specific lines of authority exist for the following positions:

4.5.1 In the absence of all Senior Chemists, the QAO will fill that position until the return of a Senior Chemist, unless otherwise delegated by the Laboratory Manager.

4.5.2 In the absence of the Senior Quality Assurance Officer the QA Officer will fill that position until the return of the Senior QA Officer. In the absence of all QA Unit staff, the Senior Vice-President will cover those duties until the return of the Senior QA Officer, the QA Officer or the QA Unit staff.

4.5.4 In the absence of the Laboratory Director, the Senior Vice-President of Heritage will manage the laboratory until the return of the Laboratory Director.

4.6 Ethics and Data Integrity

The following statements are presented to all laboratory employees at the time of employment for signature in order to insure they understand the high standards of integrity related to employment:

I. I, _____ certify and attest that there are no commercial, financial or other pressures that could adversely affect the quality of my work at Heritage Environmental Services, LLC, Commercial Laboratory Operations. Any potential conflict of interest arising will be brought to the

attention of the laboratory manager immediately. Failure to do so may result in disciplinary action, including termination for cause.

II. I state that I understand the high standards of integrity required of me with regard to the duties I perform and the data I report in connection with my employment at Heritage Environmental Services, LLC, Commercial Laboratory Operations.

III. I agree that in the performance of my duties at Heritage Environmental Services, LLC, Commercial Laboratory Operations:

a. I shall not intentionally report data values that are not the actual values obtained;
b. I shall not intentionally report the dates and times of data analyses that are not the actual dates and times of data analyses; and
c. I shall not intentionally represent another individual's work as my own.

IV. I agree to inform Heritage Environmental Services, LLC, Commercial Laboratory Operations of any accidental reporting of non-authentic data by myself in a timely manner.

V. I agree to inform Heritage Environmental Services, LLC, Commercial Laboratory Operations of any accidental or intentional reporting of non-authentic data by other employees.

Signed _____ Date: _____

The above certification must be signed as a condition of employment. Copies of the signed certifications are maintained by the QA Unit.

4.6.1 Ethical and Legal Training Procedures

As listed above in the employee ethics agreement, all personnel have ethical and legal responsibilities in the work performed. A training program has been developed by Heritage, which covers the significant aspects of the Quality Manual, and including training on the potential punishments and penalties for improper, unethical or illegal actions. All lab employees will receive this initial training and every new employee will receive data integrity training as a formal part of new employee orientation. Updated training on ethics and the policies of the laboratory will be held at an annual frequency effective July 1, 2004 with the implementation of the July 12, 2002 standard. At that time, topics covered shall be documented in writing and provided to all trainees. Key topics covered during training must include organizational mission and its relationship to the critical need for honesty and full disclosure in all analytical reporting, how and when to

report data integrity issues, and record keeping. Training shall include discussion regarding all data integrity procedures, data integrity training documentation, in-depth data monitoring and data integrity procedure documentation.

Employees are required to understand that any infractions of the laboratory data integrity procedures will result in a detailed investigation that could lead to very serious consequences including immediate termination, debarment or civil/criminal prosecution. The initial data integrity training and the annual refresher training shall have a signature attendance sheet or other form of documentation that demonstrates all staff have participated and understand their obligations related to data integrity. Senior managers acknowledge their support of these procedures by 1) upholding the spirit and intent of the organization's data integrity procedures and 2) effectively implementing the specific requirements of the procedures.

Specific examples of breaches of ethical behavior should be discussed including improper data manipulations, adjustments of instrument time clocks, and inappropriate changes in concentrations of standards. Data integrity training requires emphasis on the importance of proper written narration on the part of the analyst with respect to those cases where analytical data may be useful, but are in one sense or another partially deficient. The data integrity procedures may also include written ethics agreements, requirements for external ethics program training, and any external resources available to employees.

In-depth, periodic monitoring of data integrity will be performed with every data audit performed on a test by the QA Unit. Any discrepancies identified as a result of a data audit (however initiated) are investigated immediately and corrective actions taken.

4.6.2 Confidential Reporting of Data Integrity Issues

Heritage has provided a mechanism for confidential reporting of data integrity (or any other issues) by accessing a confidential voice-mail box. Any employee may call 1-800-566-2432, and extension #9151 to report any issues or concerns without fear of reprisal. In instances of ethical concern, the laboratory director, senior Vice-President or QA Officer will be notified of the need for further detailed investigation.

Figure 4.1
Heritage Environmental Services, LLC
Commercial Laboratory Operations

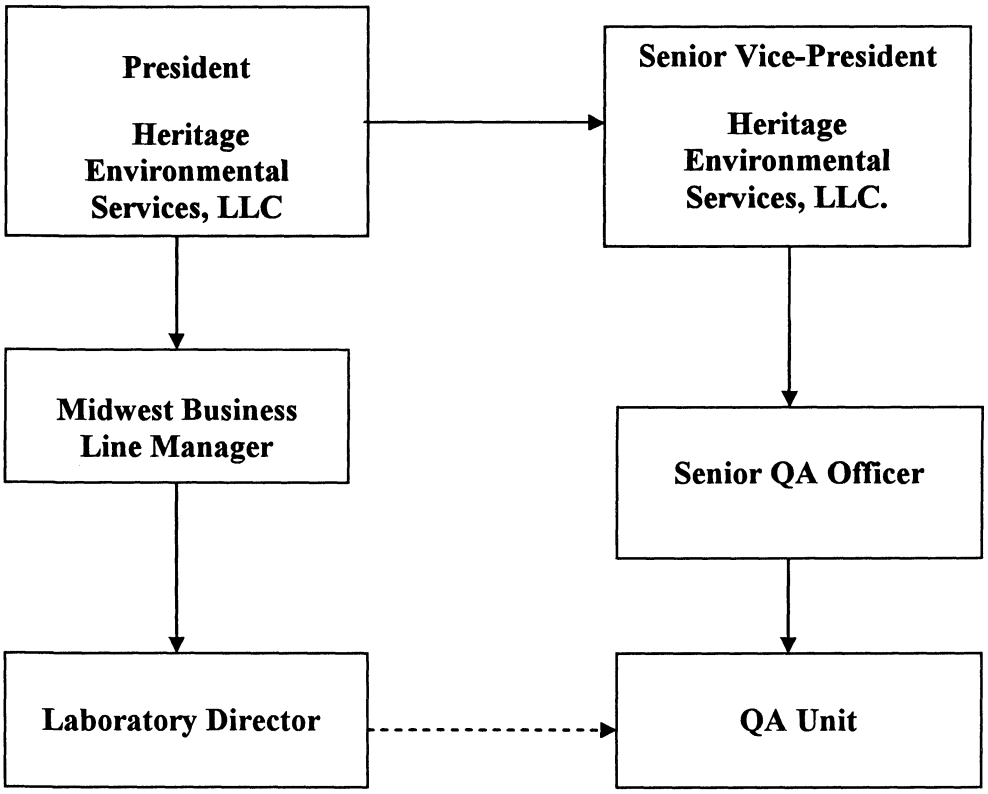


Figure 4.2
ORGANIZATION CHART
Heritage Environmental Services, LLC
COMMERCIAL LABORATORY OPERATIONS
Indianapolis, Indiana

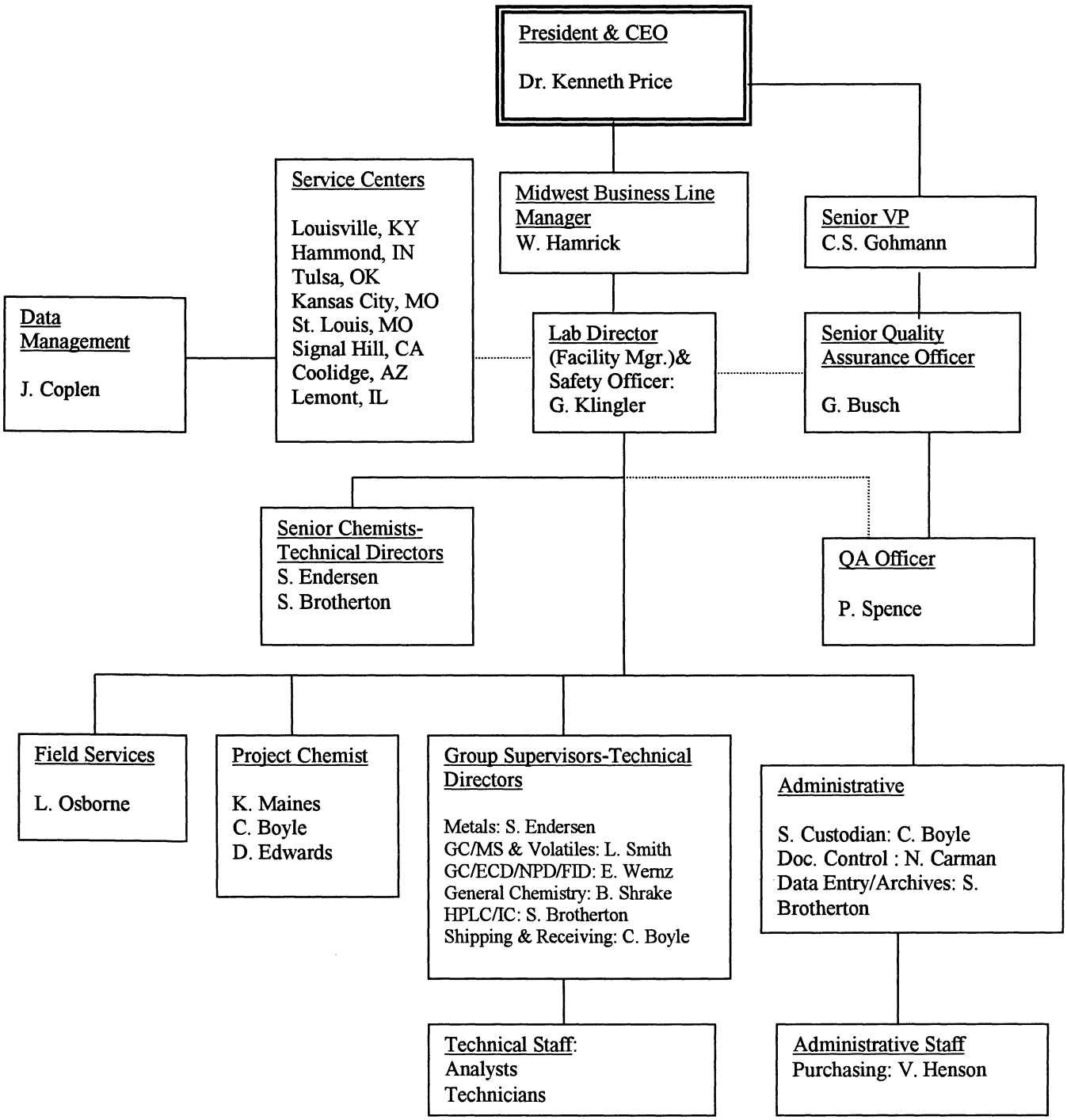
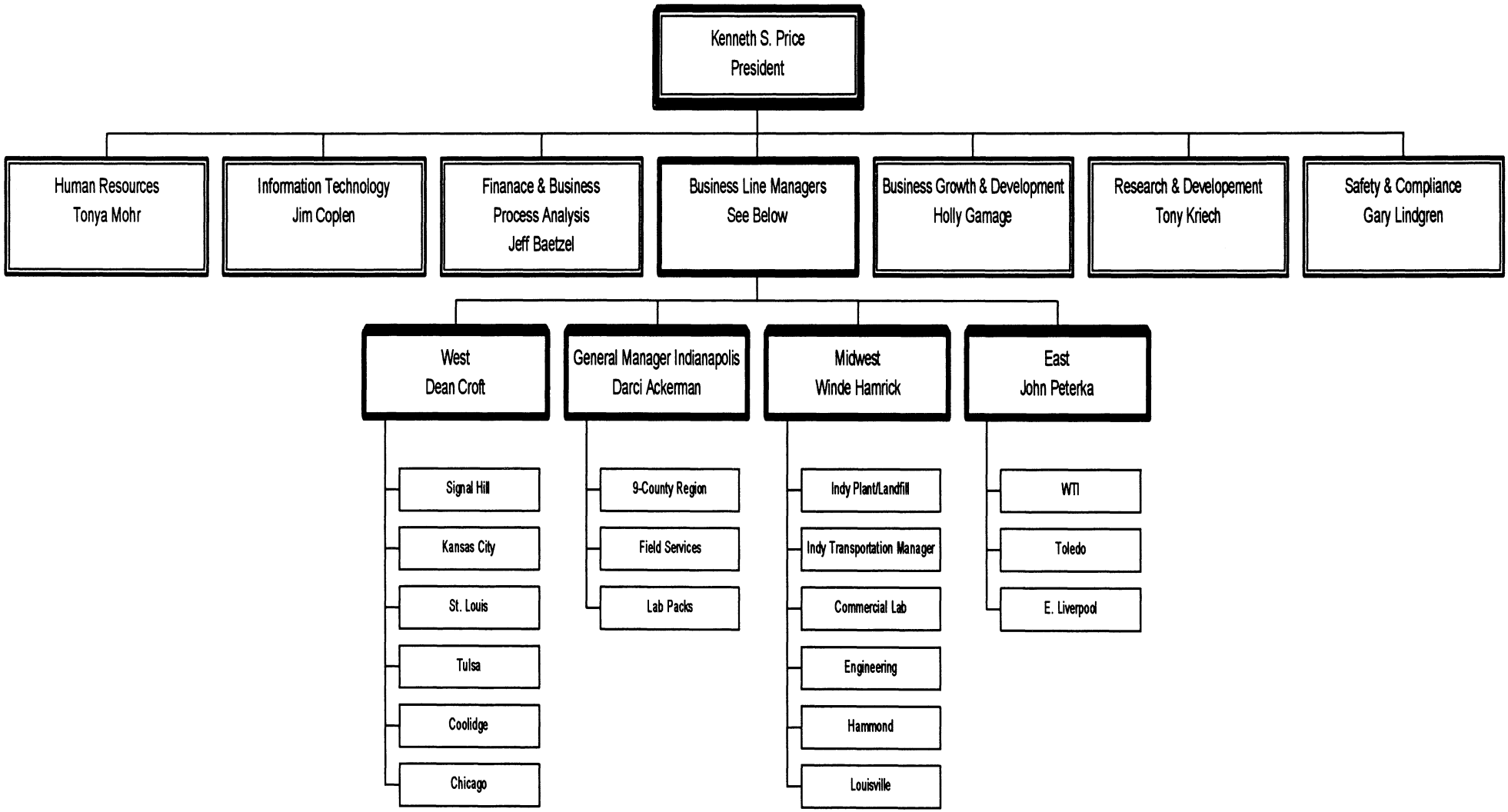


Figure 4.3
Corporate Organizational Chart

Heritage Environmental Services, LLC



5.0 QA Targets for Precision, Accuracy and Method Detection Limits

5.1 QA Targets and Method Detection Limits

The method detection limits (MDLs) and practical quantitation limits (PQLs, EQLs, LOQs or reporting limits) for routine methods performed by Heritage are detailed in the following Tables. The Tables are broken down into different regulatory program areas. The MDLs listed are not necessarily the latest study and the reporting limits may also vary depending on client needs.

Table 5.1, RCRA-SW846 Method Detection and Practical Quantitation Limits contains methods routinely used for testing samples of (but not limited to) groundwater and solid and hazardous waste. The Resource Conservation and Recovery Act (RCRA) utilizes methods (some are mandatory) published in the guidance document, SW-846, Test Methods For Evaluating Solid Wastes, Physical/Chemical Methods.

Table 5.2, CWA and SDWA Method Detection and Practical Quantitation Limits for EPA Methods and Table 5.3, CWA and SDWA Method Detection and Practical Quantitation Limits for Standard Methods, contains methods routinely used for testing samples (but not limited to) of waste water effluents, drinking water from surface and ground water and waste water treatment sludges. The Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA) utilize EPA, ASTM, Standard Methods, etc. published methods. The SDWA requires updated versions of many of the methods required by the CWA program.

Table 5.4, US EPA Contract Laboratory Program Practical Quantitation Limits contains the methods used for Routine Analytical Services (RAS) testing under contract to the US EPA. Heritage is not a direct EPA contractor at this time, but does offer these methods to commercial and industrial clients and to State regulatory agencies needing CLP analysis and reporting. The specific reportables must be negotiated, as the CLP is only a "contract" between laboratories and EPA. This table does not contain MDL data – MDLs are not a CLP program requirement.

Precision and accuracy control limits and detection limits are developed internally. Precision and accuracy control charts will be updated frequently and those control limits will be used where applicable and required by the testing methodology being employed. SW-846 requires control-charting using a laboratory's internally developed QC limits. Deviations from established criteria must be addressed in individual project plans, if required.

5.2 Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference value. Accuracy in the field is assessed through the use of field and trip blanks and through the adherence to all sample handling, preservation and holding times. Laboratory accuracy is assessed through the analysis of matrix spikes (MS) or standard reference materials (SRM) and the determination of percent recoveries. The equation to be used for accuracy can be found in section 11.0 of this QAP.

5.3 Precision

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates at a rate of 1 duplicate per 10 analytical samples. Precision in the laboratory is assessed through the calculation of relative percent difference (RPD) for 2 replicates and relative standard deviations (RSD) for three or more replicate samples. The equations to be used for precision can be found in section 11.0 of this QA Plan.

5.4 Quality Objectives and Criteria for Measurement Data

The Data Quality Objective (DQO) Process is a series of planning steps based on the Scientific Method that is designed to ensure that the type, quality and quantity of environmental data used in decision making are appropriate for the intended application. The steps of the DQO process are included in Figure 5.1, The Data Quality Objectives Process.

DQO's are qualitative and quantitative statements derived from outputs of each step of the DQO Process that:

- Clarify the study objective;
- Define the most appropriate type of data to collect;
- Determine the most appropriate conditions from which to collect the data;

The DQO's are then used to develop a scientific and resource-effective sampling design. The DQO process allows decision-makers to define their data requirements and acceptable levels of decision during planning before any data are collected. DQO's should be based on the seven-step process described in EPA QAG-4 (September 1994) document and outlined in Figure 5.1.

5.5 Comprehensive Laboratory Criteria for Measurement Data: Objectives

This QA Plan is comprehensive and generic in nature, which does not lend itself to the DQO process. The laboratory has established generic precision and

accuracy objectives, to be used when the DQO process has not been utilized. These generic objectives are given in Table 5.5, Matrix Accuracy (% Recovery) Control Criteria and Table 5.6, Matrix Precision (RPD) Control Criteria. Since sample precision and accuracy data are matrix and method dependent, these objectives are "targets" or "goals". Users of laboratory services should not establish their project QC acceptance criteria based on laboratory QC limits, but should base them on their specific data quality requirements. In most cases Heritage's generic precision and accuracy objectives will meet project requirements.

The generic objectives given in Tables 5.5 and 5.6 will not be used to reject data that meets the specifications for matrix spiking accuracy and precision as specified by a particular analytical method (see Section 12.0 for method specific criteria) or as determined from lab generated criteria from 20 or more data points. Additionally, the generic acceptance criteria will not be used for SW-846 methods that specify acceptance criteria or where the method lists acceptance criteria but a regulatory agency or customer requires acceptance criteria based on internally generated limits. Sample analysis for the State of Wisconsin and Arizona (non-NELAC states) requires establishing control limits based on historical performance for matrix spikes, surrogates, and replicates, unless specific limits are established by the methodology being used. Therefore, there are two options for these states: method criteria (if established) and lab generated control limits.

Statistical Process Control (SPC) will be utilized by Heritage as a continuous improvement tool in cases where specifications or method defined limits are permitted. Where permitted, the statistical process control criteria will be used to take corrective actions, but will not be used to reject data within specifications (method, generic or project specifications).

The capability of a method is directly related to the ability of the method to produce data within specification limits (generic limits, project limits). There will be cases where the method is incapable of overcoming matrix interferences and cannot meet established spiking and precision criteria. The results of the LCS/LFB determines the batch or run acceptance, not the MS/MSD results. Specific samples failing MS/MSD criteria will be qualified on the report for the samples spiked only. Matrix spike and duplicate results not meeting established criteria may be reported with qualification (qualifiers, comments, flags, etc.) only after both of the following conditions are met:

- The QC check samples or LCS/LFB meet acceptance criteria, which demonstrates that the method is performing within criteria.
- Best professional judgement determines that a reanalysis will not produce results meeting method specifications with the methods available to the laboratory.

All QC data is entered into LIMS with the exception of incorrect data (failures due to known cause). The validity (usability) and the completeness of the results will be left for the sample submitter to evaluate in the few cases (less than 5% of all data reported) where interference and other matrix problems cannot be overcome by the methods employed. Tests for outliers are discussed in Section 11.4.3. Outliers are excluded from the calculation of control criteria. Only data points that fail due to known causes or data points that are excluded based on the test for outliers may be excluded from the QC database.

The variance of the analytical method changes as the analyte concentration increases from the MDL. Precision and accuracy will be evaluated as a function of concentration when comparing the QC data obtained for an analytical batch versus the QC targets arrived at from the database. Concentrations of analyte less than 10 times the reporting detection limit (PQL) present in non-spiked (lab duplicate) samples will not be considered as out of control based on the same criteria developed from spiked samples (samples spiked at greater than 10 times the PQL). See Table 5.5, Matrix Precision (RPD) Control Criteria.

5.6 Completeness, Representativeness and Comparability

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that Heritage will provide data meeting QC acceptance criteria for 95 percent or more of all samples tested. Following completion of the analytical testing, the percent completeness can be calculated by the following equations:

$$Completeness = \frac{(numberofvaliddata)}{(\#\,ofsamplecollected\,/\,eachparameteranalyzed)} \times 100$$

Representative results expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition or an environmental condition. Representativeness is a qualitative parameter, which is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network should be designed to provide data representative of site conditions. During development of this network, consideration is given to past waste disposal practices, existing analytical data, physical setting and processes, and constraints inherent to the program. The rationale of the sampling network may be discussed in detail in a field-sampling plan (FSP). Representativeness will be satisfied by insuring that proper sampling technique are used, proper analytical procedures are followed and holding times of the samples are not exceeded in the laboratory. Representativeness will be assessed by the analysis of field duplicate samples.

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as documented in the QAPjP, are expected to provide comparable data. The new analytical data, however, may not be directly comparable to existing data because of differences in procedures and QA objectives.

5.6 Level of Quality Control Effort

Field blank, trip blank, method blank, duplicate, standard reference materials (SRM) and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. Field and trip blanks consisting of distilled or deionized or reverse osmosis ultra-pure water will be submitted to the laboratory to provide the means to assess the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for procedural contamination at the facility which may cause sample contamination.

Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. Trip blanks generally pertain to volatile organic samples only, as only volatiles have the tendency to pass through container seals. Trip blanks are prepared prior to the sampling event in the actual sample containers and are kept with the investigative samples throughout the sampling event. They are then packaged for shipment with other samples and sent for analysis. There should be one trip blank included in each sample shipping container. At no time after their preparation are the trip blank sample containers opened before they reach the laboratory.

Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures. For volatile organics, holding blanks are rotated in the volatile storage coolers every two weeks. Any suspect volatile result may be investigated by analysis of holding blanks. Duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the digestion and measurement methodology. Matrix spikes that are performed in duplicate are hereinafter referred to as MS/MSD samples. Sufficient sample volume should be collected to allow one matrix spike/matrix spike duplicate for every 20 or fewer investigative samples. The general level of the QC effort will be one field duplicate and one field blank for every 10 or fewer investigative samples. One volatile organic analysis (VOA) trip blank consisting of distilled deionized ultra pure water will be included along with each shipment of aqueous VOA samples.

Figure 5.1

The Data Quality Objectives Process

1. STATE THE PROBLEM
Summarize the contamination problem that will require new environmental data and identify the resources available to resolve the problem.

↓

2. IDENTIFY THE DECISION
Identify the information needed to support the decision and data to address the contamination problem.

↓

3. IDENTIFY INPUTS TO THE DECISION
Identify the information needed to support the decision, and specify which inputs require new environmental measurements.

↓

4. DEFINE THE STUDY BOUNDARIES
Specify the spatial and temporal aspects of the environment media that the data must represent to support the decision.

↓

5. DEVELOP A DECISION RULE
Develop a logical "if . . . then . . ." statement that defines the conditions that would cause the decision-maker to choose among alternative actions.

↓

6. SPECIFY LIMITS ON DECISION ERRORS
Specify decision maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data.

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-1010			1	IGNITABILITY (PENSKY-MARTENS)	<140	DEG F	NA
SW846-1010			4	IGNITABILITY (PENSKY-MARTENS)	<140	DEG F	NA
SW846-1010			5	IGNITABILITY (PENSKY-MARTENS)	<140	DEG F	NA
SW846-1020A			1	IGNITABILITY (SETA-FLASH)	<140	DEG F	NA
SW846-1020A			4	IGNITABILITY (SETAFLASH)	<140	DEG F	NA
SW846-1020A			5	IGNITABILITY (SETAFLASH)	<140	DEG F	NA
SW846-1030			5	IGNITABILITY (SOLIDS)	NA		NA
SW846-1311	(TCLP)		1	1,1,1-TRICHLOROETHANE	5	UG/L	NA
SW846-1311	(TCLP)		1	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	5	UG/L	NA
SW846-1311	(TCLP)		1	1,1-DICHLOROETHYLENE	5	UG/L	NA
SW846-1311	(TCLP)		1	1,2-DICHLOROBENZENE	10	UG/L	NA
SW846-1311	(TCLP)		1	1,2-DICHLOROBENZENE	5	UG/L	NA
SW846-1311	(TCLP)		1	1,2-DICHLOROETHANE	5	UG/L	NA
SW846-1311	(TCLP)		1	1,4-DICHLOROBENZENE	10	UG/L	NA
SW846-1311	(TCLP)		1	2,4,5-TRICHLOROPHENOL	10	UG/L	NA
SW846-1311	(TCLP)		1	2,4,6-TRICHLOROPHENOL	10	UG/L	NA
SW846-1311	(TCLP)		1	2,4-DICHLOROPHENOXYACETIC ACID	10	UG/L	NA
SW846-1311	(TCLP)		1	2,4-DINITROTOLUENE	10	UG/L	NA
SW846-1311	(TCLP)		1	2-METHYLPHENOL (O-CRESOL)	10	UG/L	NA
SW846-1311	(TCLP)		1	3-METHYLPHENOL (M-CRESOL)	10	UG/L	NA
SW846-1311	(TCLP)		1	4-METHYLPHENOL (P-CRESOL)	10	UG/L	NA
SW846-1311	(TCLP)		1	ACETONE (2-PROPANONE)	20	UG/L	NA
SW846-1311	(TCLP)		1	BENZENE	5	UG/L	NA
SW846-1311	(TCLP)		1	CARBON DISULFIDE	5	UG/L	NA
SW846-1311	(TCLP)		1	CARBON TETRACHLORIDE	5	UG/L	NA
SW846-1311	(TCLP)		1	CHLORDANE	2.5	UG/L	NA
SW846-1311	(TCLP)		1	CHLOROBENZENE	5	UG/L	NA
SW846-1311	(TCLP)		1	CHLOROFORM	5	UG/L	NA
SW846-1311	(TCLP)		1	COPPER	0.02	MG/L	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-1311	(TCLP)		1	CYCLOHEXANONE	0.125	MG/L	NA
SW846-1311	(TCLP)		1	DECACHLOROBIPHENYL (DCB)	NA	% REC	NA
SW846-1311	(TCLP)		1	DICHLOROMETHANE (METHYLENE CHLORIDE)	5	UG/L	NA
SW846-1311	(TCLP)		1	ENDRIN	0.5	UG/L	NA
SW846-1311	(TCLP)		1	ETHYL ACETATE	5	UG/L	NA
SW846-1311	(TCLP)		1	ETHYL BENZENE	5	UG/L	NA
SW846-1311	(TCLP)		1	ETHYL ETHER	5	UG/L	NA
SW846-1311	(TCLP)		1	GAMMA-BHC (LINDANE)	0.25	UG/L	NA
SW846-1311	(TCLP)		1	HEPTACHLOR	0.25	UG/L	NA
SW846-1311	(TCLP)		1	HEPTACHLOR EPOXIDE	0.25	UG/L	NA
SW846-1311	(TCLP)		1	HEXACHLOROBENZENE	10	UG/L	NA
SW846-1311	(TCLP)		1	HEXACHLOROBUTADIENE	10	UG/L	NA
SW846-1311	(TCLP)		1	HEXACHLOROETHANE	10	UG/L	NA
SW846-1311	(TCLP)		1	ISOBUTANOL (ISOBUTYL ALCOHOL)	5	MG/L	NA
SW846-1311	(TCLP)		1	METHANOL	0.25	MG/L	NA
SW846-1311	(TCLP)		1	METHOXYCHLOR	2.5	UG/L	NA
SW846-1311	(TCLP)		1	METHYL ETHYL KETONE	10	UG/L	NA
SW846-1311	(TCLP)		1	METHYL ISOBUTYL KETONE	10	UG/L	NA
SW846-1311	(TCLP)		1	METHYLPHENOLS (CRESOLS)	10	UG/L	NA
SW846-1311	(TCLP)		1	N-BUTYL ALCOHOL	5	MG/L	NA
SW846-1311	(TCLP)		1	NICKEL	0.03	MG/L	NNAA
SW846-1311	(TCLP)		1	NITROBENZENE	10	UG/L	NA
SW846-1311	(TCLP)		1	PENTACHLOROPHENOL	50	UG/L	NA
SW846-1311	(TCLP)		1	PYRIDINE	50	UG/L	NA
SW846-1311	(TCLP)		1	SILVEX (2,4,5-TP)	1.0	UG/L	NA
SW846-1311	(TCLP)		1	SOLIDS	0.1	PERCENT	NA
SW846-1311	(TCLP)		1	TETRACHLOROETHENE	5	UG/L	NA
SW846-1311	(TCLP)		1	TETRACHLOROETHYLENE	5	UG/L	NA
SW846-1311	(TCLP)		1	TOLUENE	5	UG/L	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-1311	(TCLP)		1	TOXAPHENE	5	UG/L	NA
SW846-1311	(TCLP)		1	TRICHLOROETHENE	5	UG/L	NA
SW846-1311	(TCLP)		1	TRICHLOROETHYLENE	5	UG/L	NA
SW846-1311	(TCLP)		1	TRICHLOROFLUOROMETHANE	5	UG/L	NA
SW846-1311	(TCLP)		1	VINYL CHLORIDE	10	UG/L	NA
SW846-1311	(TCLP)		1	XYLENES (O/M/P-XYLENE)	5	UG/L	NA
SW846-1311	(TCLP)		1	ZINC	0.05	MG/L	NA
SW846-1311	(TCLP)		4	1,1,1-TRICHLOROETHANE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	1,1-DICHLOROETHYLENE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	100	MG/L	NA
SW846-1311	(TCLP)		4	1,2-DICHLOROETHANE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	ACETONE (2-PROPANONE)	2.5	MG/L	NA
SW846-1311	(TCLP)		4	BENZENE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	CARBON DISULFIDE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	CARBON TETRACHLORIDE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	CHLOROBENZENE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	CHLOROFORM	0.63	MG/L	NA
SW846-1311	(TCLP)		4	DICHLOROMETHANE (METHYLENE CHLORIDE)	0.63	MG/L	NA
SW846-1311	(TCLP)		4	ETHYL ACETATE	1.2	MG/L	NA
SW846-1311	(TCLP)		4	ETHYL BENZENE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	ETHYL ETHER	0.63	MG/L	NA
SW846-1311	(TCLP)		4	MAGNESIUM	0.05	MG/L	NA
SW846-1311	(TCLP)		4	METHYL ETHYL KETONE	1.2	MG/L	NA
SW846-1311	(TCLP)		4	METHYL ISOBUTYL KETONE	1.2	MG/L	NA
SW846-1311	(TCLP)		4	SOLIDS	0.1	PERCENT	NA
SW846-1311	(TCLP)		4	TETRACHLOROETHENE	0.63	MG/L	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-1311	(TCLP)		4	TETRACHLOROETHYLENE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	TOLUENE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	TRICHLOROETHENE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	TRICHLOROETHYLENE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	TRICHLOROFLUOROMETHANE	0.63	MG/L	NA
SW846-1311	(TCLP)		4	VINYL CHLORIDE	1.2	MG/L	NA
SW846-1311	(TCLP)		4	XYLENES (O/M/P-XYLENE)	0.63	MG/L	NA
SW846-1311	(TCLP)		5	1,1,1-TRICHLOROETHANE	5	UG/L	NA
SW846-1311	(TCLP)		5	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	5	UG/L	NA
SW846-1311	(TCLP)		5	1,1-DICHLOROETHYLENE	5	UG/L	NA
SW846-1311	(TCLP)		5	1,2-DICHLOROBENZENE	10	UG/L	NA
SW846-1311	(TCLP)		5	1,2-DICHLOROETHANE	5	UG/L	NA
SW846-1311	(TCLP)		5	1,4-DICHLOROBENZENE	10	UG/L	NA
SW846-1311	(TCLP)		5	2,4,5-TRICHLOROPHENOL	10	UG/L	NA
SW846-1311	(TCLP)		5	2,4,6-TRICHLOROPHENOL	10	UG/L	NA
SW846-1311	(TCLP)		5	2,4-DICHLOROPHENOXYACETIC ACID	10	UG/L	NA
SW846-1311	(TCLP)		5	2,4-DINITROTOLUENE	10	UG/L	NA
SW846-1311	(TCLP)		5	2-METHYLPHENOL (O-CRESOL)	10	UG/L	NA
SW846-1311	(TCLP)		5	3-METHYLPHENOL (M-CRESOL)	10	UG/L	NA
SW846-1311	(TCLP)		5	4-METHYLPHENOL (P-CRESOL)	10	UG/L	NA
SW846-1311	(TCLP)		5	ACETONE (2-PROPANONE)	20	UG/L	NA
SW846-1311	(TCLP)		5	ANTIMONY	0.03	MG/L	NA
SW846-1311	(TCLP)		5	ARSENIC	0.005	MG/L	NA
SW846-1311	(TCLP)		5	BARIUM	0.01	MG/L	NA
SW846-1311	(TCLP)		5	BENZENE	5	UG/L	NA
SW846-1311	(TCLP)		5	BERYLLIUM	0.005	MG/L	NA
SW846-1311	(TCLP)		5	CADMIUM	0.005	MG/L	NA
SW846-1311	(TCLP)		5	CARBON DISULFIDE	5	UG/L	NA
SW846-1311	(TCLP)		5	CARBON TETRACHLORIDE	5	UG/L	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-1311	(TCLP)		5	CHLORDANE	2.5	UG/L	NA
SW846-1311	(TCLP)		5	CHLOROBENZENE	5	UG/L	NA
SW846-1311	(TCLP)		5	CHLOROFORM	5	UG/L	NA
SW846-1311	(TCLP)		5	CHROMIUM	0.01	MG/L	NA
SW846-1311	(TCLP)		5	COPPER	0.02	MG/L	NA
SW846-1311	(TCLP)		5	CYCLOHEXANONE	0.75	MG/L	NA
SW846-1311	(TCLP)		5	DECACHLOROBIPHENYL (DCB)		% REC	NA
SW846-1311	(TCLP)		5	DICHLOROMETHANE (METHYLENE CHLORIDE)	5	UG/L	NA
SW846-1311	(TCLP)		5	ENDRIN	0.5	UG/L	NA
SW846-1311	(TCLP)		5	ETHYL ACETATE	5	UG/L	NA
SW846-1311	(TCLP)		5	ETHYL BENZENE	5	UG/L	NA
SW846-1311	(TCLP)		5	ETHYL ETHER	5	UG/L	NA
SW846-1311	(TCLP)		5	GAMMA-BHC (LINDANE)	0.25	UG/L	NA
SW846-1311	(TCLP)		5	HEPTACHLOR	0.25	UG/L	NA
SW846-1311	(TCLP)		5	HEPTACHLOR EPOXIDE	0.25	UG/L	NA
SW846-1311	(TCLP)		5	HEXACHLOROBENZENE	10	UG/L	NA
SW846-1311	(TCLP)		5	HEXACHLOROBUTADIENE	10	UG/L	NA
SW846-1311	(TCLP)		5	HEXACHLOROETHANE	10	UG/L	NA
SW846-1311	(TCLP)		5	ISOBUTANOL (ISOBUTYL ALCOHOL)	5	MG/L	NA
SW846-1311	(TCLP)		5	LEAD	0.05	MG/L	NA
SW846-1311	(TCLP)		5	MAGNESIUM	0.05	MG/L	NA
SW846-1311	(TCLP)		5	MERCURY	0.002	MG/L	NA
SW846-1311	(TCLP)		5	METHANOL	0.75	MG/L	NA
SW846-1311	(TCLP)		5	METHOXYCHLOR	2.5	UG/L	NA
SW846-1311	(TCLP)		5	METHYL ETHYL KETONE	10	UG/L	NA
SW846-1311	(TCLP)		5	METHYL ISOBUTYL KETONE	10	UG/L	NA
SW846-1311	(TCLP)		5	METHYLPHENOLS (CRESOLS)	10	UG/L	NA
SW846-1311	(TCLP)		5	N-BUTYL ALCOHOL	5	MG/L	NA
SW846-1311	(TCLP)		5	NICKEL	0.03	MG/L	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-1311	(TCLP)		5	NITROBENZENE	10	UG/L	NA
SW846-1311	(TCLP)		5	PENTACHLOROPHENOL	50	UG/L	NA
SW846-1311	(TCLP)		5	PYRIDINE	50	UG/L	NA
SW846-1311	(TCLP)		5	SELENIUM	0.005	MG/L	NA
SW846-1311	(TCLP)		5	SILVER	0.01	MG/L	NA
SW846-1311	(TCLP)		5	SILVEX (2,4,5-TP)	0.001	MG/L	NA
SW846-1311	(TCLP)		5	SOLIDS	0.1	PERCENT	NA
SW846-1311	(TCLP)		5	TETRACHLOROETHENE	5	UG/L	NA
SW846-1311	(TCLP)		5	TETRACHLOROETHYLENE	5	UG/L	NA
SW846-1311	(TCLP)		5	THALLIUM	0.005	MG/L	NA
SW846-1311	(TCLP)		5	TOLUENE	5	UG/L	NA
SW846-1311	(TCLP)		5	TOXAPHENE	5	UG/L	NA
SW846-1311	(TCLP)		5	TRICHLOROETHENE	5	UG/L	NA
SW846-1311	(TCLP)		5	TRICHLOROETHYLENE	5	UG/L	NA
SW846-1311	(TCLP)		5	TRICHLOROFLUOROMETHANE	5	UG/L	NA
SW846-1311	(TCLP)		5	VINYL CHLORIDE	10	UG/L	NA
SW846-1311	(TCLP)		5	XYLENES (O/M/P-XYLENE)	5	UG/L	NA
SW846-1311	(TCLP)		5	ZINC	0.02	MG/L	NA
SW846-6010B	3005A/3010A	ICP	1	ALUMINUM	0.05	MG/L	0.0094
SW846-6010B	3005A/3010A	Trace	1	ANTIMONY	0.005	MG/L	0.0021
SW846-6010B	3005A/3010A	ICP	1	ANTIMONY	0.01	MG/L	0.0035
SW846-6010B	3005A/3010A	Trace	1	ARSENIC	0.005	MG/L	0.0021
SW846-6010B	3005A/3010A	ICP	1	ARSENIC	0.01	MG/L	0.0035
SW846-6010B	3005A/3010A	ICP	1	BARIUM	0.01	MG/L	0.00016
SW846-6010B	3005A/3010A	Trace	1	BERYLLIUM	0.001	MG/L	0.000069
SW846-6010B	3005A/3010A	ICP	1	BERYLLIUM	0.005	MG/L	0.000068
SW846-6010B	3005A/3010A	ICP	1	BORON	0.02	MG/L	0.0054
SW846-6010B	3005A/3010A	Trace	1	CADMIUM	0.001	MG/L	0.00019
SW846-6010B	3005A/3010A	ICP	1	CADMIUM	0.005	MG/L	0.00044
SW846-6010B	3005A/3010A	ICP	1	CALCIUM	0.2	MG/L	0.0064

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-6010B	3005A/3010A	Trace	1	CHROMIUM	0.001	MG/L	0.00042
SW846-6010B	3005A/3010A	ICP	1	CHROMIUM	0.01	MG/L	0.00038
SW846-6010B	3005A/3010A	Trace	1	COBALT	0.001	MG/L	0.00046
SW846-6010B	3005A/3010A	ICP	1	COBALT	0.01	MG/L	0.00074
SW846-6010B	3005A/3010A	ICP	1	COPPER	0.02	MG/L	0.00044
SW846-6010B	3005A/3010A	ICP	1	IRON	0.025	MG/L	0.0029
SW846-6010B	3005A/3010A	Trace	1	LEAD	0.005	MG/L	0.0023
SW846-6010B	3005A/3010A	ICP	1	LEAD	0.01	MG/L	0.0023
SW846-6010B	3005A/3010A	ICP	1	LITHIUM	0.01	MG/L	0.00090
SW846-6010B	3005A/3010A	ICP	1	MAGNESIUM	0.2	MG/L	0.0029
SW846-6010B	3005A/3010A	ICP	1	MANGANESE	0.01	MG/L	0.00034
SW846-6010B	3005A/3010A	ICP	1	MOLYBDENUM	0.01	MG/L	0.00053
SW846-6010B	3005A/3010A	ICP	1	NICKEL	0.01	MG/L	0.0011
SW846-6010B	3005A/3010A	ICP	1	POTASSIUM	0.2	MG/L	0.0043
SW846-6010B	3005A/3010A	Trace	1	SELENIUM	0.005	MG/L	0.0035
SW846-6010B	3005A/3010A	ICP	1	SELENIUM	0.01	MG/L	0.0077
SW846-6010B	3005A/3010A	ICP	1	SILICON	0.2	MG/L	0.0014
SW846-6010B	3005A/3010A	Trace	1	SILVER	0.002	MG/L	0.00015
SW846-6010B	3005A/3010A	ICP	1	SILVER	0.01	MG/L	0.00030
SW846-6010B	3005A/3010A	ICP	1	SODIUM	0.2	MG/L	0.0085
SW846-6010B	3005A/3010A	ICP	1	STRONTIUM	0.01	MG/L	0.00037
SW846-6010B	3005A/3010A	Trace	1	THALLIUM	0.01	MG/L	0.0020
SW846-6010B	3005A/3010A	ICP	1	THALLIUM	0.01	MG/L	0.0045
SW846-6010B	3005A/3010A	ICP	1	TIN	0.05	MG/L	0.0020
SW846-6010B	3005A/3010A	ICP	1	TITANIUM	0.01	MG/L	0.00091
SW846-6010B	3005A/3010A	Trace	1	VANADIUM	0.001	MG/L	0.00042
SW846-6010B	3005A/3010A	ICP	1	VANADIUM	0.01	MG/L	0.00091
SW846-6010B	3005A/3010A	ICP	1	ZINC	0.02	MG/L	0.0015
SW846-6010B	3005A/3010A	ICP	1	ZIRCONIUM	0.01	MG/L	0.0010
SW846-6010B	3051A	ICP	4	ALUMINUM	2.5	MG/KG	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-6010B	3051A	Trace	4	ANTIMONY	0.25	MG/KG	NA
SW846-6010B	3051A	ICP	4	ANTIMONY	1.5	MG/KG	NA
SW846-6010B	3051A	Trace	4	ARSENIC	0.25	MG/KG	NA
SW846-6010B	3051A	ICP	4	ARSENIC	5.0	MG/KG	NA
SW846-6010B	3051A	ICP	4	BARIUM	0.50	MG/KG	NA
SW846-6010B	3051A	Trace	4	BERYLLIUM	0.050	MG/KG	NA
SW846-6010B	3051A	ICP	4	BERYLLIUM	0.050	MG/KG	NA
SW846-6010B	3051A	ICP	4	BISMUTH	5.0	MG/KG	NA
SW846-6010B	3051A	ICP	4	BORON	2.5	MG/KG	NA
SW846-6010B	3051A	Trace	4	CADMIUM	0.050	MG/KG	NA
SW846-6010B	3051A	ICP	4	CADMIUM	0.25	MG/KG	NA
SW846-6010B	3051A	ICP	4	CALCIUM	10	MG/KG	NA
SW846-6010B	3051A	Trace	4	CHROMIUM	0.10	MG/KG	NA
SW846-6010B	3051A	ICP	4	CHROMIUM	0.50	MG/KG	NA
SW846-6010B	3051A	Trace	4	COBALT	0.050	MG/KG	NA
SW846-6010B	3051A	ICP	4	COBALT	0.50	MG/KG	NA
SW846-6010B	3051A	ICP	4	COPPER	1.0	MG/KG	NA
SW846-6010B	3051A	ICP	4	IRON	1.2	MG/KG	NA
SW846-6010B	3051A	Trace	4	LEAD	0.25	MG/KG	NA
SW846-6010B	3051A	ICP	4	LEAD	2.5	MG/KG	NA
SW846-6010B	3051A	ICP	4	LITHIUM	0.50	MG/KG	NA
SW846-6010B	3051A	ICP	4	MAGNESIUM	10	MG/KG	NA
SW846-6010B	3051A	ICP	4	MANGANESE	0.50	MG/KG	NA
SW846-6010B	3051A	ICP	4	MOLYBDENUM	0.50	MG/KG	NA
SW846-6010B	3051A	ICP	4	NICKEL	0.50	MG/KG	NA
SW846-6010B	3051A	ICP	4	POTASSIUM	10	MG/KG	NA
SW846-6010B	3051A	Trace	4	SELENIUM	0.25	MG/KG	NA
SW846-6010B	3051A	ICP	4	SELENIUM	5.0	MG/KG	NA
SW846-6010B	3051A	ICP	4	SILICON	10	MG/KG	NA
SW846-6010B	3051A	Trace	4	SILVER	0.10	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-6010B	3051A	ICP	4	SILVER	0.50	MG/KG	NA
SW846-6010B	3051A	ICP	4	SODIUM	10	MG/KG	NA
SW846-6010B	3051A	ICP	4	STRONTIUM	0.50	MG/KG	NA
SW846-6010B	3051A	Trace	4	THALLIUM	0.25	MG/KG	NA
SW846-6010B	3051A	ICP	4	THALLIUM	25	MG/KG	NA
SW846-6010B	3051A	ICP	4	TIN	2.5	MG/KG	NA
SW846-6010B	3051A	ICP	4	TITANIUM	0.50	MG/KG	NA
SW846-6010B	3051A	ICP	4	URANIUM		MG/KG	NA
SW846-6010B	3051A	Trace	4	VANADIUM	0.05	MG/KG	NA
SW846-6010B	3051A	ICP	4	VANADIUM	0.50	MG/KG	NA
SW846-6010B	3051A	ICP	4	YTTRIUM	0.5	MG/KG	NA
SW846-6010B	3051A	ICP	4	ZINC	1.0	MG/KG	NA
SW846-6010B	3051A	ICP	4	ZIRCONIUM	0.5	MG/KG	NA
SW846-6010B	3050A	ICP	5	ALUMINUM	5	MG/KG	5.4
SW846-6010B	3050A	Trace	5	ANTIMONY	0.5	MG/KG	NA
SW846-6010B	3050A	ICP	5	ANTIMONY	3.0	MG/KG	0.27
SW846-6010B	3050A	Trace	5	ARSENIC	0.5	MG/KG	NA
SW846-6010B	3050A	ICP	5	ARSENIC	10	MG/KG	0.30
SW846-6010B	3050A	ICP	5	BARIUM	1	MG/KG	0.17
SW846-6010B	3050A	Trace	5	BERYLLIUM	0.1	MG/KG	NA
SW846-6010B	3050A	ICP	5	BERYLLIUM	0.5	MG/KG	0.011
SW846-6010B	3050A	ICP	5	BORON	5	MG/KG	0.26
SW846-6010B	3050A	Trace	5	CADMIUM	0.1	MG/KG	NA
SW846-6010B	3050A	ICP	5	CADMIUM	0.5	MG/KG	0.031
SW846-6010B	3050A	ICP	5	CALCIUM	20	MG/KG	5.4
SW846-6010B	3050A	Trace	5	CHROMIUM	0.2	MG/KG	NA
SW846-6010B	3050A	ICP	5	CHROMIUM	1	MG/KG	0.074
SW846-6010B	3050A	Trace	5	COBALT	0.1	MG/KG	NA
SW846-6010B	3050A	ICP	5	COBALT	1	MG/KG	0.12

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP. METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-6010B	3050A	ICP	5	COPPER	2	MG/KG	0.19
SW846-6010B	3050A	ICP	5	IRON	2.5	MG/KG	100
SW846-6010B	3050A	Trace	5	LEAD	0.5	MG/KG	NA
SW846-6010B	3050A	ICP	5	LEAD	5	MG/KG	0.23
SW846-6010B	3050A	ICP	5	LITHIUM	1	MG/KG	0.067
SW846-6010B	3050A	ICP	5	MAGNESIUM	20	MG/KG	12.5
SW846-6010B	3050A	ICP	5	MANGANESE	1	MG/KG	1.1
SW846-6010B	3050A	ICP	5	MOLYBDENUM	1	MG/KG	0.046
SW846-6010B	3050A	ICP	5	NICKEL	1	MG/KG	0.32
SW846-6010B	3050A	ICP	5	POTASSIUM	20	MG/KG	4.0
SW846-6010B	3050A	Trace	5	SELENIUM	0.5	MG/KG	NA
SW846-6010B	3050A	ICP	5	SELENIUM	10	MG/KG	0.40
SW846-6010B	3050A	ICP	5	SILICON	20	MG/KG	4.9
SW846-6010B	3050A	Trace	5	SILVER	0.2	MG/KG	NA
SW846-6010B	3050A	ICP	5	SILVER	1	MG/KG	0.046
SW846-6010B	3050A	ICP	5	SODIUM	20	MG/KG	1.2
SW846-6010B	3050A	ICP	5	STRONTIUM	1	MG/KG	0.10
SW846-6010B	3050A	Trace	5	THALLIUM	0.5	MG/KG	NA
SW846-6010B	3050A	ICP	5	THALLIUM	50	MG/KG	0.24
SW846-6010B	3050A	ICP	5	TIN	5	MG/KG	0.48
SW846-6010B	3050A	ICP	5	TITANIUM	1	MG/KG	0.20
SW846-6010B	3050A	ICP	5	URANIUM	50	MG/KG	NA
SW846-6010B	3050A	Trace	5	VANADIUM	0.1	MG/KG	NA
SW846-6010B	3050A	ICP	5	VANADIUM	1	MG/KG	0.043
SW846-6010B	3050A	ICP	5	YTTRIUM	1.0	MG/KG	NA
SW846-6010B	3050A	ICP	5	ZINC	2	MG/KG	0.77
SW846-6010B	3050A	ICP	5	ZIRCONIUM	1	MG/KG	0.13
SW846-6020	3005A/3010A	ICP/MS	1	ALUMINUM	20	UG/L	2.4
SW846-6020	3005A/3010A	ICP/MS	1	ANTIMONY	0.10	UG/L	0.058
SW846-6020	3005A/3010A	ICP/MS	1	ARSENIC	1.0	UG/L	0.44

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-6020	3005A/3010A	ICP/MS	1	BARIUM	0.10	UG/L	0.074
SW846-6020	3005A/3010A	ICP/MS	1	BORON	5.0	UG/L	0.63
SW846-6020	3005A/3010A	ICP/MS	1	CADMIUM	0.010	UG/L	0.13
SW846-6020	3005A/3010A	ICP/MS	1	CHROMIUM	1.0	UG/L	0.23
SW846-6020	3005A/3010A	ICP/MS	1	COBALT	O.10	UG/L	0.029
SW846-6020	3005A/3010A	ICP/MS	1	COPPER	O.20	UG/L	0.12
SW846-6020	3005A/3010A	ICP/MS	1	LEAD	0.10	UG/L	0.065
SW846-6020	3005A/3010A	ICP/MS	1	MANGANESE	1.0	UG/L	0.083
SW846-6020	3005A/3010A	ICP/MS	1	NICKEL	2.0	UG/L	0.078
SW846-6020	3005A/3010A	ICP/MS	1	SELENIUM	1.0	UG/L	0.72
SW846-6020	3005A/3010A	ICP/MS	1	SILVER	0.25	UG/L	0.049
SW846-6020	3005A/3010A	ICP/MS	1	THALLIUM	0.10	UG/L	0.045
SW846-6020	3005A/3010A	ICP/MS	1	VANADIUM	2.0	UG/L	0.60
SW846-6020	3005A/3010A	ICP/MS	1	ZINC	2.0	UG/L	0.85
SW846-6020	3005A/3010A	ICP/MS	1	MOLYBDENUM	0.10	UG/L	0.046
SW846-6020	3005A/3010A	ICP/MS	1	STRONTIUM	0.10	UG/L	0.046
SW846-6020	3005A/3010A	ICP/MS	1	TIN	1.0	UG/L	0.090
SW846-6020	3005A/3010A	ICP/MS	1	TITANIUM	1.0	UG/L	0.54
SW846-6020	3005A/3010A	ICP/MS	1	ZIRCONIUM	1.0	UG/L	0.29
SW846-6020	3005A/3010A	ICP/MS	1	THORIUM	0.10	UG/L	0.028
SW846-6020	3005A/3010A	ICP/MS	1	URANIUM	0.10	UG/L	0.046
SW846-6020	3050A	ICP/MS	5	ARSENIC	1	MG/KG	0.126
SW846-6020	3050A	ICP/MS	5	BARIUM	0.5	MG/KG	0.218
SW846-6020	3050A	ICP/MS	5	CADMIUM	0.5	MG/KG	0.0157
SW846-6020	3050A	ICP/MS	5	CHROMIUM	2	MG/KG	1.45
SW846-6020	3050A	ICP/MS	5	LEAD	1	MG/KG	0.0366
SW846-6020	3050A	ICP/MS	5	NICKEL	2	MG/KG	0.141
SW846-6020	3050A	ICP/MS	5	SELENIUM	2	MG/KG	0.0727
SW846-6020	3050A	ICP/MS	5	SILVER	1	MG/KG	0.00437
SW846-6020	3050A	ICP/MS	5	ZINC	2	MG/KG	0.743

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-6020	3050A	ICP/MS	5	THALLIUM	0.1	MG/KG	0.0145
SW846-6020	3050A	ICP/MS	5	VANADIUM	2	MG/KG	0.177
SW846-6020	3050A	ICP/MS	5	COPPER	2	MG/KG	0.0990
SW846-6020	3050A	ICP/MS	5	COBALT	1	MG/KG	0.00936
SW846-6020	3050A	ICP/MS	5	BERYLLIUM	1	MG/KG	0.00537
SW846-7041	3020A	GFAA	1	ANTIMONY	0.0050	MG/L	0.0016
SW846-7041	3020A	GFAA	4	ANTIMONY	0.25	MG/KG	NA
SW846-7041	3020A	GFAA	5	ANTIMONY	0.50	MG/KG	NA
SW846-7060A	7060A	GFAA	1	ARSENIC	0.0050	MG/L	0.0020
SW846-7060A	7060A	GFAA	4	ARSENIC	0.25	MG/KG	NA
SW846-7060A	7060A	GFAA	5	ARSENIC	0.50	MG/KG	NA
SW846-7131A	3020A	GFAA	1	CADMIUM	0.0010	MG/L	0.000098
SW846-7131A	3020A	GFAA	4	CADMIUM	0.050	MG/KG	NA
SW846-7131A	3020A	GFAA	5	CADMIUM	0.10	MG/KG	NA
SW846-7191	3020A	GFAA	1	CHROMIUM	0.0050	MG/L	0.00099
SW846-7191	3020A	GFAA	4	CHROMIUM	0.25	MG/L	NA
SW846-7191	3020A	GFAA	5	CHROMIUM	0.50	MG/L	NA
SW846-7191	3020A	GFAA	5	CHROMIUM	0.5	MG/KG	NA
SW846-7196A		Spectrom.	1	HEXAVALENT CHROMIUM	0.01	MG/L	0.002
SW846-7196A		Spectrom.	4	HEXAVALENT CHROMIUM	1.0	MG/KG	NA
SW846-7196A		Spectrom.	4	HEXAVALENT CHROMIUM	1.0	MG/KG	NA
SW846-7196A		Spectrom.	5	HEXAVALENT CHROMIUM	1.0	MG/KG	NA
SW846-7196A		Spectrom.	5	HEXAVALENT CHROMIUM	1.0	MG/KG	NA
SW846-7211	3020A	GFAA	1	COPPER	0.0050	MG/L	0.00059
SW846-7211	3020A	GFAA	1	COPPER	0.010	MG/L	NA
SW846-7211	3020A	GFAA	5	COPPER	0.50	MG/KG	NA
SW846-7421	3020A	GFAA	1	LEAD	0.005	MG/L	0.0018
SW846-7421	3020A	GFAA	4	LEAD	0.25	MG/KG	NA
SW846-7421	3020A	GFAA	5	LEAD	0.50	MG/KG	NA
SW846-7470A	7470A	CVAA	1	MERCURY	0.0002	MG/L	0.000016

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-7470A	7470A	CVAA	5	MERCURY	0.033	MG/KG	NA
SW846-7471A	7470A	CVAA	4	MERCURY	0.033	MG/KG	NA
SW846-7471A	7470A	CVAA	5	MERCURY	0.033	MG/KG	NA
SW846-7740	7740	GFAA	1	SELENIUM	0.0050	MG/L	0.0012
SW846-7740	7740	GFAA	4	SELENIUM	0.25	MG/KG	NA
SW846-7740	7740	GFAA	5	SELENIUM	0.50	MG/KG	NA
SW846-7761	3020A	GFAA	1	SILVER	0.0010	MG/L	0.00024
SW846-7761	3020A	GFAA	4	SILVER	0.050	MG/KG	NA
SW846-7761	3020A	GFAA	5	SILVER	0.010	MG/KG	NA
SW846-7841	3020A	GFAA	1	THALLIUM	0.0050	MG/L	0.00052
SW846-7841	3020A	GFAA	4	THALLIUM	0.25	MG/KG	NA
SW846-7841	3020A	GFAA	5	THALLIUM	0.5	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	1	1,1,1-TRICHLOROETHANE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	1,1,2-TRICHLOROETHANE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	1-CHLORO-2-FLUOROBENZENE	NA	% REC	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	1	2-DIETHYLAMINOETHANOL		MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	2-ETHOXYETHANOL	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	2-METHYLPHENOL (O-CRESOL)	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	2-NITROPROPANE	0.25	MG/L	

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8000B	HLI-Micro Extr.	GC/FID	1	3-METHYLPHENOL/4-METHYLPHENOL (M/P-CRESOL)	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	ACETONE (2-PROPANONE)	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	BENZENE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	CARBON DISULFIDE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	CARBON TETRACHLORIDE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	CHLOROBENZENE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	CHLOROFLUOROBENZENE	NA	% REC	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	1	CYCLOHEXANONE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	DICHLOROMETHANE (METHYLENE CHLORIDE)	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	DIESEL FUEL	1.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	ETHYL ACETATE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	ETHYL BENZENE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	ETHYL ETHER	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	FLUOROBENZENE	NA	% REC	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	1	GASOLINE	0.25	MG/L	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8000B	HLI-Micro Extr.	GC/FID	1	GASOLINE	1	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	ISOBUTANOL (ISOBUTYL ALCOHOL)	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	METHANOL	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	METHYL ETHYL KETONE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	METHYL ISOBUTYL KETONE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	N-BUTANOL	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	NITROBENZENE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	OTHER HYDROCARBONS	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	PYRIDINE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	TERT-AMYL ALCOHOL	NA	% REC	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	1	TETRACHLOROETHYLENE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	TOLUENE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	TRICHLOROETHYLENE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	TRICHLOROFLUOROMETHANE	0.25	MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	1	XYLENES (O/M/P-XYLENE)	0.25	MG/L	

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8000B	HLI-Micro Extr.	GC/FID	4	1,1,1-TRICHLOROETHANE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	1,1,2-TRICHLOROETHANE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	1-CHLORO-2-FLUOROBENZENE	NA	% REC	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	4	2-DIETHYLAMINOETHANOL		MG/L	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	2-ETHOXYETHANOL	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	2-METHYLPHENOL (O-CRESOL)	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	2-NITROPROPANE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	3-METHYLPHENOL/4-METHYLPHENOL (M/P-CRESOL)	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	ACETONE (2-PROPANONE)	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	BENZENE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	CARBON DISULFIDE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	CARBON TETRACHLORIDE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	CHLOROBENZENE	50	MG/KG	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8000B	HLI-Micro Extr.	GC/FID	4	CYCLOHEXANONE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	DICHLOROMETHANE (METHYLENE CHLORIDE)	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	DIESEL FUEL	1000	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	ETHYL ACETATE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	ETHYL BENZENE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	ETHYL ETHER	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	GASOLINE	500	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	ISOBUTANOL (ISOBUTYL ALCOHOL)	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	METHANOL	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	METHYL ETHYL KETONE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	METHYL ISOBUTYL KETONE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	N-BUTANOL	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	NITROBENZENE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	OTHER HYDROCARBONS	1500	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	PYRIDINE	50	MG/KG	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8000B	HLI-Micro Extr.	GC/FID	4	TERT-AMYL ALCOHOL	NA	% REC	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	4	TETRACHLOROETHYLENE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	TOLUENE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	TRICHLOROETHYLENE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	TRICHLOROFLUOROMETHANE	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	4	XYLENES (O/M/P-XYLENE)	50	MG/KG	
SW846-8000B	HLI-Micro Extr.	GC/FID	5	1,1,1-TRICHLOROETHANE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	1,1,2-TRICHLOROETHANE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	1-CHLORO-2-FLUOROBENZENE	NA	% REC	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	2-DIETHYLAMINOETHANOL		MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	2-ETHOXYETHANOL	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	2-METHYLPHENOL (O-CRESOL)	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	2-NITROPROPANE	0.67	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8000B	HLI-Micro Extr.	GC/FID	5	3-METHYLPHENOL/4-METHYLPHENOL (M/P-CRESOL)	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	ACETONE (2-PROPANONE)	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	BENZENE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	CARBON DISULFIDE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	CARBON TETRACHLORIDE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	CHLOROBENZENE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	CHLOROFLUOROBENZENE	NA	% REC	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	CYCLOHEXANONE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	DICHLOROMETHANE (METHYLENE CHLORIDE)	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	DIESEL FUEL	10	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	ETHYL ACETATE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	ETHYL BENZENE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	ETHYL ETHER	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	FLUOROBENZENE	NA	% REC	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	GASOLINE	1	MG/KG	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8000B	HLI-Micro Extr.	GC/FID	5	GASOLINE	5	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	ISOBUTANOL (ISOBUTYL ALCOHOL)	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	METHANOL	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	METHYL ETHYL KETONE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	METHYL ISOBUTYL KETONE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	N-BUTANOL	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	NITROBENZENE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	OTHER HYDROCARBONS	25	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	PYRIDINE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	TERT-AMYL ALCOHOL	NA	% REC	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	TETRACHLOROETHYLENE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	TOLUENE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	TRICHLOROETHYLENE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	TRICHLOROFLUOROMETHANE	0.67	MG/KG	NA
SW846-8000B	HLI-Micro Extr.	GC/FID	5	XYLENES (O/M/P-XYLENE)	0.67	MG/KG	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8010B	5030B	GC/ELCD	1	1,1,1-TRICHLOROETHANE	1	UG/L	0.44
SW846-8010B	5030B	GC/ELCD	1	1,1,1,2-TETRACHLOROETHANE	1	UG/L	0.50
SW846-8010B	5030B	GC/ELCD	1	1,1,2,2-TETRACHLOROETHANE	1	UG/L	0.37
SW846-8010B	5030B	GC/ELCD	1	1,1,2-TRICHLOROETHANE	1	UG/L	0.43
SW846-8010B	5030B	GC/ELCD	1	1,1-DICHLOROETHANE	1	UG/L	0.41
SW846-8010B	5030B	GC/ELCD	1	1,1-DICHLOROETHENE	1	UG/L	0.66
SW846-8010B	5030B	GC/ELCD	1	1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	1	UG/L	0.49
SW846-8010B	5030B	GC/ELCD	1	1,2-DICHLOROETHANE	1	UG/L	0.48
SW846-8010B	5030B	GC/ELCD	1	1,2-DICHLOROPROPANE	1	UG/L	0.45
SW846-8010B	5030B	GC/ELCD	1	1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)	1	UG/L	0.28
SW846-8010B	5030B	GC/ELCD	1	1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	1	UG/L	0.40
SW846-8010B	5030B	GC/ELCD	1	2-CHLOROETHYLVINYLETHER	10	UG/L	
SW846-8010B	5030B	GC/ELCD	1	BROMODICHLOROMETHANE	1	UG/L	0.36
SW846-8010B	5030B	GC/ELCD	1	BROMOFORM	1	UG/L	0.34
SW846-8010B	5030B	GC/ELCD	1	BROMOMETHANE	1	UG/L	0.38
SW846-8010B	5030B	GC/ELCD	1	CARBON TETRACHLORIDE	1	UG/L	0.52
SW846-8010B	5030B	GC/ELCD	1	CHLOROBENZENE	1	UG/L	0.29
SW846-8010B	5030B	GC/ELCD	1	CHLOROETHANE	1	UG/L	0.42
SW846-8010B	5030B	GC/ELCD	1	CHLOROFLUOROBENZENE		% REC	NA
SW846-8010B	5030B	GC/ELCD	1	CHLOROFORM	1	UG/L	0.46
SW846-8010B	5030B	GC/ELCD	1	CHLOROMETHANE	1	UG/L	0.48
SW846-8010B	5030B	GC/ELCD	1	CIS-1,3-DICHLOROPROPENE	1	UG/L	0.20
SW846-8010B	5030B	GC/ELCD	1	DIBROMOCHLOROMETHANE	1	UG/L	0.58
SW846-8010B	5030B	GC/ELCD	1	DICHLOROMETHANE (METHYLENE CHLORIDE)	2.5	UG/L	1.32
SW846-8010B	5030B	GC/ELCD	1	FLUOROBENZENE		% REC	NA
SW846-8010B	5030B	GC/ELCD	1	TETRACHLOROETHENE	1	UG/L	0.54

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8010B	5030B	GC/ELCD	1	TRANS-1,2-DICHLOROETHENE	1	UG/L	0.48
SW846-8010B	5030B	GC/ELCD	1	TRANS-1,3-DICHLOROPROPENE	1	UG/L	0.18
SW846-8010B	5030B	GC/ELCD	1	TRICHLOROETHENE	1	UG/L	0.41
SW846-8010B	5030B	GC/ELCD	1	TRICHLOROFLUOROMETHANE	1	UG/L	0.50
SW846-8010B	5030B	GC/ELCD	1	VINYL CHLORIDE	1	UG/L	0.60
SW846-8010B	5030B	GC/ELCD	4	1,1,1-TRICHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	1,1,2,2-TETRACHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	1,1,2-TRICHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	1,1-DICHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	1,1-DICHLOROETHENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	1,2-DICHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	1,2-DICHLOROPROPANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	2-CHLOROETHYLVINYLETHER	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	BROMODICHLOROMETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	BROMOFORM	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	BROMOMETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	CARBON TETRACHLORIDE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	CHLOROBENZENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	CHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	CHLOROFLUOROBENZENE		% REC	NA
SW846-8010B	5030B	GC/ELCD	4	CHLOROFLUOROBENZENE		MG/L	NA
SW846-8010B	5030B	GC/ELCD	4	CHLOROFORM	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	CHLOROMETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	CIS-1,3-DICHLOROPROPENE	50	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8010B	5030B	GC/ELCD	4	DIBROMOCHLOROMETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	DICHLOROMETHANE (METHYLENE CHLORIDE)	125	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	FLUOROBENZENE		% REC	NA
SW846-8010B	5030B	GC/ELCD	4	FLUOROBENZENE		MG/L	NA
SW846-8010B	5030B	GC/ELCD	4	TETRACHLOROETHENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	TRANS-1,2-DICHLOROETHENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	TRANS-1,3-DICHLOROPROPENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	TRICHLOROETHENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	TRICHLOROFLUOROMETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	4	VINYL CHLORIDE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,1,1-TRICHLOROETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,1,1-TRICHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,1,2,2-TETRACHLOROETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,1,2,2-TETRACHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,1,2-TRICHLOROETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,1,2-TRICHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,1-DICHLOROETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,1-DICHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,1-DICHLOROETHENE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,1-DICHLOROETHENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,2-DICHLOROBENZENE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,2-DICHLOROBENZENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,2-DICHLOROETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,2-DICHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,2-DICHLOROPROPANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,2-DICHLOROPROPANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,3-DICHLOROBENZENE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,3-DICHLOROBENZENE	50	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8010B	5030B	GC/ELCD	5	1,4-DICHLOROBENZENE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	1,4-DICHLOROBENZENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	2-CHLOROETHYLVINYLETHER	10	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	2-CHLOROETHYLVINYLETHER	500	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	BROMODICHLOROMETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	BROMODICHLOROMETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	BROMOFORM	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	BROMOFORM	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	BROMOMETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	BROMOMETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CARBON TETRACHLORIDE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CARBON TETRACHLORIDE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CHLOROBENZENE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CHLOROBENZENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CHLOROETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CHLOROETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CHLOROFLUOROBENZENE		% REC	NA
SW846-8010B	5030B	GC/ELCD	5	CHLOROFORM	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CHLOROFORM	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CHLOROMETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CHLOROMETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CIS-1,3-DICHLOROPROPENE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	CIS-1,3-DICHLOROPROPENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	DIBROMOCHLOROMETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	DIBROMOCHLOROMETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	DICHLOROMETHANE (METHYLENE CHLORIDE)	12	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	DICHLOROMETHANE (METHYLENE CHLORIDE)	125	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	FLUOROBENZENE		% REC	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8010B	5030B	GC/ELCD	5	TETRACHLOROETHENE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	TETRACHLOROETHENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	TRANS-1,2-DICHLOROETHENE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	TRANS-1,2-DICHLOROETHENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	TRANS-1,3-DICHLOROPROPENE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	TRANS-1,3-DICHLOROPROPENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	TRICHLOROETHENE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	TRICHLOROETHENE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	TRICHLOROFLUOROMETHANE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	TRICHLOROFLUOROMETHANE	50	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	VINYL CHLORIDE	5	UG/KG	NA
SW846-8010B	5030B	GC/ELCD	5	VINYL CHLORIDE	50	UG/KG	NA
SW846-8011		GC/ECD	1	ETHYLENE DIBROMIDE	0.02	UG/L	
SW846-8011		GC/ECD	1	1,2-DIBROMO-3-CHLOROPROPANE	0.02	UG/L	
SW846-8015B		GC/FID	1	2-ETHOXYETHANOL	5	MG/L	
SW846-8015B		GC/FID	1	2-NITROPROPANE	5	MG/L	
SW846-8015B		GC/FID	1	CYCLOHEXANONE	0.125	MG/L	
SW846-8015B		GC/FID	1	CYCLOHEXANONE	0.75	MG/L	
SW846-8015B		GC/FID	1	GASOLINE	1.3	MG/L	
SW846-8015B		GC/FID	1	ISOBUTANOL (ISOBUTYL ALCOHOL)	5	MG/L	
SW846-8015B		GC/FID	1	METHANOL	0.25	MG/L	
SW846-8015B		GC/FID	1	METHANOL	0.75	MG/L	
SW846-8015B		GC/FID	1	N,N-DIMETHYL ACETAMIDE (DMAC)	10	MG/L	
SW846-8015B		GC/FID	1	N-BUTYL ALCOHOL	5	MG/L	
SW846-8015B		GC/FID	1	TERT-AMYL ALCOHOL		% REC	NA
SW846-8015B		GC/FID	4	2-ETHOXYETHANOL	50	MG/KG	NA
SW846-8015B		GC/FID	4	2-NITROPROPANE	50	MG/KG	NA
SW846-8015B		GC/FID	4	CYCLOHEXANONE	10	MG/KG	NA
SW846-8015B		GC/FID	4	GASOLINE	250	MG/KG	NA
SW846-8015B		GC/FID	4	ISOBUTANOL (ISOBUTYL ALCOHOL)	10	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8015B		GC/FID	4	METHANOL	10	MG/KG	NA
SW846-8015B		GC/FID	4	N,N-DIMETHYL ACETAMIDE (DMAC)	10	MG/L	NA
SW846-8015B		GC/FID	4	N-BUTYL ALCOHOL	10	MG/KG	NA
SW846-8015B		GC/FID	4	TERT-AMYL ALCOHOL		% REC	NA
SW846-8015B		GC/FID	5	2-ETHOXYETHANOL	5	MG/KG	NA
SW846-8015B		GC/FID	5	2-NITROPROPANE	5	MG/KG	NA
SW846-8015B		GC/FID	5	CYCLOHEXANONE	0.75	MG/KG	NA
SW846-8015B		GC/FID	5	CYCLOHEXANONE	0.75	MG/L	NA
SW846-8015B		GC/FID	5	CYCLOHEXANONE	0.75	MG/KG	NA
SW846-8015B		GC/FID	5	GASOLINE	25	MG/KG	NA
SW846-8015B		GC/FID	5	ISOBUTANOL (ISOBUTYL ALCOHOL)	0.75	MG/KG	NA
SW846-8015B		GC/FID	5	ISOBUTANOL (ISOBUTYL ALCOHOL)	5	MG/KG	NA
SW846-8015B		GC/FID	5	ISOBUTANOL (ISOBUTYL ALCOHOL)	5	MG/L	NA
SW846-8015B		GC/FID	5	METHANOL	0.75	MG/KG	NA
SW846-8015B		GC/FID	5	METHANOL	0.75	MG/L	NA
SW846-8015B		GC/FID	5	METHANOL	5	MG/KG	NA
SW846-8015B		GC/FID	5	N,N-DIMETHYL ACETAMIDE (DMAC)	10	MG/L	NA
SW846-8015B		GC/FID	5	N-BUTYL ALCOHOL	5	MG/KG	NA
SW846-8015B		GC/FID	5	N-BUTYL ALCOHOL	5	MG/L	NA
SW846-8015B		GC/FID	5	TERT-AMYL ALCOHOL		% REC	NA
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	1	1-CHLORO-2-FLUOROBENZENE	NA	% REC	NA
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	1	DIESEL FUEL	0.1	MG/L	0.1245
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	1	DIESEL FUEL	0.50	MG/L	0.1245
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	1	GASOLINE	0.1	MG/L	0.0300
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	1	GASOLINE	0.25	MG/L	0.0300

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	1	OTHER HYDROCARBONS	1.25	MG/L	NA
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	1	TERT-AMYL ALCOHOL	NA	% REC	NA
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	4	1-CHLORO-2-FLUOROBENZENE	NA	% REC	NA
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	4	DIESEL FUEL	25	MG/KG	NA
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	4	GASOLINE	5	MG/KG	NA
SW846-8015B (MOD)	HLI-MICRO-EXTR.	GC/FID	4	OTHER HYDROCARBONS	2500	MG/KG	NA
SW846-8015B (MOD)		GC/FID	4	TERT-AMYL ALCOHOL	NA	% REC	NA
SW846-8015B (MOD)		GC/FID	5	1-CHLORO-2-FLUOROBENZENE	NA	% REC	NA
SW846-8015B (MOD)		GC/FID	5	DIESEL FUEL	10	MG/KG	NA
SW846-8015B (MOD)		GC/FID	5	DIESEL FUEL	3	MG/KG	NA
SW846-8015B (MOD)		GC/FID	5	GASOLINE	2	MG/KG	NA
SW846-8015B (MOD)		GC/FID	5	GASOLINE	5	MG/KG	NA
SW846-8015B (MOD)		GC/FID	5	OTHER HYDROCARBONS	25	MG/KG	NA
SW846-8015B (MOD)		GC/FID	5	TERT-AMYL ALCOHOL	NA	% REC	NA
SW846-8015B	5030B	GC/FID	1	1-CHLORO-2-FLUOROBENZENE	NA	% REC	NA
SW846-8015B	3510C	GC/FID	1	1-CHLOROOCTADECANE	NA	% REC	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8015B	3510C	GC/FID	1	DIESEL RANGE ORGANICS (DRO)	0.1	MG/L	
SW846-8015B	5030B	GC/FID	1	GASOLINE RANGE ORGANICS (GRO)	0.1	MG/L	
SW846-8015B	5030B	GC/FID	4	1-CHLORO-2-FLUOROBENZENE	NA	% REC	NA
SW846-8015B	3510C	GC/FID	4	1-CHLOROOCTADECANE	NA	% REC	NA
SW846-8015B	3580A	GC/FID	4	DIESEL RANGE ORGANICS (DRO)		MG/KG	NA
SW846-8015B	5030B	GC/FID	4	GASOLINE RANGE ORGANICS (GRO)	0.25	MG/L	NA
SW846-8015B	5030B	GC/FID	5	1-CHLORO-2-FLUOROBENZENE	NA	% REC	NA
SW846-8015B	3550A	GC/FID	5	1-CHLOROOCTADECANE	NA	% REC	NA
SW846-8015B	3550A	GC/FID	5	DIESEL RANGE ORGANICS (DRO)	3	MG/KG	NA
SW846-8015B	5030B	GC/FID	5	GASOLINE RANGE ORGANICS (GRO)	0.5	MG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	1	BENZENE	1	UG/L	0.31
SW846-8020A	5030B	GC/PID/ELCD	1	CHLOROFLUOROBENZENE	NA	% REC	NA
SW846-8020A	5030B	GC/PID/ELCD	1	ETHYL BENZENE	1	UG/L	0.30
SW846-8020A	5030B	GC/PID/ELCD	1	FLUOROBENZENE	NA	% REC	NA
SW846-8020A	5030B	GC/PID/ELCD	1	M/P-XYLENE	1	UG/L	0.57
SW846-8020A	5030B	GC/PID/ELCD	1	O-XYLENE	1	UG/L	0.29
SW846-8020A	5030B	GC/PID/ELCD	1	TOLUENE	1	UG/L	0.32
SW846-8020A	5030B	GC/PID/ELCD	4	BENZENE	125	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	4	BENZENE	500	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	4	CHLOROFLUOROBENZENE	NA	% REC	NA
SW846-8020A	5030B	GC/PID/ELCD	4	ETHYL BENZENE	125	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	4	ETHYL BENZENE	500	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	4	FLUOROBENZENE	NA	% REC	NA
SW846-8020A	5030B	GC/PID/ELCD	4	M/P-XYLENE	125	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	4	M/P-XYLENE	500	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	4	O-XYLENE	125	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	4	O-XYLENE	500	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	4	TOLUENE	125	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	4	TOLUENE	500	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	5	BENZENE	5	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8020A	5030B	GC/PID/ELCD	5	BENZENE	50	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	5	CHLOROFLUOROBENZENE	NA	% REC	NA
SW846-8020A	5030B	GC/PID/ELCD	5	ETHYL BENZENE	5	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	5	ETHYL BENZENE	50	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	5	FLUOROBENZENE	NA	% REC	NA
SW846-8020A	5030B	GC/PID/ELCD	5	M/P-XYLENE	5	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	5	M/P-XYLENE	50	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	5	O-XYLENE	5	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	5	O-XYLENE	50	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	5	TOLUENE	5	UG/KG	NA
SW846-8020A	5030B	GC/PID/ELCD	5	TOLUENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	1	1,1,1,2-TETRACHLOROETHANE	1	UG/L	0.50
SW846-8021B	5030B	GC/PID/ELCD	1	1,1,1-TRICHLOROETHANE	1	UG/L	0.44
SW846-8021B	5030B	GC/PID/ELCD	1	1,1,2,2-TETRACHLOROETHANE	1	UG/L	0.37
SW846-8021B	5030B	GC/PID/ELCD	1	1,1,2-TRICHLOROETHANE	1	UG/L	0.43
SW846-8021B	5030B	GC/PID/ELCD	1	1,1-DICHLOROETHANE	1	UG/L	0.41
SW846-8021B	5030B	GC/PID/ELCD	1	1,1-DICHLOROETHENE	1	UG/L	0.66
SW846-8021B	5030B	GC/PID/ELCD	1	1,1-DICHLOROPROPENE	1	UG/L	0.44
SW846-8021B	5030B	GC/PID/ELCD	1	1,2,3-TRICHLOROBENZENE	1	UG/L	0.43
SW846-8021B	5030B	GC/PID/ELCD	1	1,2,3-TRICHLOROPROPANE	1	UG/L	0.36
SW846-8021B	5030B	GC/PID/ELCD	1	1,2,4-TRICHLOROBENZENE	1	UG/L	0.32
SW846-8021B	5030B	GC/PID/ELCD	1	1,2,4-TRIMETHYLBENZENE	1	UG/L	0.31
SW846-8021B	5030B	GC/PID/ELCD	1	1,2-DIBROMO-3-CHLOROPROPANE	1	UG/L	0.46
SW846-8021B	5030B	GC/PID/ELCD	1	1,2-DIBROMOETHANE (EDB)	1	UG/L	0.44
SW846-8021B	5030B	GC/PID/ELCD	1	1,2-DICHLOROBENZENE	1	UG/L	0.49
SW846-8021B	5030B	GC/PID/ELCD	1	1,2-DICHLOROETHANE	1	UG/L	0.48
SW846-8021B	5030B	GC/PID/ELCD	1	1,2-DICHLOROPROPANE	1	UG/L	0.45
SW846-8021B	5030B	GC/PID/ELCD	1	1,3,5-TRIMETHYLBENZENE	1	UG/L	0.64
SW846-8021B	5030B	GC/PID/ELCD	1	1,3-DICHLOROBENZENE	1	UG/L	0.28
SW846-8021B	5030B	GC/PID/ELCD	1	1,3-DICHLOROPROPANE	1	UG/L	0.32

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8021B	5030B	GC/PID/ELCD	1	1,4-DICHLOROBENZENE	1	UG/L	0.40
SW846-8021B	5030B	GC/PID/ELCD	1	2,2-DICHLOROPROPANE	1	UG/L	0.87
SW846-8021B	5030	GC/PID/ELCD	1	2-CHLOROTOLUENE	1	UG/L	0.34
SW846-8021B	5030B	GC/PID/ELCD	1	4-CHLOROTOLUENE	1	UG/L	0.53
SW846-8021B	5030B	GC/PID/ELCD	1	4-ISOPROPYLTOLUENE	1	UG/L	0.30
SW846-8021B	5030B	GC/PID/ELCD	1	BENZENE	1	UG/L	0.31
SW846-8021B	5030B	GC/PID/ELCD	1	BROMOBENZENE	1	UG/L	0.48
SW846-8021B	5030B	GC/PID/ELCD	1	BROMOCHLOROMETHANE	1	UG/L	0.36
SW846-8021B	5030B	GC/PID/ELCD	1	BROMODICHLOROMETHANE	1	UG/L	0.40
SW846-8021B	5030B	GC/PID/ELCD	1	BROMOFORM	1	UG/L	0.34
SW846-8021B	5030B	GC/PID/ELCD	1	BROMOMETHANE	1	UG/L	0.38
SW846-8021B	5030B	GC/PID/ELCD	1	CARBON TETRACHLORIDE	1	UG/L	0.52
SW846-8021B	5030B	GC/PID/ELCD	1	CHLOROBENZENE	1	UG/L	0.29
SW846-8021B	5030B	GC/PID/ELCD	1	CHLOROETHANE	1	UG/L	0.42
SW846-8021B	5030B	GC/PID/ELCD	1	CHLOROFLUOROBENZENE	NA	% REC	NA
SW846-8021B	5030B	GC/PID/ELCD	1	CHLOROFORM	1	UG/L	0.46
SW846-8021B	5030B	GC/PID/ELCD	1	CHLOROMETHANE	1	UG/L	0.48
SW846-8021B	5030B	GC/PID/ELCD	1	CIS-1,2-DICHLOROETHENE	1	UG/L	0.36
SW846-8021B	5030B	GC/PID/ELCD	1	CIS-1,3-DICHLOROPROPENE	1	UG/L	0.20
SW846-8021B	5030B	GC/PID/ELCD	1	DIBROMOCHLOROMETHANE	1	UG/L	0.58
SW846-8021B	5030B	GC/PID/ELCD	1	DIBROMOMETHANE	1	UG/L	0.52
SW846-8021B	5030B	GC/PID/ELCD	1	DICHLORODIFLUOROMETHANE	1	UG/L	0.32
SW846-8021B	5030B	GC/PID/ELCD	1	DICHLOROMETHANE (METHYLENE CHLORIDE)	2.5	UG/L	1.32
SW846-8021B	5030B	GC/PID/ELCD	1	ETHYL BENZENE	1	UG/L	0.30
SW846-8021B	5030B	GC/PID/ELCD	1	FLUOROBENZENE	NA	% REC	NA
SW846-8021B	5030B	GC/PID/ELCD	1	HEXACHLOROBUTADIENE	1	UG/L	0.45
SW846-8021B	5030B	GC/PID/ELCD	1	ISOPROPYLBENZENE (CUMENE)	1	UG/L	0.31
SW846-8021B	5030B	GC/PID/ELCD	1	M/P-XYLENE	1	UG/L	0.57
SW846-8021B	5030B	GC/PID/ELCD	1	N-BUTYLBENZENE	1	UG/L	0.31

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8021B	5030B	GC/PID/ELCD	1	N-PROPYLBENZENE	1	UG/L	0.30
SW846-8021B	5030B	GC/PID/ELCD	1	NAPHTHALENE	1	UG/L	0.22
SW846-8021B	5030B	GC/PID/ELCD	1	O-XYLENE	1	UG/L	0.29
SW846-8021B	5030B	GC/PID/ELCD	1	SEC-BUTYLBENZENE	1	UG/L	0.30
SW846-8021B	5030B	GC/PID/ELCD	1	STYRENE	1	UG/L	0.32
SW846-8021B	5030B	GC/PID/ELCD	1	TERT-BUTYLBENZENE	1	UG/L	0.30
SW846-8021B	5030B	GC/PID/ELCD	1	TETRACHLOROETHENE	1	UG/L	0.54
SW846-8021B	5030B	GC/PID/ELCD	1	TOLUENE	1	UG/L	0.32
SW846-8021B	5030B	GC/PID/ELCD	1	TRANS-1,2-DICHLOROETHENE	1	UG/L	0.48
SW846-8021B	5030B	GC/PID/ELCD	1	TRANS-1,3-DICHLOROPROPENE	1	UG/L	0.18
SW846-8021B	5030B	GC/PID/ELCD	1	TRICHLOROETHENE	1	UG/L	0.41
SW846-8021B	5030B	GC/PID/ELCD	1	TRICHLOROFLUOROMETHANE	1	UG/L	0.50
SW846-8021B	5030B	GC/PID/ELCD	1	VINYL CHLORIDE	1	UG/L	0.60
SW846-8021B	5030B	GC/PID/ELCD	4	1,1,1,2-TETRACHLOROETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1,1,2-TETRACHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1,1-TRICHLOROETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1,1-TRICHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1,2,2-TETRACHLOROETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1,2,2-TETRACHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1,2-TRICHLOROETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1,2-TRICHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1-DICHLOROETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1-DICHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1-DICHLOROETHENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1-DICHLOROETHENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1-DICHLOROPROPENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,1-DICHLOROPROPENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2,3-TRICHLOROBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2,3-TRICHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2,3-TRICHLOROPROPANE	1200	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8021B	5030B	GC/PID/ELCD	4	1,2,3-TRICHLOROPROPANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2,4-TRICHLOROBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2,4-TRICHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2,4-TRIMETHYLBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2,4-TRIMETHYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2-DIBROMO-3-CHLOROPROPANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2-DIBROMO-3-CHLOROPROPANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2-DIBROMOETHANE (EDB)	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2-DIBROMOETHANE (EDB)	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2-DICHLOROBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2-DICHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2-DICHLOROETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2-DICHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2-DICHLOROPROPANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,2-DICHLOROPROPANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,3,5-TRIMETHYLBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,3,5-TRIMETHYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,3-DICHLOROBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,3-DICHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,3-DICHLOROPROPANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,3-DICHLOROPROPANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,4-DICHLOROBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	1,4-DICHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	2,2-DICHLOROPROPANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	2,2-DICHLOROPROPANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	2-CHLOROTOLUENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	2-CHLOROTOLUENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	4-CHLOROTOLUENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	4-CHLOROTOLUENE	50	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8021B	5030B	GC/PID/ELCD	4	4-ISOPROPYLTOLUENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	4-ISOPROPYLTOLUENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BROMOBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BROMOBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BROMOCHLOROMETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BROMOCHLOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BROMODICHLOROMETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BROMODICHLOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BROMOFORM	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BROMOFORM	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BROMOMETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	BROMOMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CARBON TETRACHLORIDE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CARBON TETRACHLORIDE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CHLOROBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CHLOROETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CHLOROFLUOROBENZENE	NA	% REC	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CHLOROFORM	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CHLOROFORM	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CHLOROMETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CHLOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CIS-1,2-DICHLOROETHENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CIS-1,2-DICHLOROETHENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CIS-1,3-DICHLOROPROPENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	CIS-1,3-DICHLOROPROPENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	DIBROMOCHLOROMETHANE	1200	UG/KG	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8021B	5030B	GC/PID/ELCD	4	DIBROMOCHLOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	DIBROMOMETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	DIBROMOMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	DICHLORODIFLUOROMETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	DICHLORODIFLUOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	DICHLOROMETHANE (METHYLENE CHLORIDE)	125	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	DICHLOROMETHANE (METHYLENE CHLORIDE)	3200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	ETHYL BENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	ETHYL BENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	FLUOROBENZENE	NA	% REC	NA
SW846-8021B	5030B	GC/PID/ELCD	4	HEXACHLOROBUTADIENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	HEXACHLOROBUTADIENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	ISOPROPYLBENZENE (CUMENE)	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	ISOPROPYLBENZENE (CUMENE)	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	M/P-XYLENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	M/P-XYLENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	N-BUTYLBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	N-BUTYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	N-PROPYLBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	N-PROPYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	NAPHTHALENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	NAPHTHALENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	O-XYLENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	O-XYLENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	SEC-BUTYLBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	SEC-BUTYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	STYRENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	STYRENE	50	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8021B	5030B	GC/PID/ELCD	4	TERT-BUTYLBENZENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TERT-BUTYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TETRACHLOROETHENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TETRACHLOROETHENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TOLUENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TOLUENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TRANS-1,2-DICHLOROETHENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TRANS-1,2-DICHLOROETHENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TRANS-1,3-DICHLOROPROPENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TRANS-1,3-DICHLOROPROPENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TRICHLOROETHENE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TRICHLOROETHENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TRICHLOROFLUOROMETHANE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	TRICHLOROFLUOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	VINYL CHLORIDE	1200	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	4	VINYL CHLORIDE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1,1,2-TETRACHLOROETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1,1,2-TETRACHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1,1-TRICHLOROETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1,1-TRICHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1,2,2-TETRACHLOROETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1,2,2-TETRACHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1,2-TRICHLOROETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1,2-TRICHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1-DICHLOROETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1-DICHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1-DICHLOROETHENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1-DICHLOROETHENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1-DICHLOROPROPENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,1-DICHLOROPROPENE	50	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8021B	5030B	GC/PID/ELCD	5	1,2,3-TRICHLOROBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2,3-TRICHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2,3-TRICHLOROPROPANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2,3-TRICHLOROPROPANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2,4-TRICHLOROBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2,4-TRICHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2,4-TRIMETHYLBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2,4-TRIMETHYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2-DIBROMO-3-CHLOROPROPANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2-DIBROMO-3-CHLOROPROPANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2-DIBROMOETHANE (EDB)	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2-DIBROMOETHANE (EDB)	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2-DICHLOROBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2-DICHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2-DICHLOROETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2-DICHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2-DICHLOROPROPANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,2-DICHLOROPROPANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,3,5-TRIMETHYLBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,3,5-TRIMETHYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,3-DICHLOROBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,3-DICHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,3-DICHLOROPROPANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,3-DICHLOROPROPANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,4-DICHLOROBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	1,4-DICHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	2,2-DICHLOROPROPANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	2,2-DICHLOROPROPANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	2-CHLOROTOLUENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	2-CHLOROTOLUENE	50	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8021B	5030B	GC/PID/ELCD	5	4-CHLOROTOLUENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	4-CHLOROTOLUENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	4-ISOPROPYLTOLUENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	4-ISOPROPYLTOLUENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BROMOBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BROMOBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BROMOCHLOROMETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BROMOCHLOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BROMODICHLOROMETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BROMODICHLOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BROMOFORM	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BROMOFORM	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BROMOMETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	BROMOMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CARBON TETRACHLORIDE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CARBON TETRACHLORIDE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CHLOROBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CHLOROBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CHLOROETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CHLOROETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CHLOROFLUOROBENZENE	NA	% REC	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CHLOROFORM	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CHLOROFORM	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CHLOROMETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CHLOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CIS-1,2-DICHLOROETHENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CIS-1,2-DICHLOROETHENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	CIS-1,3-DICHLOROPROPENE	5	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8021B	5030B	GC/PID/ELCD	5	CIS-1,3-DICHLOROPROPENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	DIBROMOCHLOROMETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	DIBROMOCHLOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	DIBROMOMETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	DIBROMOMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	DICHLORODIFLUOROMETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	DICHLORODIFLUOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	DICHLOROMETHANE (METHYLENE CHLORIDE)	12	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	DICHLOROMETHANE (METHYLENE CHLORIDE)	125	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	ETHYL BENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	ETHYL BENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	FLUOROBENZENE	NA	% REC	NA
SW846-8021B	5030B	GC/PID/ELCD	5	HEXACHLOROBUTADIENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	HEXACHLOROBUTADIENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	ISOPROPYLBENZENE (CUMENE)	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	ISOPROPYLBENZENE (CUMENE)	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	M/P-XYLENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	M/P-XYLENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	N-BUTYLBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	N-BUTYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	N-PROPYLBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	N-PROPYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	NAPHTHALENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	NAPHTHALENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	O-XYLENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	O-XYLENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	SEC-BUTYLBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	SEC-BUTYLBENZENE	50	UG/KG	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8021B	5030B	GC/PID/ELCD	5	STYRENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	STYRENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TERT-BUTYLBENZENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TERT-BUTYLBENZENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TETRACHLOROETHENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TETRACHLOROETHENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TOLUENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TOLUENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TRANS-1,2-DICHLOROETHENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TRANS-1,2-DICHLOROETHENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TRANS-1,3-DICHLOROPROPENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TRANS-1,3-DICHLOROPROPENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TRICHLOROETHENE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TRICHLOROETHENE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TRICHLOROFLUOROMETHANE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	TRICHLOROFLUOROMETHANE	50	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	VINYL CHLORIDE	5	UG/KG	NA
SW846-8021B	5030B	GC/PID/ELCD	5	VINYL CHLORIDE	50	UG/KG	NA
SW846-8041	3510C	FID	1	2,3,4,6-TETRACHLOROPHENOL	40	UG/L	18.065
SW846-8041	3510C	FID	1	2,4,5-TRICHLOROPHENOL	10	UG/L	21.001
SW846-8041	3510C	FID	1	2,4,6-TRIBROMOPHENOL	NA	% REC	NA
SW846-8041	3510C	FID	1	2,4,6-TRICHLOROPHENOL	10	UG/L	6.411
SW846-8041	3510C	FID	1	2,4-DICHLOROPHENOL	10	UG/L	5.181
SW846-8041	3510C	FID	1	2,4-DIMETHYLPHENOL	10	UG/L	8.097
SW846-8041	3510C	FID	1	2,4-DINITROPHENOL	40	UG/L	0.342
SW846-8041	3510C	FID	1	2,6-DICHLOROPHENOL	10	UG/L	7.797
SW846-8041	3510C	FID	1	2-CHLOROPHENOL	10	UG/L	8.339
SW846-8041	3510C	FID	1	2-FLUOROPHENOL	NA	% REC	NA
SW846-8041	3510C	FID	1	2-METHYLPHENOL (O-CRESOL)	10	UG/L	3.486
SW846-8041	3510C	FID	1	2-NITROPHENOL	10	UG/L	6.243

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8041	3510C	FID	1	3-METHYLPHENOL (M-CRESOL)	10	UG/L	6.021
SW846-8041	3510C	FID	1	4,6-DINITRO-2-METHYLPHENOL	40	UG/L	1.038
SW846-8041	3510C	FID	1	4-CHLORO-3-METHYLPHENOL	10	UG/L	6.021
SW846-8041	3510C	FID	1	4-METHYLPHENOL (P-CRESOL)	10	UG/L	13.246
SW846-8041	3510C	FID	1	4-NITROPHENOL	40	UG/L	2.384
SW846-8041	3510C	FID	1	PENTACHLOROPHENOL	40	UG/L	1.213
SW846-8041	3510C	FID	1	PHENOL	10	UG/L	1.914
SW846-8041	3550A	FID	5	2,3,4,6-TETRACHLOROPHENOL	25	MG/KG	2.304
SW846-8041	3550A	FID	5	2,4,5-TRICHLOROPHENOL	1	MG/KG	1.358
SW846-8041	3550A	FID	5	2,4,6-TRIBROMOPHENOL	NA	% REC	NA
SW846-8041	3550A	FID	5	2,4,6-TRICHLOROPHENOL	1	MG/KG	2.063
SW846-8041	3550A	FID	5	2,4-DICHLOROPHENOL	1	MG/KG	2.118
SW846-8041	3550A	FID	5	2,4-DIMETHYLPHENOL	1	MG/KG	1.071
SW846-8041	3550A	FID	5	2,4-DINITROPHENOL	25	MG/KG	NA
SW846-8041	3550A	FID	5	2,6-DICHLOROPHENOL	1	MG/KG	1.11
SW846-8041	3550A	FID	5	2-CHLOROPHENOL	1	MG/KG	1.162
SW846-8041	3550A	FID	5	2-FLUOROPHENOL	NA	% REC	NA
SW846-8041	3550A	FID	5	2-METHYLPHENOL (O-CRESOL)	1	MG/KG	1.891
SW846-8041	3550A	FID	5	2-NITROPHENOL	1	MG/KG	1.633
SW846-8041	3550A	FID	5	3-METHYLPHENOL (M-CRESOL)	1	MG/KG	1.175
SW846-8041	3550A	FID	5	4,6-DINITRO-2-METHYLPHENOL	25	MG/KG	2.504
SW846-8041	3550A	FID	5	4-CHLORO-3-METHYLPHENOL	1	MG/KG	2.014
SW846-8041	3550A	FID	5	4-METHYLPHENOL (P-CRESOL)	1	MG/KG	1.175
SW846-8041	3550A	FID	5	4-NITROPHENOL	25	MG/KG	1.138
SW846-8041	3550A	FID	5	PENTACHLOROPHENOL	25	MG/KG	NA
SW846-8041	3550A	FID	5	PHENOL	1	MG/KG	1.987
SW846-8081A	3510C	GC/ECD	1	4,4'-DDD	0.1	UG/L	0.0391
SW846-8081A	3510C	GC/ECD	1	4,4'-DDE	0.1	UG/L	0.01647
SW846-8081A	3510C	GC/ECD	1	4,4'-DDT	0.1	UG/L	0.0369
SW846-8081A	3510C	GC/ECD	1	ALDRIN	0.05	UG/L	0.01087

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8081A	3510C	GC/ECD	1	ALPHA-BHC	0.05	UG/L	0.0117
SW846-8081A	3510C	GC/ECD	1	ALPHA-CHLORDANE	0.10	UG/L	0.00736
SW846-8081A	3510C	GC/ECD	1	BETA-BHC	0.05	UG/L	0.00846
SW846-8081A	3510C	GC/ECD	1	CHLORDANE	0.5	UG/L	0.1306
SW846-8081A	3510C	GC/ECD	1	DECACHLOROBIPHENYL (DCB)	NA	% REC	NA
SW846-8081A	3510C	GC/ECD	1	DELTA-BHC	0.05	UG/L	0.00509
SW846-8081A	3510C	GC/ECD	1	DIELDRIN	0.1	UG/L	0.0309
SW846-8081A	3510C	GC/ECD	1	ENDOSULFAN I	0.05	UG/L	0.0140
SW846-8081A	3510C	GC/ECD	1	ENDOSULFAN II	0.1	UG/L	0.01380
SW846-8081A	3510C	GC/ECD	1	ENDOSULFAN SULFATE	0.1	UG/L	0.01229
SW846-8081A	3510C	GC/ECD	1	ENDRIN	0.1	UG/L	0.0420
SW846-8081A	3510C	GC/ECD	1	ENDRIN ALDEHYDE	0.1	UG/L	0.01227
SW846-8081A	3510C	GC/ECD	1	ENDRIN KETONE	0.1	UG/L	0.01056
SW846-8081A	3510C	GC/ECD	1	GAMMA-BHC (LINDANE)	0.05	UG/L	0.0111
SW846-8081A	3510C	GC/ECD	1	GAMMA-CHLORDANE	0.10	UG/L	0.00509
SW846-8081A	3510C	GC/ECD	1	HEPTACHLOR	0.05	UG/L	0.0154
SW846-8081A	3510C	GC/ECD	1	HEPTACHLOR EPOXIDE	0.05	UG/L	0.00977
SW846-8081A	3510C	GC/ECD	1	METHOXYCHLOR	0.5	UG/L	0.1838
SW846-8081	3510C	GC/ECD	1	PCB AROCLOR 1016	0.1	UG/L	0.0822
SW846-8081	3510C	GC/ECD	1	PCB AROCLOR 1221	0.5	UG/L	0.0774
SW846-8081	3510C	GC/ECD	1	PCB AROCLOR 1232	0.1	UG/L	0.0414
SW846-8081	3510C	GC/ECD	1	PCB AROCLOR 1242	0.1	UG/L	0.0916
SW846-8081	3510C	GC/ECD	1	PCB AROCLOR 1248	0.1	UG/L	0.0990
SW846-8081	3510C	GC/ECD	1	PCB AROCLOR 1254	0.1	UG/L	0.0756
SW846-8081	3510C	GC/ECD	1	PCB AROCLOR 1260	0.1	UG/L	0.0605
SW846-8081	3510C	GC/ECD	1	PCB AROCLOR 1262	0.1	UG/L	0.0653
SW846-8081	3510C	GC/ECD	1	TOXAPHENE	1	UG/L	0.2415
SW846-8081A	3580A	GC/ECD	4	2-CHLOROBIPHENYL (1)	10	MG/KG	NA
SW846-8081A	3580A	GC/ECD	4	3-CHLOROBIPHENYL	30	MG/KG	NA
SW846-8081A	3580A	GC/ECD	4	4,4'-DDD	1000	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8081A	3580A	GC/ECD	4	4,4'-DDE	1000	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	4,4'-DDT	1000	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	4-CHLOROBIPHENYL	10	MG/KG	NA
SW846-8081A	3580A	GC/ECD	4	ALDRIN	500	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	ALPHA-BHC	500	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	ALPHA-CHLORDANE	5000	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	BETA-BHC	500	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	DECACHLOROBIPHENYL (DCB)		% REC	NA
SW846-8081A	3580A	GC/ECD	4	DELTA-BHC	500	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	DIELDRIN	1000	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	ENDOSULFAN I	500	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	ENDOSULFAN II	1000	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	ENDOSULFAN SULFATE	1000	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	ENDRIN	1000	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	ENDRIN ALDEHYDE	1000	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	ENDRIN KETONE	1000	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	GAMMA-BHC (LINDANE)	500	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	GAMMA-CHLORDANE	5000	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	HEPTACHLOR	500	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	HEPTACHLOR EPOXIDE	500	UG/KG	NA
SW846-8081A	3580A	GC/ECD	4	METHOXYCHLOR	5000	UG/KG	NA
SW846-8081	3580A	GC/ECD	4	PCB AROCLOR 1016	1000	UG/KG	
SW846-8081	3580A	GC/ECD	4	PCB AROCLOR 1221	5000	UG/KG	
SW846-8081	3580A	GC/ECD	4	PCB AROCLOR 1232	1000	UG/KG	
SW846-8081	3580A	GC/ECD	4	PCB AROCLOR 1242	1000	UG/KG	
SW846-8081	3580A	GC/ECD	4	PCB AROCLOR 1248	1000	UG/KG	
SW846-8081	3580A	GC/ECD	4	PCB AROCLOR 1254	1000	UG/KG	
SW846-8081	3580A	GC/ECD	4	PCB AROCLOR 1260	1000	UG/KG	
SW846-8081	3580A	GC/ECD	4	PCB AROCLOR 1262	1000	UG/KG	
SW846-8081A	3580A	GC/ECD	4	TOXAPHENE	10000	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8081A	3550A	GC/ECD	5	2-CHLOROBIPHENYL (1)	10	MG/KG	NA
SW846-8081A	3550A	GC/ECD	5	3-CHLOROBIPHENYL	30	MG/KG	NA
SW846-8081A	3550A	GC/ECD	5	4,4'-DDD	16	UG/KG	0.41
SW846-8081A	3550A	GC/ECD	5	4,4'-DDE	16	UG/KG	0.40
SW846-8081A	3550A	GC/ECD	5	4,4'-DDT	16	UG/KG	0.50
SW846-8081A	3550A	GC/ECD	5	4-CHLOROBIPHENYL	10	MG/KG	NA
SW846-8081A	3550A	GC/ECD	5	ALDRIN	8	UG/KG	0.44
SW846-8081A	3550A	GC/ECD	5	ALPHA-BHC	8	UG/KG	0.47
SW846-8081A	3550A	GC/ECD	5	ALPHA-CHLORDANE	80	UG/KG	0.24
SW846-8081A	3550A	GC/ECD	5	BETA-BHC	8	UG/KG	0.88
SW846-8081A	3550A	GC/ECD	5	CHLORDANE	2.5	UG/KG	6.16
SW846-8081A	3550A	GC/ECD	5	DECACHLOROBIPHENYL (DCB)		% REC	NA
SW846-8081A	3550A	GC/ECD	5	DELTA-BHC	8	UG/KG	NA
SW846-8081A	3550A	GC/ECD	5	DIELDRIN	16	UG/KG	0.19
SW846-8081A	3550A	GC/ECD	5	ENDOSULFAN I	8	UG/KG	0.32
SW846-8081A	3550A	GC/ECD	5	ENDOSULFAN II	16	UG/KG	0.33
SW846-8081A	3550A	GC/ECD	5	ENDOSULFAN SULFATE	16	UG/KG	0.29
SW846-8081A	3550A	GC/ECD	5	ENDRIN	0.5	UG/KG	0.25
SW846-8081A	3550A	GC/ECD	5	ENDRIN ALDEHYDE	16	UG/KG	1.33
SW846-8081A	3550A	GC/ECD	5	ENDRIN KETONE	16	UG/KG	0.61
SW846-8081A	3550A	GC/ECD	5	GAMMA-BHC (LINDANE)	8.0	UG/KG	0.34
SW846-8081A	3550A	GC/ECD	5	GAMMA-CHLORDANE	80	UG/KG	0.28
SW846-8081A	3550A	GC/ECD	5	HEPTACHLOR	8.0	UG/KG	0.52
SW846-8081A	3550A	GC/ECD	5	HEPTACHLOR EPOXIDE	8.0	UG/KG	0.93
SW846-8081A	3550A	GC/ECD	5	METHOXYCHLOR	80	UG/KG	1.63
SW846-8081	3550A	GC/ECD	5	PCB AROCLOR 1016	80	UG/KG	466.4
SW846-8081	3550A	GC/ECD	5	PCB AROCLOR 1221	80	UG/KG	84.0
SW846-8081	3550A	GC/ECD	5	PCB AROCLOR 1232	80	UG/KG	282.8
SW846-8081	3550A	GC/ECD	5	PCB AROCLOR 1242	80	UG/KG	90.7
SW846-8081	3550A	GC/ECD	5	PCB AROCLOR 1248	80	UG/KG	84.0

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8081	3550A	GC/ECD	5	PCB AROCLOR 1254	160	UG/KG	475.2
SW846-8081	3550A	GC/ECD	5	PCB AROCLOR 1260	160	UG/KG	381.9
SW846-8081	3550A	GC/ECD	5	PCB AROCLOR 1262	1000	UG/KG	168.0
SW846-8081A	3550A	GC/ECD	5	TOXAPHENE	160	UG/KG	
SW846-8082	3510C	GC/ECD	1	2,2',3',3',4,4',5,5',6-NONACHLOROBIPHENYL (206)		UG/L	0.00840
SW846-8082	3510C	GC/ECD	1	2,2',3,3',4,4',5-HEPTACHLOROBIPHENYL (170)		UG/L	0.00840
SW846-8082	3510C	GC/ECD	1	2,2',3,4',5,5',6-HEPTACHLOROBIPHENYL (187)		UG/L	0.00594
SW846-8082	3510C	GC/ECD	1	2,2',3,4,4',5',6-HEPTACHLOROBIPHENYL (183)		UG/L	0.00767
SW846-8082	3510C	GC/ECD	1	2,2',3,4,4',5'-HEXACHLOROBIPHENYL (138)		UG/L	0.0000
SW846-8082	3510C	GC/ECD	1	2,2',3,4,4',5,5'HEPTACHLOROBIPHENYL (180)		UG/L	0.00840
SW846-8082	3510C	GC/ECD	1	2,2',3,4,5'-PENTACHLOROBIPHENYL (87)		UG/L	0.00594
SW846-8082	3510C	GC/ECD	1	2,2',3,4,5,5'-HEXACHLOROBIPHENYL (141)		UG/L	0.00594
SW846-8082	3510C	GC/ECD	1	2,2',3,5'-TETRACHLOROBIPHENYL (44)		UG/L	0.02300
SW846-8082	3510C	GC/ECD	1	2,2',3,5,5',6-HEXACHLOROBIPHENYL (151)		UG/L	0.0000
SW846-8082	3510C	GC/ECD	1	2,2',4,4',5,5'-HEXACHLOROBIPHENYL (153)		UG/L	0.00767
SW846-8082	3510C	GC/ECD	1	2,2',4,5,5'-PENTACHLOROBIPHENYL (101)		UG/L	0.01084
SW846-8082	3510C	GC/ECD	1	2,2',5,5'-TETRACHLOROBIPHENYL (52)		UG/L	0.00767
SW846-8082	3510C	GC/ECD	1	2,2',5-TRICHLOROBIPHENYL (18)		UG/L	0.00840
SW846-8082	3510C	GC/ECD	1	2,3',4,4'-TETRACHLOROBIPHENYL (66)		UG/L	0.0000

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8082	3510C	GC/ECD	1	2,3,3',4',6-PENTACHLOROBIPHENYL (110)		UG/L	0.00594
SW846-8082	3510C	GC/ECD	1	2,3-DICHLOROBIPHENYL (5)		UG/L	0.00767
SW846-8082	3510C	GC/ECD	1	2,4',5-TRICHLOROBIPHENYL (31)		UG/L	0.00840
SW846-8082	3510C	GC/ECD	1	2-CHLOROBIPHENYL (1)		UG/L	0.09802
SW846-8082	3510C	GC/ECD	1	DECACHLOROBIPHENYL (DCB)		% REC	NA
SW846-8082	3510C	GC/ECD	1	PCB AROCLOR 1016	0.1	UG/L	0.1523
SW846-8082	3510C	GC/ECD	1	PCB AROCLOR 1221	0.5	UG/L	0.0911
SW846-8082	3510C	GC/ECD	1	PCB AROCLOR 1232	0.1	UG/L	0.0955
SW846-8082	3510C	GC/ECD	1	PCB AROCLOR 1242	0.1	UG/L	0.0831
SW846-8082	3510C	GC/ECD	1	PCB AROCLOR 1248	0.1	UG/L	0.0725
SW846-8082	3510C	GC/ECD	1	PCB AROCLOR 1254	0.1	UG/L	0.0679
SW846-8082	3510C	GC/ECD	1	PCB AROCLOR 1260	0.1	UG/L	0.1696
SW846-8082	3510C	GC/ECD	1	PCB AROCLOR 1262	0.1	UG/L	0.0870
SW846-8082	3580A	GC/ECD	4	2,2',3',3',4,4',5,5',6-NONACHLOROBIPHENYL (206)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',3,3',4,4',5-HEPTACHLOROBIPHENYL (170)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',3,4',5,5',6-HEPTACHLOROBIPHENYL (187)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',3,4,4',5',6-HEPTACHLOROBIPHENYL (183)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',3,4,4',5'-HEXACHLOROBIPHENYL (138)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',3,4,4',5,5'HEPTACHLOROBIPHENYL (180)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',3,4,5'-PENTACHLOROBIPHENYL (87)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',3,4,5,5'-HEXACHLOROBIPHENYL (141)		UG/KG	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8082	3580A	GC/ECD	4	2,2',3,5'-TETRACHLOROBIPHENYL (44)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',3,5,5',6-HEXACHLOROBIPHENYL (151)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',4,4',5,5'-HEXACHLOROBIPHENYL (153)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',4,5,5'-PENTACHLOROBIPHENYL (101)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',5,5'-TETRACHLOROBIPHENYL (52)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,2',5-TRICHLOROBIPHENYL (18)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,3',4,4'-TETRACHLOROBIPHENYL (66)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,3,3',4',6-PENTACHLOROBIPHENYL (110)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,3-DICHLOROBIPHENYL (5)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2,4',5-TRICHLOROBIPHENYL (31)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	2-CHLOROBIPHENYL (1)		UG/KG	NA
SW846-8082	3580A	GC/ECD	4	DECACHLOROBIPHENYL (DCB)		% REC	NA
SW846-8082	3580A	GC/ECD	4	PCB AROCLOR 1016	1000	UG/KG	265.5
SW846-8082	3580A	GC/ECD	4	PCB AROCLOR 1221	5000	UG/KG	386.6
SW846-8082	3580A	GC/ECD	4	PCB AROCLOR 1232	1000	UG/KG	211.4
SW846-8082	3580A	GC/ECD	4	PCB AROCLOR 1242	1000	UG/KG	462.2
SW846-8082	3580A	GC/ECD	4	PCB AROCLOR 1248	1000	UG/KG	234.4
SW846-8082	3580A	GC/ECD	4	PCB AROCLOR 1254	1000	UG/KG	153.4
SW846-8082	3580A	GC/ECD	4	PCB AROCLOR 1260	1000	UG/KG	810.3
SW846-8082	3580A	GC/ECD	4	PCB AROCLOR 1262	1000	UG/KG	620.7
SW846-8082	3545	GC/ECD	5	2,2',3',3',4,4',5,5',6-NONACHLOROBIPHENYL (206)	0.25	MG/KG	0.00840
SW846-8082	3545	GC/ECD	5	2,2',3,3',4,4',5-HEPTACHLOROBIPHENYL (170)	0.25	MG/KG	0.00767
SW846-8082	3545	GC/ECD	5	2,2',3,4',5,5',6-HEPTACHLOROBIPHENYL (187)	0.25	MG/KG	0.01414

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8082	3545	GC/ECD	5	2,2',3,4,4',5',6-HEPTACHLOROBIPHENYL (183)	0.25	MG/KG	0.01188
SW846-8082	3545	GC/ECD	5	2,2',3,4,4',5'-HEXACHLOROBIPHENYL (138)	0.25	MG/KG	0.00840
SW846-8082	3545	GC/ECD	5	2,2',3,4,4',5,5'HEPTACHLOROBIPHENYL (180)	0.25	MG/KG	0.00840
SW846-8082	3545	GC/ECD	5	2,2',3,4,5'-PENTACHLOROBIPHENYL (87)	0.25	MG/KG	0.01084
SW846-8082	3545	GC/ECD	5	2,2',3,4,5,5'-HEXACHLOROBIPHENYL (141)	0.25	MG/KG	0.00840
SW846-8082	3545	GC/ECD	5	2,2',3,5'-TETRACHLOROBIPHENYL (44)	0.5	MG/KG	0.00767
SW846-8082	3545	GC/ECD	5	2,2',3,5,5',6-HEXACHLOROBIPHENYL (151)	0.25	MG/KG	0.00767
SW846-8082	3545	GC/ECD	5	2,2',4,4',5,5'-HEXACHLOROBIPHENYL (153)	0.25	MG/KG	0.01084
SW846-8082	3545	GC/ECD	5	2,2',4,5,5'-PENTACHLOROBIPHENYL (101)	0.5	MG/KG	0.00840
SW846-8082	3545	GC/ECD	5	2,2',5,5'-TETRACHLOROBIPHENYL (52)	0.5	MG/KG	0.0000
SW846-8082	3545	GC/ECD	5	2,2',5-TRICHLOROBIPHENYL (18)	0.5	MG/KG	0.00767
SW846-8082	3545	GC/ECD	5	2,3',4,4'-TETRACHLOROBIPHENYL (66)	0.25	MG/KG	0.00907
SW846-8082	3545	GC/ECD	5	2,3,3',4',6-PENTACHLOROBIPHENYL (110)	0.25	MG/KG	0.00840
SW846-8082	3545	GC/ECD	5	2,3-DICHLOROBIPHENYL (5)	0.5	MG/KG	0.00767
SW846-8082	3545	GC/ECD	5	2,4',5-TRICHLOROBIPHENYL (31)	0.5	MG/KG	0.00767
SW846-8082	3545	GC/ECD	5	2-CHLOROBIPHENYL (1)	5	MG/KG	0.00594
SW846-8082	3545	GC/ECD	5	DECACHLOROBIPHENYL (DCB)		% REC	NA
SW846-8082	3550A	GC/ECD	5	PCB AROCLOR 1016	1	MG/KG	0.4664
SW846-8082	3550A	GC/ECD	5	PCB AROCLOR 1221	5	MG/KG	0.0840
SW846-8082	3550A	GC/ECD	5	PCB AROCLOR 1232	1	MG/KG	0.2828
SW846-8082	3550A	GC/ECD	5	PCB AROCLOR 1242	1	MG/KG	0.0907

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8082	3550A	GC/ECD	5	PCB AROCLOR 1248	1	MG/KG	0.0840
SW846-8082	3550A	GC/ECD	5	PCB AROCLOR 1254	1	MG/KG	0.4752
SW846-8082	3550A	GC/ECD	5	PCB AROCLOR 1260	1	MG/KG	0.3819
SW846-8082	3550A	GC/ECD	5	PCB AROCLOR 1262	1	MG/KG	0.1680
SW846-8082	3545	GC/ECD	5	PCB AROCLOR 1016	1	MG/KG	
SW846-8082	3545	GC/ECD	5	PCB AROCLOR 1221	5	MG/KG	
SW846-8082	3545	GC/ECD	5	PCB AROCLOR 1232	1	MG/KG	
SW846-8082	3545	GC/ECD	5	PCB AROCLOR 1242	1	MG/KG	
SW846-8082	3545	GC/ECD	5	PCB AROCLOR 1248	1	MG/KG	
SW846-8082	3545	GC/ECD	5	PCB AROCLOR 1254	1	MG/KG	
SW846-8082	3545	GC/ECD	5	PCB AROCLOR 1260	1	MG/KG	
SW846-8082	3545	GC/ECD	5	PCB AROCLOR 1262	1	MG/KG	
SW846-8091	3510C	GC/ECD	1	2,4-DINITROTOLUENE	0.02	UG/L	
SW846-8091	3510C	GC/ECD	1	2,6-DINITROTOLUENE	0.01	UG/L	
SW846-8091	3510C	GC/ECD	1	PENTACHLORONITROBENZENE		% REC	NA
SW846-8121	3510C	GC/ECD	1	1,2,3,4-TETRACHLOROBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	1,2,3,5-TETRACHLOROBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	1,2,3-TRICHLOROBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	1,2,4,5-TETRACHLOROBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	1,2,4-TRICHLOROBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	1,2-DICHLOROBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	1,3,5-TRIBROMOBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	1,3,5-TRICHLOROBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	1,3-DICHLOROBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	1,4-DICHLOROBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	2-CHLORONAPHTHALENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	ALPHA-BHC	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	BENZAL CHLORIDE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	BENZOTRICHLORIDE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	BENZYL CHLORIDE	5.0	UG/L	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8121	3510C	GC/ECD	1	BETA-BHC	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	DELTA-BHC	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	GAMMA-BHC (LINDANE)	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	HEXACHLOROBENZENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	HEXACHLOROBUTADIENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	HEXACHLOROCYCLOPENTADIENE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	HEXACHLOROETHANE	5.0	UG/L	
SW846-8121	3510C	GC/ECD	1	PENTACHLOROBENZENE	5.0	UG/L	
SW846-8121	3580A	GC/ECD	4	1,2,3,4-TETRACHLOROBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	1,2,3,5-TETRACHLOROBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	1,2,3-TRICHLOROBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	1,2,4,5-TETRACHLOROBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	1,2,4-TRICHLOROBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	1,2-DICHLOROBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	1,3,5-TRIBROMOBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	1,3,5-TRICHLOROBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	1,3-DICHLOROBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	1,4-DICHLOROBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	2-CHLORONAPHTHALENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	ALPHA-BHC		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	BENZAL CHLORIDE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	BENZOTRICHLORIDE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	BENZYL CHLORIDE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	BETA-BHC		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	DELTA-BHC		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	GAMMA-BHC (LINDANE)		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	HEXACHLOROBENZENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	HEXACHLOROBUTADIENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	HEXACHLOROCYCLOPENTADIENE		UG/KG	NA
SW846-8121	3580A	GC/ECD	4	HEXACHLOROETHANE		UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8121	3580A	GC/ECD	4	PENTACHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	1,2,3,4-TETRACHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	1,2,3,5-TETRACHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	1,2,3-TRICHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	1,2,4,5-TETRACHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	1,2,4-TRICHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	1,2-DICHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	1,3,5-TRIBROMOBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	1,3,5-TRICHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	1,3-DICHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	1,4-DICHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	2-CHLORONAPHTHALENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	ALPHA-BHC		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	BENZAL CHLORIDE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	BENZOTRICHLORIDE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	BENZYL CHLORIDE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	BETA-BHC		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	DELTA-BHC		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	GAMMA-BHC (LINDANE)		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	HEXACHLOROBENZENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	HEXACHLOROBUTADIENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	HEXACHLOROCYCLOPENTADIENE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	HEXACHLOROETHANE		UG/KG	NA
SW846-8121	3550A	GC/ECD	5	PENTACHLOROBENZENE		UG/KG	NA
SW846-8141A	3510C	GC/NPD	1	2-NITRO-M-XYLENE		% REC	NA
SW846-8141A	3510C	GC/NPD	1	CHLOROPYRIFOS (DURSBAN)	0.1	UG/L	0.057
SW846-8141A	3510C	GC/NPD	1	DICHLORVOS		UG/L	0.035
SW846-8141A	3510C	GC/NPD	1	MEVINPHOS		UG/L	0.050
SW846-8141A	3510C	GC/NPD	1	DEMETON A		UG/L	0.030
SW846-8141A	3510C	GC/NPD	1	NALED		UG/L	0.213

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8141A	3510C	GC/NPD	1	PHORATE		UG/L	0.014
SW846-8141A	3510C	GC/NPD	1	DISULFOTON		UG/L	0.029
SW846-8141A	3510C	GC/NPD	1	METHYL PARATHION		UG/L	0.022
SW846-8141A	3510C	GC/NPD	1	RONNEL		UG/L	0.016
SW846-8141A	3510C	GC/NPD	1	FENTHION		UG/L	0.012
SW846-8141A	3510C	GC/NPD	1	ETHOPROP		UG/L	0.034
SW846-8141A	3510C	GC/NPD	1	TRICHLORONATE		UG/L	0.017
SW846-8141A	3510C	GC/NPD	1	MERPHOS		UG/L	0.189
SW846-8141A	3510C	GC/NPD	1	STIROFOS		UG/L	0.204
SW846-8141A	3510C	GC/NPD	1	TOKUTHION		UG/L	0.013
SW846-8141A	3510C	GC/NPD	1	FENSULFOTHION		UG/L	0.190
SW846-8141A	3510C	GC/NPD	1	SULPROFOS		UG/L	0.016
SW846-8141A	3510C	GC/NPD	1	AZINPHOSMETHYL		UG/L	0.091
SW846-8141A	3510C	GC/NPD	1	DIMETHOATE		UG/L	0.056
SW846-8141A	3510C	GC/NPD	1	DIAZINON		UG/L	0.053
SW846-8141A	3510C	GC/NPD	1	ETHYL PARATHION		UG/L	0.066
SW846-8141A	3510C	GC/NPD	1	COUMAPHOS		UG/L	0.100
SW846-8141A	3510C	GC/NPD	1	CHLORPYRIFOS		UG/L	0.057
SW846-8141A	3510C	GC/NPD	1	EPN		UG/L	0.054
SW846-8141A	3510C	GC/NPD	1	MALATHION	0.1	UG/L	0.073
SW846-8141A	3580A	GC/NPD	4	2-NITRO-M-XYLENE		% REC	NA
SW846-8141A	3580A	GC/NPD	4	CHLOROPYRIFOS (DURSBAN)	30	MG/KG	NA
SW846-8141A	3580A	GC/NPD	4	MALATHION	30	MG/KG	NA
SW846-8141A	3550A	GC/NPD	5	2-NITRO-M-XYLENE		% REC	NA
SW846-8141A	3550A	GC/NPD	5	CHLOROPYRIFOS (DURSBAN)	0.1	MG/KG	NA
SW846-8141A	3550A	GC/NPD	5	MALATHION	0.1	MG/KG	NA
SW846-8141A	3550A	GC/NPD	5	MALATHION	1.0	MG/KG	NA
SW846-8151A		GC/ECD	1	2,4,5-TRICHLOROPHENOXYACETIC ACID (2,4,5-T)	1.0	UG/L	
SW846-8151A		GC/ECD	1	2,4-DICHLOROPHENOXYACETIC ACID	10	UG/L	

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8151A		GC/ECD	1	DCAA		% REC	NA
SW846-8151A		GC/ECD	1	SILVEX (2,4,5-TP)	1.0	UG/L	
SW846-8151A		GC/ECD	5	2,4,5-TRICHLOROPHENOXYACETIC ACID (2,4,5-T)	20	UG/KG	NA
SW846-8151A		GC/ECD	5	2,4-DICHLOROPHENOXYACETIC ACID	20	UG/KG	NA
SW846-8151A		GC/ECD	5	DCAA		% REC	NA
SW846-8151A		GC/ECD	5	SILVEX (2,4,5-TP)	20	UG/KG	NA
SW846-8260B	5030B	GC/MS	1	1,1,1,2-TETRACHLOROETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,1,1-TRICHLOROETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,1,2,2-TETRACHLOROETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,1,2-TRICHLOROETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,1-DICHLOROETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,1-DICHLOROETHENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,1-DICHLOROETHYLENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,1-DICHLOROPROPENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2,3-TRICHLOROBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2,3-TRICHLOROPROPANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2,4-TRICHLOROBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2,4-TRIMETHYLBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2-DIBROMO-3-CHLOROPROPANE	10	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2-DIBROMO-3-CHLOROPROPANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2-DIBROMOETHANE (EDB)	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2-DICHLOROBENZENE	10	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2-DICHLOROBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2-DICHLOROETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2-DICHLOROETHENE (CIS & TRANS)	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,2-DICHLOROPROPANE	5	UG/L	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	1	1,3,5-TRIMETHYLBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,3-DICHLOROBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,3-DICHLOROPROPANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,4-DICHLOROBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	1,4-DIOXANE	1000	UG/L	
SW846-8260B	5030B	GC/MS	1	2,2-DICHLOROPROPANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	2-CHLORO-1,3-BUTADIENE (CHLOROPRENE)	5	UG/L	
SW846-8260B	5030B	GC/MS	1	2-CHLOROETHYLVINYLETHER	10	UG/L	
SW846-8260B	5030B	GC/MS	1	2-CHLOROTOLUENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	2-HEXANONE	10	UG/L	
SW846-8260B	5030B	GC/MS	1	3-CHLOROPROPENE (ALLYL CHLORIDE)	20	UG/L	
SW846-8260B	5030B	GC/MS	1	4-BROMOFLUOROBENZENE		% REC	
SW846-8260B	5030B	GC/MS	1	4-CHLOROTOLUENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	4-ISOPROPYLTOLUENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	4-METHYL-2-PENTANONE	10	UG/L	
SW846-8260B	5030B	GC/MS	1	ACETONE (2-PROPANONE)	20	UG/L	
SW846-8260B	5030B	GC/MS	1	ACETONITRILE	50	UG/L	
SW846-8260B	5030B	GC/MS	1	ACROLEIN	50	UG/L	
SW846-8260B	5030B	GC/MS	1	ACRYLONITRILE	70	UG/L	
SW846-8260B	5030B	GC/MS	1	BENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	BROMOBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	BROMOCHLOROMETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	BROMODICHLOROMETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	BROMOFORM	5	UG/L	
SW846-8260B	5030B	GC/MS	1	BROMOMETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	CARBON DISULFIDE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	CARBON TETRACHLORIDE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	CHLOROBENZENE	5	UG/L	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	1	CHLORODIBROMOMETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	CHLOROETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	CHLOROFORM	5	UG/L	
SW846-8260B	5030B	GC/MS	1	CHLOROMETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	CIS-1,2-DICHLOROETHENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	CIS-1,3-DICHLOROPROPENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	DIBROMOCHLOROMETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	DIBROMOFLUOROMETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	DIBROMOMETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	DICHLORODIFLUOROMETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	DICHLOROETHANE-D4		% REC	
SW846-8260B	5030B	GC/MS	1	DICHLOROMETHANE (METHYLENE CHLORIDE)	5	UG/L	
SW846-8260B	5030B	GC/MS	1	DIETHYL ETHER	5	UG/L	
SW846-8260B	5030B	GC/MS	1	ETHYL ACETATE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	ETHYL BENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	ETHYL CYANIDE (PROPIONITRILE)	5	UG/L	
SW846-8260B	5030B	GC/MS	1	ETHYL ETHER	5	UG/L	
SW846-8260B	5030B	GC/MS	1	ETHYL METHACRYLATE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	HEXACHLOROBUTADIENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	IODOMETHANE	10	UG/L	
SW846-8260B	5030B	GC/MS	1	ISOBUTANOL (ISOBUTYL ALCOHOL)	1000	UG/L	
SW846-8260B	5030B	GC/MS	1	ISOPROPYLBENZENE (CUMENE)	5	UG/L	
SW846-8260B	5030B	GC/MS	1	M/P-XYLENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	METHACRYLONITRILE	20	UG/L	
SW846-8260B	5030B	GC/MS	1	METHYL ETHYL KETONE	10	UG/L	
SW846-8260B	5030B	GC/MS	1	METHYL IODIDE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	METHYL ISOBUTYL KETONE	10	UG/L	
SW846-8260B	5030B	GC/MS	1	METHYL METHACRYLATE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	METHYL-T-BUTYL ETHER (MTBE)	5	UG/L	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	1	N-BUTYLBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	N-PROPYLBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	NAPHTHALENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	O-XYLENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	SEC-BUTYLBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	STYRENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	TERT-BUTYLBENZENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	TETRACHLOROETHENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	TETRAHYDROFURAN	10	UG/L	
SW846-8260B	5030B	GC/MS	1	TOLUENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	TOLUENE-D8		% REC	
SW846-8260B	5030B	GC/MS	1	TRANS-1,2-DICHLOROETHENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	TRANS-1,3-DICHLOROPROPENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	TRANS-1,4-DICHLORO-2-BUTENE	20	UG/L	
SW846-8260B	5030B	GC/MS	1	TRICHLOROETHENE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	TRICHLOROFLUOROMETHANE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	VINYL ACETATE	10	UG/L	
SW846-8260B	5030B	GC/MS	1	VINYL CHLORIDE	5	UG/L	
SW846-8260B	5030B	GC/MS	1	XYLENES (O/M/P-XYLENE)	5	UG/L	
SW846-8260B	5030B	GC/MS	4	1,1,1,2-TETRACHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,1,1-TRICHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,1,2,2-TETRACHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,1,2-TRICHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,1-DICHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,1-DICHLOROETHENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,1-DICHLOROPROPENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,2,3-TRICHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,2,3-TRICHLOROPROPANE	0.63	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	4	1,2,4-TRICHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,2,4-TRIMETHYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,2-DIBROMO-3-CHLOROPROPANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,2-DIBROMOETHANE (EDB)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,2-DICHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,2-DICHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,2-DICHLOROETHENE (CIS & TRANS)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,2-DICHLOROPROPANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,3,5-TRIMETHYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,3-DICHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,3-DICHLOROPROPANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	1,4-DICHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	2,2-DICHLOROPROPANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	2-CHLOROETHYLVINYLETHER	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	2-CHLOROTOLUENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	2-HEXANONE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	4-BROMOFLUOROBENZENE		% REC	NA
SW846-8260B	5030B	GC/MS	4	4-CHLOROTOLUENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	4-ISOPROPYLTOLUENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	4-METHYL-2-PENTANONE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	ACETONE (2-PROPANONE)	1.2	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	ACROLEIN	3.1	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	ACRYLONITRILE	4.3	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	BENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	BROMOBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	BROMOCHLOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	BROMODICHLOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	BROMOFORM	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	BROMOMETHANE	0.63	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	4	CARBON DISULFIDE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	CARBON TETRACHLORIDE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	CHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	CHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	CHLOROFORM	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	CHLOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	CIS-1,2-DICHLOROETHENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	CIS-1,3-DICHLOROPROPENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	DIBROMOCHLOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	DIBROMOFLUOROMETHANE		MG/KG	NA
SW846-8260B	5030B	GC/MS	4	DIBROMOMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	DICHLORODIFLUOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	DICHLORODIFLUOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	DICHLOROETHANE-D4		% REC	NA
SW846-8260B	5030B	GC/MS	4	DICHLOROMETHANE (METHYLENE CHLORIDE)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	DIETHYL ETHER	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	ETHYL ACETATE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	ETHYL BENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	ETHYL ETHER	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	HEXACHLOROBUTADIENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	ISOPROPYLBENZENE (CUMENE)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	M/P-XYLENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	METHYL ETHYL KETONE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	METHYL ISOBUTYL KETONE		UG/KG	NA
SW846-8260B	5030B	GC/MS	4	METHYL-T-BUTYL ETHER (MTBE)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	N-BUTYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	N-PROPYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	NAPHTHALENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	O-XYLENE	0.63	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	4	SEC-BUTYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	STYRENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	TERT-BUTYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	TETRACHLOROETHENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	TETRAHYDROFURAN	1.6	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	TOLUENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	TOLUENE-D8		% REC	NA
SW846-8260B	5030B	GC/MS	4	TRANS-1,2-DICHLOROETHENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	TRICHLOROETHENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	TRICHLOROFLUOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	VINYL ACETATE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	VINYL CHLORIDE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	4	XYLENES (O/M/P-XYLENE)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1,1,2-TETRACHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1,1,2-TETRACHLOROETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1,1-TRICHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1,1-TRICHLOROETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1,2,2-TETRACHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1,2,2-TETRACHLOROETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1,2-TRICHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1,2-TRICHLOROETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1-DICHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1-DICHLOROETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1-DICHLOROETHENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1-DICHLOROETHENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,1-DICHLOROPROPENE	0.63	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	5	1,1-DICHLOROPROPENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2,3-TRICHLOROBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2,3-TRICHLOROPROPANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2,4-TRICHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2,4-TRICHLOROBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2,4-TRIMETHYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2,4-TRIMETHYLBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DIBROMO-3-CHLOROPROPANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DIBROMO-3-CHLOROPROPANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DIBROMOETHANE (EDB)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DIBROMOETHANE (EDB)	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DICHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DICHLOROBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DICHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DICHLOROETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DICHLOROETHENE (CIS & TRANS)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DICHLOROETHENE (CIS & TRANS)	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DICHLOROPROPANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,2-DICHLOROPROPANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,3,5-TRIMETHYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,3,5-TRIMETHYLBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,3-DICHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,3-DICHLOROBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,3-DICHLOROPROPANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,3-DICHLOROPROPANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,4-DICHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,4-DICHLOROBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,4-DIOXANE	1000	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	1,4-DIOXANE	63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	2,2-DICHLOROPROPANE	0.63	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	5	2,2-DICHLOROPROPANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	2-CHLORO-1,3-BUTADIENE (CHLOROPRENE)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	2-CHLORO-1,3-BUTADIENE (CHLOROPRENE)	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	2-CHLOROETHYLVINYLETHER	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	2-CHLOROETHYLVINYLETHER	10	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	2-CHLOROTOLUENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	2-CHLOROTOLUENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	2-HEXANONE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	2-HEXANONE	10	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	3-CHLOROPROPENE (ALLYL CHLORIDE)	1.2	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	3-CHLOROPROPENE (ALLYL CHLORIDE)	20	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	4-BROMOFLUOROBENZENE		% REC	NA
SW846-8260B	5030B	GC/MS	5	4-CHLOROTOLUENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	4-CHLOROTOLUENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	4-ISOPROPYLTOLUENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	4-ISOPROPYLTOLUENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	4-METHYL-2-PENTANONE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	4-METHYL-2-PENTANONE	10	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	ACETONE (2-PROPANONE)	1.2	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	ACETONE (2-PROPANONE)	20	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	ACETONITRILE	3.1	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	ACETONITRILE	50	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	ACROLEIN	3.1	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	ACROLEIN	50	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	ACRYLONITRILE	4.4	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	ACRYLONITRILE	70	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	5	BENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	BENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	BROMOBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	BROMOBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	BROMOCHLOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	BROMOCHLOROMETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	BROMOFORM	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	BROMOFORM	5	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	BROMOMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	BROMOMETHANE	10	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	CARBON DISULFIDE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	CARBON DISULFIDE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	CARBON TETRACHLORIDE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	CARBON TETRACHLORIDE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	CHLOROBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	CHLOROBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	CHLORODIBROMOMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	CHLORODIBROMOMETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	CHLOROETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	CHLOROETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	CHLOROFORM	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	CHLOROFORM	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	CHLOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	CHLOROMETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	CIS-1,2-DICHLOROETHENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	CIS-1,2-DICHLOROETHENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	CIS-1,3-DICHLOROPROPENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	CIS-1,3-DICHLOROPROPENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	DIBROMOCHLOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	DIBROMOCHLOROMETHANE	5.0	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	5	DIBROMOMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	DIBROMOMETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	DICHLORODIFLUOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	DICHLORODIFLUOROMETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	DICHLOROETHANE-D4		% REC	NA
SW846-8260B	5030B	GC/MS	5	DICHLOROMETHANE (METHYLENE CHLORIDE)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	DICHLOROMETHANE (METHYLENE CHLORIDE)	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	DIETHYL ETHER	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	DIETHYL ETHER	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	ETHYL ACETATE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	ETHYL ACETATE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	ETHYL BENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	ETHYL BENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	ETHYL CYANIDE (PROPIONITRILE)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	ETHYL CYANIDE (PROPIONITRILE)	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	ETHYL ETHER	5.0	UG/L	NA
SW846-8260B	5030B	GC/MS	5	ETHYL METHACRYLATE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	ETHYL METHACRYLATE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	HEXACHLOROBUTADIENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	HEXACHLOROBUTADIENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	IODOMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	IODOMETHANE	10	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	ISOBUTANOL (ISOBUTYL ALCOHOL)	1000	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	ISOBUTANOL (ISOBUTYL ALCOHOL)	63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	ISOPROPYLBENZENE (CUMENE)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	ISOPROPYLBENZENE (CUMENE)	5	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	M/P-XYLENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	M/P-XYLENE	5	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	5	METHACRYLONITRILE	1.2	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	METHACRYLONITRILE	20	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	METHYL ETHYL KETONE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	METHYL ETHYL KETONE	10	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	METHYL IODIDE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	METHYL ISOBUTYL KETONE	0.63	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	METHYL METHACRYLATE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	METHYL METHACRYLATE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	METHYL-T-BUTYL ETHER (MTBE)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	METHYL-T-BUTYL ETHER (MTBE)	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	N-BUTYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	N-BUTYLBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	N-PROPYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	N-PROPYLBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	NAPHTHALENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	NAPHTHALENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	O-XYLENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	O-XYLENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	SEC-BUTYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	SEC-BUTYLBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	STYRENE	0.31	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	STYRENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	TERT-BUTYLBENZENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	TERT-BUTYLBENZENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	TETRACHLOROETHENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	TETRACHLOROETHENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	TETRAHYDROFURAN	1.6	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	TETRAHYDROFURAN	25	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	TOLUENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	TOLUENE	5.0	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8260B	5030B	GC/MS	5	TOLUENE-D8		% REC	NA
SW846-8260B	5030B	GC/MS	5	TRANS-1,2-DICHLOROETHENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	TRANS-1,2-DICHLOROETHENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	TRANS-1,3-DICHLOROPROPENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	TRANS-1,3-DICHLOROPROPENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	TRANS-1,4-DICHLORO-2-BUTENE	1.2	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	TRANS-1,4-DICHLORO-2-BUTENE	20	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	TRICHLOROETHENE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	TRICHLOROETHENE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	TRICHLOROFLUOROMETHANE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	TRICHLOROFLUOROMETHANE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	VINYL ACETATE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	VINYL ACETATE	10	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	VINYL CHLORIDE	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	VINYL CHLORIDE	5.0	UG/KG	NA
SW846-8260B	5030B	GC/MS	5	XYLENES (O/M/P-XYLENE)	0.63	MG/KG	NA
SW846-8260B	5030B	GC/MS	5	XYLENES (O/M/P-XYLENE)	5.0	UG/KG	NA
SW846-8270C	3510C	GC/MS	1	1,2,3,4-TETRACHLOROBENZENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	1,2,4,5-TETRACHLOROBENZENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	1,2,4-TRICHLOROBENZENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	1,2-DICHLOROBENZENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	1,2-DIPHENYLHYDRAZINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	1,3-DICHLOROBENZENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	1,3-DINITROBENZENE	50	UG/L	
SW846-8270C	3510C	GC/MS	1	1,4-DICHLOROBENZENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	1,4-NAPHTHOQUINONE	50	UG/L	
SW846-8270C	3510C	GC/MS	1	1-NAPHTHYLAMINE	50	UG/L	
SW846-8270C	3510C	GC/MS	1	2,3,4,6-TETRACHLOROPHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2,4,5-TRICHLOROPHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2,4,5-TRICHLOROPHENOL	50	UG/L	

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Table 5.1

RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3510C	GC/MS	1	2,4,6-TRIBROMOPHENOL		% REC	
SW846-8270C	3510C	GC/MS	1	2,4,6-TRICHLOROPHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2,4-DICHLOROPHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2,4-DIMETHYLPHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2,4-DINITROPHENOL	50	UG/L	
SW846-8270C	3510C	GC/MS	1	2,4-DINITROTOLUENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2,6-DICHLOROPHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2,6-DINITROTOLUENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2-ACETYLAMINOFLUORENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2-CHLORONAPHTHALENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2-CHLOROPHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2-FLUOROBIPHENYL		% REC	
SW846-8270C	3510C	GC/MS	1	2-FLUOROPHENOL		% REC	
SW846-8270C	3510C	GC/MS	1	2-METHYLNAPHTHALENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2-METHYLPHENOL (O-CRESOL)	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2-NAPHTHYLAMINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2-NITROANILINE (O-NITROANILINE)	50	UG/L	
SW846-8270C	3510C	GC/MS	1	2-NITROPHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2-PICOLINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	2-PICOLINE	50	UG/L	
SW846-8270C	3510C	GC/MS	1	2-SEC-BUTYL-4,6-DINITROPHENOL (DINOSEB)	10	UG/L	
SW846-8270C	3510C	GC/MS	1	3,3'-DICHLOROBENZIDINE	20	UG/L	
SW846-8270C	3510C	GC/MS	1	3,3'-DIMETHYLBENZIDINE	20	UG/L	
SW846-8270C	3510C	GC/MS	1	3-METHYLCHOLANTHRENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	3-METHYLPHENOL (M-CRESOL)	10	UG/L	
SW846-8270C	3510C	GC/MS	1	3-NITROANILINE (M-NITROANILINE)	50	UG/L	
SW846-8270C	3510C	GC/MS	1	4,6-DINITRO-O-CRESOL(2-METHYL-4,6-DINITROPHENOL)	50	UG/L	
SW846-8270C	3510C	GC/MS	1	4-(DIMETHYLAMINO)AZOBENZENE	10	UG/L	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3510C	GC/MS	1	4-AMINOBIPHENYL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	4-BROMODIPHENYL ETHER	10	UG/L	
SW846-8270C	3510C	GC/MS	1	4-CHLORO-3-METHYLPHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	4-CHLOROANILINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	4-CHLOROPHENYL-PHENYLETHER	10	UG/L	
SW846-8270C	3510C	GC/MS	1	4-METHYLPHENOL (P-CRESOL)	10	UG/L	
SW846-8270C	3510C	GC/MS	1	4-NITROANILINE (P-NITROANILINE)	50	UG/L	
SW846-8270C	3510C	GC/MS	1	4-NITROPHENOL	50	UG/L	
SW846-8270C	3510C	GC/MS	1	4-NITROQUINOLINE-OXIDE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	5-NITRO-O-TOLUIDINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	7,12-DIMETHYLBENZ(A)ANTHRACENE	20	UG/L	
SW846-8270C	3510C	GC/MS	1	ACENAPHTHENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ACENAPHTHYLENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ACETOPHENONE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ALDRIN	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ALPHA-BHC	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ALPHA-ENDOSULFAN	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ANILINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ANTHRACENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ARAMITE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BENZIDINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BENZO(A)ANTHRACENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BENZO(A)ANTHRACENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BENZO(A)PYRENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BENZO(B)FLUORANTHENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BENZO(G,H,I)PERYLENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BENZO(K)FLUORANTHENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BENZOIC ACID	50	UG/L	
SW846-8270C	3510C	GC/MS	1	BENZYL ALCOHOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BENZYLBUTYLPHTHALATE	10	UG/L	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3510C	GC/MS	1	BETA-BHC	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BETA-ENDOSULFAN	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BIS(2-CHLOROETHOXY)METHANE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BIS(2-CHLOROETHYL)ETHER	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BIS(2-CHLOROISOPROPYL)ETHER	10	UG/L	
SW846-8270C	3510C	GC/MS	1	BIS(2-ETHYLHEXYL)PHTHALATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	CARBAZOLE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	CHLORDANE	50	UG/L	
SW846-8270C	3510C	GC/MS	1	CHLOROBENZILATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	CHRYSENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DELTA-BHC	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DI-N-BUTYLPHTHALATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DI-N-OCTYLPHTHALATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DI-N-PROPYLNITROSOAMINE	50	UG/L	
SW846-8270C	3510C	GC/MS	1	DIALLATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DIBENZ(A,H)ANTHRACENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DIBENZOFURAN	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DIELDRIN	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DIETHYLPHTHALATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DIMETHOATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DIMETHYL BENZENEETHANAMINE	20	UG/L	
SW846-8270C	3510C	GC/MS	1	DIMETHYLPHTHALATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DINITROBENZENES	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DINITROBENZENES	50	UG/L	
SW846-8270C	3510C	GC/MS	1	DIPHENYLAMINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	DISULFOTON	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ENDOSULFAN SULFATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ENDRIN	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ENDRIN ALDEHYDE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ETHYL METHANESULFONATE	10	UG/L	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3510C	GC/MS	1	ETHYL PARATHION (PARATHION)	10	UG/L	
SW846-8270C	3510C	GC/MS	1	FAMPHUR	10	UG/L	
SW846-8270C	3510C	GC/MS	1	FLUORANTHENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	FLUORENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	GAMMA-BHC (LINDANE)	10	UG/L	
SW846-8270C	3510C	GC/MS	1	HEPTACHLOR	10	UG/L	
SW846-8270C	3510C	GC/MS	1	HEPTACHLOR EPOXIDE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	HEXACHLOROBENZENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	HEXACHLOROBUTADIENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	HEXACHLOROCYCLOPENTADIENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	HEXACHLOROETHANE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	HEXACHLOROPHENE	200	UG/L	
SW846-8270C	3510C	GC/MS	1	HEXACHLOROPROPENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	INDENO(1,2,3-CD)PYRENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ISODRIN	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ISOPHORONE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	ISOSAFROLE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	KEPONE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	METHAPYRILENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	METHOXYCHLOR	50	UG/L	
SW846-8270C	3510C	GC/MS	1	METHYL METHANESULFONATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	METHYL PARATHION	10	UG/L	
SW846-8270C	3510C	GC/MS	1	METHYLPHENOLS (CRESOLS)	10	UG/L	
SW846-8270C	3510C	GC/MS	1	N-NITROSO-DI-N-PROPYLAMINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	N-NITROSODI-N-BUTYLAMINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	N-NITROSODIETHYLAMINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	N-NITROSODIMETHYLAMINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	N-NITROSODIPHENYLAMINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	N-NITROSOMETHYLETHYLAMINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	N-NITROSOMORPHOLINE	10	UG/L	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3510C	GC/MS	1	N-NITROSOPIPERIDINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	N-NITROSOPYRROLIDINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	NAPHTHALENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	NITROBENZENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	NITROBENZENE-D5		% REC	
SW846-8270C	3510C	GC/MS	1	O,O,O-TRIETHYL PHOSPHOROTHIOATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	O-TOLUIDINE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	P,P'-DDD	10	UG/L	
SW846-8270C	3510C	GC/MS	1	P,P'-DDE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	P,P'-DDT	10	UG/L	
SW846-8270C	3510C	GC/MS	1	P-PHENYLENEDIAMINE	20	UG/L	
SW846-8270C	3510C	GC/MS	1	PCB AROCLOR 1016	50	UG/L	
SW846-8270C	3510C	GC/MS	1	PCB AROCLOR 1221	50	UG/L	
SW846-8270C	3510C	GC/MS	1	PCB AROCLOR 1232	50	UG/L	
SW846-8270C	3510C	GC/MS	1	PCB AROCLOR 1242	50	UG/L	
SW846-8270C	3510C	GC/MS	1	PCB AROCLOR 1248	50	UG/L	
SW846-8270C	3510C	GC/MS	1	PCB AROCLOR 1254	50	UG/L	
SW846-8270C	3510C	GC/MS	1	PCB AROCLOR 1260	50	UG/L	
SW846-8270C	3510C	GC/MS	1	PENTACHLOROBENZENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	PENTACHLOROETHANE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	PENTACHLORONITROBENZENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	PENTACHLOROPHENOL	50	UG/L	
SW846-8270C	3510C	GC/MS	1	PHENACETIN	10	UG/L	
SW846-8270C	3510C	GC/MS	1	PHENANTHRENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	PHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	PHENOL-D5		% REC	
SW846-8270C	3510C	GC/MS	1	PHORATE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	PHORATE	50	UG/L	
SW846-8270C	3510C	GC/MS	1	PRONAMIDE	10	UG/L	

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3510C	GC/MS	1	PYRENE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	PYRIDINE	50	UG/L	
SW846-8270C	3510C	GC/MS	1	SAFROLE	10	UG/L	
SW846-8270C	3510C	GC/MS	1	SYM-(1,3,5)-TRINITROBENZENE	20	UG/L	
SW846-8270C	3510C	GC/MS	1	TERPHENYL-D14		% REC	
SW846-8270C	3510C	GC/MS	1	TETRACHLOROBENZENES	10	UG/L	
SW846-8270C	3510C	GC/MS	1	TETRACHLOROPHENOL	10	UG/L	
SW846-8270C	3510C	GC/MS	1	TETRAETHYL DITHIOPYROPHOSPHATE (SULFOTEPP)	10	UG/L	
SW846-8270C	3510C	GC/MS	1	THIONAZIN	10	UG/L	
SW846-8270C	3510C	GC/MS	1	TOLUENEDIAMINE	50	UG/L	
SW846-8270C	3510C	GC/MS	1	TOXAPHENE	50	UG/L	
SW846-8270C	3580A	GC/MS	4	1,2,3,4-TETRACHLOROBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	1,2,4,5-TETRACHLOROBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	1,2,4-TRICHLOROBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	1,2-DICHLOROBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	1,2-DIPHENYLHYDRAZINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	1,3-DICHLOROBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	1,3-DINITROBENZENE	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	1,4-DICHLOROBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	1,4-NAPHTHOQUINONE	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	1-NAPHTHYLAMINE	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2,3,4,6-TETRACHLOROPHENOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2,4,5-TRICHLOROPHENOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2,4,6-TRIBROMOPHENOL		% REC	NA
SW846-8270C	3580A	GC/MS	4	2,4,6-TRICHLOROPHENOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2,4-DICHLOROPHENOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2,4-DIMETHYLPHENOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2,4-DINITROPHENOL	500	MG/KG	NA

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Table 5.1

RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3580A	GC/MS	4	2,4-DINITROTOLUENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2,6-DICHLOROPHENOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2,6-DINITROTOLUENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2-ACETYLAMINOFLUORENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2-CHLORONAPHTHALENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2-CHLOROPHENOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2-FLUOROBIPHENYL	NA	% REC	NA
SW846-8270C	3580A	GC/MS	4	2-FLUOROPHENOL	NA	% REC	NA
SW846-8270C	3580A	GC/MS	4	2-METHYLNAPHTHALENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2-METHYLPHENOL (O-CRESOL)	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2-NAPHTHYLAMINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2-NITROANILINE (O-NITROANILINE)	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2-NITROPHENOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2-PICOLINE	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	2-SEC-BUTYL-4,6-DINITROPHENOL (DINOSEB)	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	3,3'-DICHLOROBENZIDINE	200	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	3,3'-DIMETHYLBENZIDINE	200	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	3-METHYLCHOLANTHRENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	3-METHYLPHENOL (M-CRESOL)	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	3-NITROANILINE (M-NITROANILINE)	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	4,6-DINITRO-O-CRESOL(2-METHYL-4,6-DINITROPHENOL)	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	4-(DIMETHYLAMINO)AZOBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	4-AMINOBIPHENYL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	4-BROMODIPHENYL ETHER	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	4-CHLORO-3-METHYLPHENOL (P-CHLORO-M-CRESOL)	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	4-CHLOROANILINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	4-CHLOROPHENYL-PHENYLETHER	100	MG/KG	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3580A	GC/MS	4	4-METHYLPHENOL (P-CRESOL)	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	4-NITROANILINE (P-NITROANILINE)	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	4-NITROPHENOL	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	4-NITROQUINOLINE-OXIDE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	5-NITRO-O-TOLUIDINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	7,12-DIMETHYLBENZ(A)ANTHRACENE	200	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ACENAPHTHENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ACENAPHTHYLENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ACETOPHENONE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ALDRIN	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ALPHA-BHC	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ALPHA-ENDOSULFAN	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ANILINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ANTHRACENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ARAMITE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BENZIDINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BENZO(A)ANTHRACENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BENZO(A)ANTHRACENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BENZO(A)PYRENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BENZO(B)FLUORANTHENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BENZO(G,H,I)PERYLENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BENZO(K)FLUORANTHENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BENZOIC ACID	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BENZYL ALCOHOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BENZYLBUTYLPHTHALATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BETA-BHC	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BETA-ENDOSULFAN	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BIS(2-CHLOROETHOXY)METHANE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BIS(2-CHLOROETHYL)ETHER	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	BIS(2-CHLOROISOPROPYL)ETHER	100	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3580A	GC/MS	4	BIS(2-ETHYLHEXYL)PHTHALATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	CARBAZOLE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	CHLORDANE	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	CHLOROBENZILATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	CHRYSENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DELTA-BHC	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DI-N-BUTYLPHTHALATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DI-N-OCTYLPHTHALATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DI-N-PROPYLNITROSOAMINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DIALLATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DIBENZ(A,H)ANTHRACENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DIBENZOFURAN	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DIELDRIN	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DIETHYLPHTHALATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DIMETHOATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DIMETHYL BENZENEETHANAMINE	200	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DIMETHYLPHTHALATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DINITROBENZENES	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DIPHENYLAMINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	DISULFOTON	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ENDOSULFAN SULFATE	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ENDRIN	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ENDRIN ALDEHYDE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ETHYL METHANESULFONATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ETHYL PARATHION (PARATHION)	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	FAMPHUR	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	FLUORANTHENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	FLUORENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	GAMMA-BHC (LINDANE)	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	HEPTACHLOR	100	MG/KG	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3580A	GC/MS	4	HEPTACHLOR EPOXIDE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	HEXACHLOROBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	HEXACHLOROBUTADIENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	HEXACHLOROCYCLOPENTADIENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	HEXACHLOROETHANE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	HEXACHLOROPHENE	2000	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	HEXACHLOROPROPENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	INDENO(1,2,3-CD)PYRENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ISODRIN	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ISOPHORONE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	ISOSAFROLE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	KEPONE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	METHAPYRILENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	METHOXYCHLOR	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	METHYL METHANESULFONATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	METHYL PARATHION	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	METHYLPHENOLS (CRESOLS)	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	N-NITROSO-DI-N-PROPYLAMINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	N-NITROSODI-N-BUTYLAMINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	N-NITROSODIETHYLAMINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	N-NITROSODIMETHYLAMINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	N-NITROSODIPHENYLAMINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	N-NITROSOMETHYLETHYLAMINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	N-NITROSOMORPHOLINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	N-NITROSOPIPERIDINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	N-NITROSOPYRROLIDINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	NAPHTHALENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	NITROBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	NITROBENZENE-D5		% REC	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3580A	GC/MS	4	O,O,O-TRIETHYL PHOSPHOROTHIOATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	O-TOLUIDINE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	P,P'-DDD	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	P,P'-DDE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	P,P'-DDT	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	P-PHENYLENEDIAMINE	200	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PCB AROCLOR 1016	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PCB AROCLOR 1221	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PCB AROCLOR 1232	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PCB AROCLOR 1242	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PCB AROCLOR 1248	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PCB AROCLOR 1254	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PCB AROCLOR 1260	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PENTACHLOROBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PENTACHLOROETHANE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PENTACHLORONITROBENZENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PENTACHLOROPHENOL	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PHENACETIN	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PHENANTHRENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PHENOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PHENOL-D5		% REC	NA
SW846-8270C	3580A	GC/MS	4	PHORATE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PRONAMIDE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PYRENE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	PYRIDINE	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	SAFROLE	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	SYM-(1,3,5)-TRINITROBENZENE	200	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	TERPHENYL-D14		% REC	NA
SW846-8270C	3580A	GC/MS	4	TETRACHLOROBENZENES	100	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3580A	GC/MS	4	TETRACHLOROPHENOL	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	TETRAETHYL DITHIOPYROPHOSPHATE (SULFOTEPP)	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	THIONAZIN	100	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	TOLUENEDIAMINE	500	MG/KG	NA
SW846-8270C	3580A	GC/MS	4	TOXAPHENE	500	MG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	1,2,3,4-TETRACHLOROBENZENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	1,2,4,5-TETRACHLOROBENZENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	1,2,4-TRICHLOROBENZENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	1,2-DIPHENYLHYDRAZINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	1,4-NAPHTHOQUINONE	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	1-NAPHTHYLAMINE	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,3,4,6-TETRACHLOROPHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,4,5-TRICHLOROPHENOL	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,4,5-TRICHLOROPHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,4,6-TRIBROMOPHENOL		% REC	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,4,6-TRICHLOROPHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,4-DICHLOROPHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,4-DIMETHYLPHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,4-DINITROPHENOL	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,4-DINITROTOLUENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,6-DICHLOROPHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2,6-DINITROTOLUENE	330	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3550A/3540C	GC/MS	5	2-ACETYLAMINOFLUORENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-CHLORONAPHTHALENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-CHLOROPHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-FLUOROBIPHENYL		% REC	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-FLUOROPHENOL		% REC	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-METHYLNAPHTHALENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-METHYLPHENOL (O-CRESOL)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-NAPHTHYLAMINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-NITROANILINE (O-NITROANILINE)	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-NITROPHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-PICOLINE	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	2-SEC-BUTYL-4,6-DINITROPHENOL (DINOSEB)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	3,3'-DICHLOROBENZIDINE	660	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	3,3'-DIMETHYLBENZIDINE	660	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	3-METHYLCHOLANTHRENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	3-METHYLPHENOL (M-CRESOL)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	3-NITROANILINE (M-NITROANILINE)	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4,6-DINITRO-O-CRESOL(2-METHYL-4,6-DINITROPHENOL)	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4-(DIMETHYLAMINO)AZOBENZENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4-AMINOBIPHENYL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4-BROMODIPHENYL ETHER	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4-CHLORO-3-METHYLPHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4-CHLOROANILINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4-CHLOROPHENYL-PHENYLETHER	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4-METHYLPHENOL (P-CRESOL)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4-NITROANILINE (P-NITROANILINE)	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4-NITROPHENOL	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	4-NITROQUINOLINE-OXIDE	330	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3550A/3540C	GC/MS	5	5-NITRO-O-TOLUIDINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	7,12-DIMETHYLBENZ(A)ANTHRACENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ACENAPHTHENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ACENAPHTHYLENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ACETOPHENONE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ALDRIN	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ALPHA-BHC	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ALPHA-ENDOSULFAN	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ANILINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ANTHRACENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ARAMITE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BENZIDINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BENZO(A)ANTHRACENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BENZO(A)ANTHRACENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BENZO(A)PYRENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BENZO(B)FLUORANTHENE (3,4-BENZOFLUORANTHENE)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BENZO(G,H,I)PERYLENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BENZO(K)FLUORANTHENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BENZOIC ACID	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BENZYL ALCOHOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BENZYLBUTYLPHTHALATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BETA-BHC	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BETA-ENDOSULFAN	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BIS(2-CHLOROETHOXY)METHANE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BIS(2-CHLOROETHYL)ETHER	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BIS(2-CHLOROISOPROPYL)ETHER	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	BIS(2-ETHYLHEXYL)PHTHALATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	CARBAZOLE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	CHLORDANE	1600	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3550A/3540C	GC/MS	5	CHLOROBENZILATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	CHRYSENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DELTA-BHC	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DI-N-BUTYLPHTHALATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DI-N-OCTYLPHTHALATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DI-N-PROPYLNITROSOAMINE	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DIALLATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DIBENZ(A,H)ANTHRACENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DIBENZOFURAN	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DIELDRIN	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DIETHYLPHTHALATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DIMETHOATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DIMETHYL BENZENEETHANAMINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DIMETHYLPHTHALATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DINITROBENZENES	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DIPHENYLAMINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	DISULFOTON	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ENDOSULFAN SULFATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ENDRIN	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ENDRIN ALDEHYDE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ETHYL METHANESULFONATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ETHYL PARATHION (PARATHION)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	FAMPHUR	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	FLUORANTHENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	FLUORENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	GAMMA-BHC (LINDANE)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	HEPTACHLOR	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	HEPTACHLOR EPOXIDE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	HEXACHLOROBENZENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	HEXACHLOROBUTADIENE	330	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3550A/3540C	GC/MS	5	HEXACHLOROCYCLOPENTADIENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	HEXACHLOROETHANE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	HEXACHLOROPROPENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	INDENO(1,2,3-CD)PYRENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ISODRIN	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ISOPHORONE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	ISOSAFROLE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	KEPONE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	METHAPYRILENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	METHOXYCHLOR	1700	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	METHYL METHANESULFONATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	METHYL PARATHION	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	N-NITROSO-DI-N-PROPYLAMINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	N-NITROSODI-N-BUTYLAMINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	N-NITROSODIETHYLAMINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	N-NITROSODIMETHYLAMINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	N-NITROSODIPHENYLAMINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	N-NITROSOMETHYLETHYLAMINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	N-NITROSOMORPHOLINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	N-NITROSOPIPERIDINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	N-NITROSOPYRROLIDINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	NAPHTHALENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	NITROBENZENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	NITROBENZENE-D5		% REC	NA
SW846-8270C	3550A/3540C	GC/MS	5	O,O,O-TRIETHYL PHOSPHOROTHIOATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	O-TOLUIDINE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	P,P'-DDD	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	P,P'-DDE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	P,P'-DDT	330	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3550A/3540C	GC/MS	5	P-PHENYLENEDIAMINE	660	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PCB AROCLOR 1016	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PCB AROCLOR 1221	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PCB AROCLOR 1232	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PCB AROCLOR 1242	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PCB AROCLOR 1248	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PCB AROCLOR 1254	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PCB AROCLOR 1260	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PENTACHLOROBENZENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PENTACHLOROETHANE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PENTACHLORONITROBENZENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PENTACHLOROPHENOL	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PHENACETIN	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PHENANTHRENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PHENOL-D5		% REC	NA
SW846-8270C	3550A/3540C	GC/MS	5	PHORATE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PRONAMIDE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PYRENE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	PYRIDINE	1600	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	SAFROLE	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	SYM-(1,3,5)-TRINITROBENZENE	660	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	TERPHENYL-D14		% REC	NA
SW846-8270C	3550A/3540C	GC/MS	5	TETRACHLOROBENZENES	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	TETRACHLOROPHENOL	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	TETRAETHYL DITHIOPYROPHOSPHATE (SULFOTEPP)	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	THIONAZIN	330	UG/KG	NA
SW846-8270C	3550A/3540C	GC/MS	5	TOLUENEDIAMINE	1600	UG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8270C	3550A/3540C	GC/MS	5	TOXAPHENE	1600	UG/KG	NA
SW846-8280	3510C	GC/MS	1	1,2,3,4,6,7,8-HEPTACHLORODIBENZODIOXIN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	1,2,3,4,7,8-HEXACHLORODIBENZODIOXIN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	1,2,3,6,7,8-HEXACHLORODIBENZODIOXIN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	1,2,3,7,8,9-HEXACHLORODIBENZODIOXIN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	1,2,3,7,8-PENTACHLORODIBENZODIOXIN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	2,3,7,8-TCDD	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	2,3,7,8-TETRACHLORODIBENZOFURAN	0.3	NG/L	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8280	3510C	GC/MS	1	OCTACHLORODIBENZODIOXIN	0.3	NG/L	
SW846-8280	3510C	GC/MS	1	OCTACHLORODIBENZOFURAN	0.3	NG/L	
SW846-8280	3550A	GC/MS	5	1,2,3,4,6,7,8-HEPTACHLORODIBENZODIOXIN		UG/KG	
SW846-8280	3550A	GC/MS	5	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN		UG/KG	
SW846-8280	3550A	GC/MS	5	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN		UG/KG	
SW846-8280	3550A	GC/MS	5	1,2,3,4,7,8-HEXACHLORODIBENZODIOXIN		UG/KG	
SW846-8280	3550A	GC/MS	5	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN		UG/KG	
SW846-8280	3550A	GC/MS	5	1,2,3,6,7,8-HEXACHLORODIBENZODIOXIN		UG/KG	
SW846-8280	3550A	GC/MS	5	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN		UG/KG	
SW846-8280	3550A	GC/MS	5	1,2,3,7,8,9-HEXACHLORODIBENZODIOXIN		UG/KG	
SW846-8280	3550A	GC/MS	5	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN		UG/KG	
SW846-8280	3550A	GC/MS	5	1,2,3,7,8-PENTACHLORODIBENZODIOXIN		UG/KG	
SW846-8280	3550A	GC/MS	5	1,2,3,7,8-PENTACHLORODIBENZOFURAN		UG/KG	
SW846-8280	3550A	GC/MS	5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN		UG/KG	
SW846-8280	3550A	GC/MS	5	2,3,4,7,8-PENTACHLORODIBENZOFURAN		UG/KG	
SW846-8280	3550A	GC/MS	5	2,3,7,8-TCDD		UG/KG	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8280	3550A	GC/MS	5	2,3,7,8-TETRACHLORODIBENZOFURAN		UG/KG	
SW846-8280	3550A	GC/MS	5	OCTACHLORODIBENZODIOXIN		UG/KG	
SW846-8280	3550A	GC/MS	5	OCTACHLORODIBENZOFURAN		UG/KG	
SW846-8310	3510C	HPLC	1	2-FLUOROBIPHENYL		% REC	NA
SW846-8310	3510C	HPLC	1	ACENAPHTHENE	0.16	UG/L	
SW846-8310	3510C	HPLC	1	ACENAPHTHYLENE	0.40	UG/L	
SW846-8310	3510C	HPLC	1	ANTHRACENE	0.08	UG/L	
SW846-8310	3510C	HPLC	1	BENZO(A)ANTHRACENE	0.13	UG/L	
SW846-8310	3510C	HPLC	1	BENZO(A)PYRENE	0.23	UG/L	
SW846-8310	3510C	HPLC	1	BENZO(B)FLUORANTHENE	0.10	UG/L	
SW846-8310	3510C	HPLC	1	BENZO(G,H,I)PERYLENE	0.20	UG/L	
SW846-8310	3510C	HPLC	1	BENZO(K)FLUORANTHENE	0.06	UG/L	
SW846-8310	3510C	HPLC	1	CHRYSENE	0.05	UG/L	
SW846-8310	3510C	HPLC	1	DIBENZ(A,H)ANTHRACENE	0.13	UG/L	
SW846-8310	3510C	HPLC	1	FLUORANTHENE	0.08	UG/L	
SW846-8310	3510C	HPLC	1	FLUORENE	0.13	UG/L	
SW846-8310	3510C	HPLC	1	INDENO(1,2,3-CD)PYRENE	0.13	UG/L	
SW846-8310	3510C	HPLC	1	NAPHTHALENE	0.16	UG/L	
SW846-8310	3510C	HPLC	1	PHENANTHRENE	0.16	UG/L	
SW846-8310	3510C	HPLC	1	PYRENE	0.08	UG/L	
SW846-8310	3580A	HPLC	4	2-FLUOROBIPHENYL		% REC	NA
SW846-8310	3580A	HPLC	4	ACENAPHTHENE	0.06	MG/KG	NA
SW846-8310	3580A	HPLC	4	ACENAPHTHYLENE	0.39	MG/KG	NA
SW846-8310	3580A	HPLC	4	ANTHRACENE	0.12	MG/KG	NA
SW846-8310	3580A	HPLC	4	BENZO(A)ANTHRACENE	0.06	MG/KG	NA
SW846-8310	3580A	HPLC	4	BENZO(A)PYRENE	0.24	MG/KG	NA
SW846-8310	3580A	HPLC	4	BENZO(B)FLUORANTHENE	0.12	MG/KG	NA
SW846-8310	3580A	HPLC	4	BENZO(G,H,I)PERYLENE	0.21	MG/KG	NA
SW846-8310	3580A	HPLC	4	BENZO(K)FLUORANTHENE	0.09	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8310	3580A	HPLC	4	CHRYSENE	0.12	MG/KG	NA
SW846-8310	3580A	HPLC	4	DIBENZ(A,H)ANTHRACENE	0.15	MG/KG	NA
SW846-8310	3580A	HPLC	4	FLUORANTHENE	0.09	MG/KG	NA
SW846-8310	3580A	HPLC	4	FLUORENE	0.12	MG/KG	NA
SW846-8310	3580A	HPLC	4	FLUORENE	0.13	MG/KG	NA
SW846-8310	3580A	HPLC	4	INDENO(1,2,3-CD)PYRENE	0.12	MG/KG	NA
SW846-8310	3580A	HPLC	4	INDENO(1,2,3-CD)PYRENE	0.13	MG/KG	NA
SW846-8310	3580A	HPLC	4	NAPHTHALENE	0.12	MG/KG	NA
SW846-8310	3580A	HPLC	4	NAPHTHALENE	0.13	MG/KG	NA
SW846-8310	3580A	HPLC	4	PHENANTHRENE	0.06	MG/KG	NA
SW846-8310	3580A	HPLC	4	PYRENE	0.06	MG/KG	NA
SW846-8310	3550A	HPLC	5	2-FLUOROBIPHENYL		% REC	NA
SW846-8310	3550A	HPLC	5	ACENAPHTHENE	0.06	MG/KG	NA
SW846-8310	3550A	HPLC	5	ACENAPHTHYLENE	0.39	MG/KG	NA
SW846-8310	3550A	HPLC	5	ANTHRACENE	0.12	MG/KG	NA
SW846-8310	3550A	HPLC	5	BENZO(A)ANTHRACENE	0.06	MG/KG	NA
SW846-8310	3550A	HPLC	5	BENZO(A)PYRENE	0.24	MG/KG	NA
SW846-8310	3550A	HPLC	5	BENZO(B)FLUORANTHENE	0.12	MG/KG	NA
SW846-8310	3550A	HPLC	5	BENZO(G,H,I)PERYLENE	0.21	MG/KG	NA
SW846-8310	3550A	HPLC	5	BENZO(K)FLUORANTHENE	0.09	MG/KG	NA
SW846-8310	3550A	HPLC	5	CHRYSENE	0.12	MG/KG	NA
SW846-8310	3550A	HPLC	5	DIBENZ(A,H)ANTHRACENE	0.15	MG/KG	NA
SW846-8310	3550A	HPLC	5	FLUORANTHENE	0.09	MG/KG	NA
SW846-8310	3550A	HPLC	5	FLUORENE	0.13	MG/KG	NA
SW846-8310	3550A	HPLC	5	INDENO(1,2,3-CD)PYRENE	0.13	MG/KG	NA
SW846-8310	3550A	HPLC	5	NAPHTHALENE	0.13	MG/KG	NA
SW846-8310	3550A	HPLC	5	PHENANTHRENE	0.06	MG/KG	NA
SW846-8310	3550A	HPLC	5	PYRENE	0.06	MG/KG	NA
SW846-8316		HPLC	1	ACRYLAMIDE		MG/L	
SW846-8316		HPLC	5	ACRYLAMIDE	20	UG/KG	NA

Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8318		HPLC	1	4-BROMO-3,5-DIMETHYLPHENYL N-METHYLCARBAMATE		% REC	NA
SW846-8318		HPLC	1	ALDICARB	3.0	UG/L	
SW846-8318		HPLC	1	CARBOFURAN	3.0	UG/L	
SW846-8318		HPLC	4	4-BROMO-3,5-DIMETHYLPHENYL N-METHYLCARBAMATE		% REC	NA
SW846-8318		HPLC	4	ALDICARB		UG/KG	NA
SW846-8318		HPLC	4	CARBOFURAN		UG/KG	NA
SW846-8318		HPLC	5	4-BROMO-3,5-DIMETHYLPHENYL N-METHYLCARBAMATE		% REC	NA
SW846-8318		HPLC	5	ALDICARB	5.0	UG/KG	NA
SW846-8318		HPLC	5	CARBOFURAN	4.0	UG/KG	NA
SW846-8330		HPLC	1	1,3,5-TNB	0.60	UG/L	
SW846-8330		HPLC	1	1,3-DINITROBENZENE	0.32	UG/L	
SW846-8330		HPLC	1	2,4,6-TNT	0.50	UG/L	
SW846-8330		HPLC	1	2,4-DINITROTOLUENE	0.32	UG/L	
SW846-8330		HPLC	1	2,6-DINITROTOLUENE	0.32	UG/L	
SW846-8330		HPLC	1	2-AMINO-4,6-DNT	0.50	UG/L	
SW846-8330		HPLC	1	2-NITROTOLUENE	0.50	UG/L	
SW846-8330		HPLC	1	3-NITROTOLUENE	0.60	UG/L	
SW846-8330		HPLC	1	4-AMINO-2,6-DNT	0.32	UG/L	
SW846-8330		HPLC	1	4-NITROTOLUENE	0.50	UG/L	
SW846-8330		HPLC	1	HMX	0.50	UG/L	
SW846-8330		HPLC	1	NITROBENZENE	0.60	UG/L	
SW846-8330		HPLC	1	RDX	0.60	UG/L	
SW846-8330		HPLC	1	TETRYL	0.50	UG/L	
SW846-8330		HPLC	5	1,3,5-TNB	0.25	MG/KG	NA
SW846-8330		HPLC	5	1,3-DINITROBENZENE	0.25	MG/KG	NA
SW846-8330		HPLC	5	2,4,6-TNT	0.25	MG/KG	NA
SW846-8330		HPLC	5	2,4-DINITROTOLUENE	0.25	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-8330		HPLC	5	2,6-DINITROTOLUENE	0.25	MG/KG	NA
SW846-8330		HPLC	5	2-AMINO-4,6-DNT	NA	% REC	NA
SW846-8330		HPLC	5	2-NITROTOLUENE	0.25	MG/KG	NA
SW846-8330		HPLC	5	3-NITROTOLUENE	0.25	MG/KG	NA
SW846-8330		HPLC	5	4-AMINO-2,6-DNT	0.25	MG/KG	NA
SW846-8330		HPLC	5	4-NITROTOLUENE	0.25	MG/KG	NA
SW846-8330		HPLC	5	HMX	0.25	MG/KG	NA
SW846-8330		HPLC	5	NITROBENZENE	0.25	MG/KG	NA
SW846-8330		HPLC	5	RDX	0.25	MG/KG	NA
SW846-8330		HPLC	5	TETRYL	0.25	MG/KG	NA
SW846-9012A	9010A	Auto Analy.	1	CYANIDE	0.0050	MG/L	0.003
SW846-9012A	9010A	Auto Analy.	1	CYANIDE, AMENABLE	0.010	MG/L	0.003
SW846-9012A	9010A	Auto Analy.	4	CYANIDE	0.25	MG/KG	NA
SW846-9012A	9010A	Auto Analy.	4	CYANIDE, AMENABLE	0.25	MG/KG	NA
SW846-9012A	9010A	Auto Analy.	5	CYANIDE	0.13	MG/KG	NA
SW846-9012A	9010A	Auto Analy.	5	CYANIDE	0.13	MG/KG	NA
SW846-9012A	9010A	Auto Analy.	5	CYANIDE, AMENABLE	0.13	MG/KG	NA
SW846-9020B		Micro Coul.	1	TOTAL ORGANIC HALOGEN (TOX)	0.010	MG/L	0.007
SW846-9020B		Micro Coul.	4	EXTRACTABLE ORGANIC HALIDES	100	MG/KG	0.007
SW846-9020B (9023)		Micro Coul.	5	EXTRACTABLE ORGANIC HALIDES	100	MG/KG	NA
SW846-9020B		Micro Coul.	5	TOTAL ORGANIC HALOGEN (TOX)	100	MG/L	NA
SW846-9034			1	SULFIDE	1.0	MG/L	
SW846-9031			4	SULFIDE	10	MG/L	NA
SW846-9031			5	SULFIDE	10	MG/KG	NA
SW846-9031			5	SULFIDE	10	MG/KG	NA
SW846-9038		Turbidimeter	1	SULFATE	5.0	MG/L	3.879
SW846-9038		Turbid.imeter	5	SULFATE	500	MG/KG	NA
SW846-9038		Turbid.imeter	5	SULFATE	500	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-9040B			1	PH	0.10	STD. UNITS	NA
SW846-9040B			4	PH	0.10	STD. UNITS	NA
SW846-9040B			5	PH	0.10	STD. UNITS	NA
SW846-9041A			1	PH	1.0	STD. UNITS	NA
SW846-9041A			4	PH	2.0	STD. UNITS	NA
SW846-9041A			5	PH	2.0	STD. UNITS	NA
SW846-9045C			4	PH	0.10	STD. UNITS	NA
SW846-9045C			5	PH	0.10	STD. UNITS	NA
SW846-9050A			1	CONDUCTIVITY	1.0	UMHOS/CM	NA
SW846-9050A			1	CONDUCTIVITY	5.0	UMHOS/CM	NA
SW846-9050A			5	CONDUCTIVITY	5.0	UMHOS/CM	NA
SW846-9056		Ion Chrom.	1	BROMIDE	0.05	MG/L	
SW846-9056		Ion Chrom.	1	CHLORIDE	0.25	MG/L	
SW846-9056		Ion Chrom.	1	FLUORIDE	0.10	MG/L	
SW846-9056		Ion Chrom.	1	HYDROBROMIC ACID	0.10	PERCENT	
SW846-9056		Ion Chrom.	1	HYDROCHLORIC ACID	0.10	PERCENT	
SW846-9056		Ion Chrom.	1	HYDROFLUORIC ACID	0.10	PERCENT	
SW846-9056		Ion Chrom.	1	IODIDE	0.50	MG/L	
SW846-9056		Ion Chrom.	1	NITRIC ACID	0.10	PERCENT	

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-9056		Ion Chrom.	1	NITROGEN, NITRATE	0.050	MG/L	
SW846-9056		Ion Chrom.	1	NITROGEN, NITRATE-NITRITE	0.10	MG/L	
SW846-9056		Ion Chrom.	1	NITROGEN, NITRITE	0.050	MG/L	
SW846-9056		Ion Chrom.	1	ORTHO-PHOSPHORUS	0.050	MG/L	
SW846-9056		Ion Chrom.	1	PHOSPHORIC ACID	0.10	PERCENT	
SW846-9056		Ion Chrom.	1	SULFATE	0.25	MG/L	
SW846-9056		Ion Chrom.	1	SULFURIC ACID	0.10	PERCENT	
SW846-9056		Ion Chrom.	4	HYDROBROMIC ACID		MG/L	NA
SW846-9056		Ion Chrom.	4	HYDROCHLORIC ACID		MG/L	NA
SW846-9056		Ion Chrom.	4	HYDROFLUORIC ACID		MG/L	NA
SW846-9056		Ion Chrom.	4	NITRIC ACID		MG/L	NA
SW846-9056		Ion Chrom.	4	PHOSPHORIC ACID		MG/L	NA
SW846-9056		Ion Chrom.	4	SULFURIC ACID		MG/L	NA
SW846-9056		Ion Chrom.	5	BROMIDE	0.50	MG/KG	NA
SW846-9056		Ion Chrom.	5	CHLORIDE	2.5	MG/KG	NA
SW846-9056		Ion Chrom.	5	FLUORIDE	1.0	MG/KG	NA
SW846-9056		Ion Chrom.	5	HYDROBROMIC ACID	0.10	PERCENT	NA
SW846-9056		Ion Chrom.	5	HYDROCHLORIC ACID	0.10	PERCENT	NA
SW846-9056		Ion Chrom.	5	HYDROFLUORIC ACID	0.10	PERCENT	NA
SW846-9056		Ion Chrom.	5	IODIDE	5.0	MG/KG	NA
SW846-9056		Ion Chrom.	5	NITRIC ACID	0.10	PERCENT	NA
SW846-9056		Ion Chrom.	5	NITROGEN, NITRATE	0.50	MG/KG	NA
SW846-9056		Ion Chrom.	5	NITROGEN, NITRATE-NITRITE	1.0	MG/KG	NA
SW846-9056		Ion Chrom.	5	NITROGEN, NITRITE	0.50	MG/KG	NA
SW846-9056		Ion Chrom.	5	ORTHO-PHOSPHORUS	0.50	MG/KG	NA
SW846-9056		Ion Chrom.	5	PHOSPHORIC ACID	0.1	PERCENT	NA
SW846-9056		Ion Chrom.	5	SULFATE	2.5	MG/KG	NA
SW846-9056		Ion Chrom.	5	SULFURIC ACID	0.1	PERCENT	NA
SW846-9056 MOD		Ion Chrom.	5	CHLORIDE	60	MG/KG	NA

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Table 5.1
RCRA-SW846 Method Detection and Practical Quantitation Limits

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
SW846-9056 MOD		Ion Chrom.	5	SULFATE	200	MG/KG	NA
SW846-9060		IR/Combustion	1	TOTAL ORGANIC CARBON (TOC)	1.0	MG/L	0.346
SW846-9066	9065	Auto Analy.	1	PHENOLICS	0.01	MG/L	0.007
SW846-9066	9065	Auto Analy.	4	PHENOLICS	0.10	MG/KG	NA
SW846-9066	9065	Auto Analy.	5	PHENOLICS	0.10	MG/KG	NA
SW846-9081			5	CATION EXCHANGE CAPACITY	0.02	MEQ/100G	NA
SW846-9095A			5	PAINT FILTER LIQUID (TOTAL ML AFTER 5 MINUTES)	0	MG/L	NA
SW846-9214		Ion Selective Electrode	1	FLUORIDE	0.10	MG/L	0.085
SW846-9214		Ion Selective Electrode	5	FLUORIDE	10	MG/KG	NA
SW846-9251		Auto Analy.	1	CHLORIDE	1.0	MG/L	0.187
SW846-9251		Auto Analy.	5	CHLORIDE	100	MG/KG	NA
SW 7.3.3.2		Auto Analy.	1	REACTIVE CYANIDE	0.0050	MG/L	NA
SW 7.3.3.2		Auto Analy.	5	REACTIVE CYANIDE	0.050	MG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 110.3			1	COLOR	10	STD. UNITS	NA
EPA 110.3			3	COLOR	10	STD. UNITS	NA
EPA 120.1			1	CONDUCTIVITY	5.0	UMHOS/CM	NA
EPA 130.2			1	HARDNESS	1.0	MG/L	NA
EPA 140.1			1	ODOR			NA
EPA 150.1			1	PH	0.1	STD. UNITS	NA
EPA 160.1			1	DISSOLVED SOLIDS	10	MG/L	NA
EPA 160.2			1	SUSPENDED SOLIDS	1.0	MG/L	NA
EPA 160.3			1	SOLIDS	10	MG/L	NA
EPA 160.3			4	SOLIDS	0.001	PERCENT	NA
EPA 160.3			5	SOLIDS	0.001	PERCENT	NA
EPA 160.4			1	TOTAL SOLIDS, VOLATILE	10	MG/L	NA
EPA 160.4			1	VOLATILE SUSPENDED SOLIDS	1.0	MG/L	NA
EPA 160.4			4	TOTAL SOLIDS, VOLATILE	0.0010	PERCENT	NA
EPA 160.4			5	TOTAL SOLIDS, VOLATILE	0.0010	PERCENT	NA
EPA 160.5			1	TOTAL SOLIDS, SETTLEABLE	0.1	ML/L	NA
EPA 160.5			5	TOTAL SOLIDS, SETTLEABLE	0.1	ML/L	NA
EPA 170.1			1	TEMPERATURE	NA	DEGREES C	NA
EPA 180.1			1	TURBIDITY	0.1	NTU	NA
EPA 180.1MOD			1	TURBIDITY	0.5	NTU	NA
EPA 200.7	200.0	ICP	1	ALUMINUM	0.050	MG/L	0.0058
EPA 200.7	200.0	Trace	1	ANTIMONY	0.0050	MG/L	0.0035
EPA 200.7	200.0	ICP	1	ANTIMONY	0.010	MG/L	0.0021
EPA 200.7	200.0	ICP	1	ARSENIC	0.010	MG/L	0.0035
EPA 200.7	200.0	Trace	1	ARSENIC	0.005	MG/L	0.0021

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 200.7	200.0	ICP	1	BARIUM	0.010	MG/L	0.00016
EPA 200.7	200.0	Trace	1	BERYLLIUM	0.0010	MG/L	0.000069
EPA 200.7	200.0	ICP	1	BERYLLIUM	0.0050	MG/L	0.000068
EPA 200.7	200.0	ICP	1	BORON	0.050	MG/L	0.0054
EPA 200.7	200.0	Trace	1	CADMIUM	0.0010	MG/L	0.00019
EPA 200.7	200.0	ICP	1	CADMIUM	0.0050	MG/L	0.00044
EPA 200.7	200.0	ICP	1	CALCIUM	0.20	MG/L	0.0064
EPA 200.7	200.0	Trace	1	CHROMIUM	0.0020	MG/L	0.00042
EPA 200.7	200.0	ICP	1	CHROMIUM	0.010	MG/L	0.00038
EPA 200.7	200.0	Trace	1	COBALT	0.0010	MG/L	0.00046
EPA 200.7	200.0	ICP	1	COBALT	0.010	MG/L	0.00074
EPA 200.7	200.0	ICP	1	COPPER	0.020	MG/L	0.00044
EPA 200.7	200.0	ICP	1	IRON	0.0250	MG/L	0.0029
EPA 200.7	200.0	Trace	1	LEAD	0.0050	MG/L	0.0023
EPA 200.7	200.0	ICP	1	LEAD	0.010	MG/L	0.0023
EPA 200.7	200.0	ICP	1	LITHIUM	0.010	MG/L	0.00090
EPA 200.7	200.0	ICP	1	MAGNESIUM	0.20	MG/L	0.0029
EPA 200.7	200.0	Trace	1	MANGANESE	0.0020	MG/L	0.00034
EPA 200.7	200.0	ICP	1	MANGANESE	0.010	MG/L	0.00034
EPA 200.7	200.0	ICP	1	MOLYBDENUM	0.010	MG/L	0.00053
EPA 200.7	200.0	ICP	1	NICKEL	0.010	MG/L	0.0011
EPA 200.7	200.0	ICP	1	POTASSIUM	0.20	MG/L	0.0043
EPA 200.7	200.0	ICP	1	SELENIUM	0.010	MG/L	0.0077
EPA 200.7	200.0	Trace	1	SELENIUM	0.0050	MG/L	0.0035
EPA 200.7	200.0	ICP	1	SILICON	0.20	MG/L	0.0014
EPA 200.7	200.0	Trace	1	SILVER	0.0020	MG/L	0.00015
EPA 200.7	200.0	ICP	1	SILVER	0.010	MG/L	0.00030

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 200.7	200.0	ICP	1	SODIUM	0.20	MG/L	0.0085
EPA 200.7	200.0	ICP	1	STRONTIUM	0.010	MG/L	0.00037
EPA 200.7	200.0	Trace	1	THALLIUM	0.010	MG/L	0.0020
EPA 200.7	200.0	ICP	1	THALLIUM	0.010	MG/L	0.0045
EPA 200.7	200.0	ICP	1	TIN	0.050	MG/L	0.0020
EPA 200.7	200.0	ICP	1	TITANIUM	0.010	MG/L	0.00091
EPA 200.7	200.0	Trace	1	VANADIUM	0.0010	MG/L	0.00042
EPA 200.7	200.0	ICP	1	VANADIUM	0.010	MG/L	0.00091
EPA 200.7	200.0	ICP	1	ZINC	0.020	MG/L	0.0015
EPA 200.7	200.0	ICP	1	ZIRCONIUM	0.010	MG/L	0.0010
EPA 200.7	200.0	ICP	4	ALUMINUM	2.5	MG/KG	NA
EPA 200.7	200.0	Trace	4	ANTIMONY	0.250	MG/KG	NA
EPA 200.7	200.0	ICP	4	ANTIMONY	15	MG/KG	NA
EPA 200.7	200.0	Trace	4	ARSENIC	0.25	MG/KG	NA
EPA 200.7	200.0	ICP	4	ARSENIC	5.0	MG/KG	NA
EPA 200.7	200.0	ICP	4	BARIUM	0.50	MG/KG	NA
EPA 200.7	200.0	Trace	4	BERYLLIUM	0.050	MG/KG	NA
EPA 200.7	200.0	ICP	4	BERYLLIUM	0.20	MG/KG	NA
EPA 200.7	200.0	Trace	4	CADMIUM	0.05	MG/KG	NA
EPA 200.7	200.0	ICP	4	CADMIUM	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	4	CALCIUM	10	MG/KG	NA
EPA 200.7	200.0	Trace	4	CHROMIUM	0.10	MG/KG	NA
EPA 200.7	200.0	ICP	4	CHROMIUM	0.50	MG/KG	NA
EPA 200.7	200.0	Trace	4	COBALT	0.050	MG/KG	NA
EPA 200.7	200.0	ICP	4	COBALT	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	4	COPPER	1.0	MG/KG	NA
EPA 200.7	200.0	ICP	4	IRON	1.2	MG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 200.7	200.0	Trace	4	LEAD	0.25	MG/KG	NA
EPA 200.7	200.0	ICP	4	LEAD	2.5	MG/KG	NA
EPA 200.7	200.0	ICP	4	MAGNESIUM	10	MG/KG	NA
EPA 200.7	200.0	Trace	4	MANGANESE	0.10	MG/KG	NA
EPA 200.7	200.0	ICP	4	MANGANESE	0.5	MG/KG	NA
EPA 200.7	200.0	ICP	4	MOLYBDENUM	0.5	MG/KG	NA
EPA 200.7	200.0	ICP	4	NICKEL	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	4	POTASSIUM	10	MG/KG	NA
EPA 200.7	200.0	Trace	4	SELENIUM	0.25	MG/KG	NA
EPA 200.7	200.0	ICP	4	SELENIUM	5.0	MG/KG	NA
EPA 200.7	200.0	Trace	4	SILVER	0.10	MG/KG	NA
EPA 200.7	200.0	ICP	4	SILVER	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	4	SODIUM	10.0	MG/KG	NA
EPA 200.7	200.0	Trace	4	THALLIUM	0.25	MG/KG	NA
EPA 200.7	200.0	ICP	4	THALLIUM	25	MG/KG	NA
EPA 200.7	200.0	ICP	4	TIN	2.5	MG/KG	NA
EPA 200.7	200.0	Trace	4	VANADIUM	0.050	MG/KG	NA
EPA 200.7	200.0	ICP	4	VANADIUM	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	4	ZINC	1.0	MG/KG	NA
EPA 200.7	200.0	ICP	4	ZIRCONIUM	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	5	ALUMINUM	5.0	MG/KG	NA
EPA 200.7	200.0	Trace	5	ANTIMONY	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	5	ANTIMONY	3.0	MG/KG	
EPA 200.7	200.0	Trace	5	ARSENIC	0.50	MG/KG	
EPA 200.7	200.0	ICP	5	BARIUM	1.0	MG/KG	
EPA 200.7	200.0	Trace	5	BERYLLIUM	0.10	MG/KG	NA
EPA 200.7	200.0	ICP	5	BERYLLIUM	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	5	BISMUTH	5.0	MG/KG	NA

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 200.7	200.0	ICP	5	BORON	5.0	MG/KG	NA
EPA 200.7	200.0	Trace	5	CADMIUM	0.10	MG/KG	NA
EPA 200.7	200.0	ICP	5	CADMIUM	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	5	CALCIUM	20	MG/KG	NA
EPA 200.7	200.0	Trace	5	CHROMIUM	0.20	MG/KG	NA
EPA 200.7	200.0	ICP	5	CHROMIUM	1.0	MG/KG	NA
EPA 200.7	200.0	Trace	5	COBALT	0.10	MG/KG	NA
EPA 200.7	200.0	ICP	5	COBALT	1.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	COPPER	2.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	IRON	2.5	MG/KG	NA
EPA 200.7	200.0	Trace	5	LEAD	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	5	LEAD	5.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	LITHIUM	1.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	MAGNESIUM	20	MG/KG	NA
EPA 200.7	200.0	Trace	5	MANGANESE	0.20	MG/KG	NA
EPA 200.7	200.0	ICP	5	MANGANESE	1.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	MOLYBDENUM	1.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	NICKEL	1.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	POTASSIUM	20.0	MG/KG	NA
EPA 200.7	200.0	Trace	5	SELENIUM	0.50	MG/KG	NA
EPA 200.7	200.0	ICP	5	SELENIUM	10.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	SILICON	20	MG/KG	NA
EPA 200.7	200.0	Trace	5	SILVER	0.20	MG/KG	NA
EPA 200.7	200.0	ICP	5	SILVER	1.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	SODIUM	20	MG/KG	NA
EPA 200.7	200.0	ICP	5	STRONTIUM	1.0	MG/KG	NA
EPA 200.7	200.0	Trace	5	THALLIUM	0.50	MG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 200.7	200.0	ICP	5	THALLIUM	50	MG/KG	NA
EPA 200.7	200.0	ICP	5	TIN	5.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	TITANIUM	1.0	MG/KG	NA
EPA 200.7	200.0	Trace	5	VANADIUM	0.10	MG/KG	NA
EPA 200.7	200.0	ICP	5	VANADIUM	1.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	ZINC	2.0	MG/KG	NA
EPA 200.7	200.0	ICP	5	ZIRCONIUM	1.0	MG/KG	NA
EPA 200.8	200.8	ICP/MS	1	ALUMINUM	20	UG/L	2.4
EPA 200.8	200.8	ICP/MS	1	ANTIMONY	0.10	UG/L	0.058
EPA 200.8	200.8	ICP/MS	1	ARSENIC	1.0	UG/L	0.44
EPA 200.8	200.8	ICP/MS	1	BARIUM	0.10	UG/L	0.074
EPA 200.8	200.8	ICP/MS	1	CADMIUM	0.10	UG/L	0.13
EPA 200.8	200.8	ICP/MS	1	CHROMIUM	1.0	UG/L	0.23
EPA 200.8	200.8	ICP/MS	1	COBALT	O.10	UG/L	0.029
EPA 200.8	200.8	ICP/MS	1	COPPER	O.20	UG/L	0.12
EPA 200.8	200.8	ICP/MS	1	LEAD	0.10	UG/L	0.065
EPA 200.8	200.8	ICP/MS	1	MANGANESE	1.0	UG/L	0.083
EPA 200.8	200.8	ICP/MS	1	NICKEL	2.0	UG/L	0.078
EPA 200.8	200.8	ICP/MS	1	SELENIUM	1.0	UG/L	0.72
EPA 200.8	200.8	ICP/MS	1	SILVER	0.25	UG/L	0.049
EPA 200.8	200.8	ICP/MS	1	THALLIUM	0.10	UG/L	0.045
EPA 200.8	200.8	ICP/MS	1	VANADIUM	2.0	UG/L	0.60
EPA 200.8	200.8	ICP/MS	1	ZINC	2.0	UG/L	0.85
EPA 200.8	200.8	ICP/MS	1	MOLYBDENUM	0.10	UG/L	0.046
EPA 200.8	200.8	ICP/MS	1	STRONTIUM	0.10	UG/L	0.046
EPA 200.8	200.8	ICP/MS	1	TIN	1.0	UG/L	0.090
EPA 200.8	200.8	ICP/MS	1	TITANIUM	1.0	UG/L	0.54
EPA 200.8	200.8	ICP/MS	1	ZIRCONIUM	1.0	UG/L	0.29

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 200.8	200.8	ICP/MS	1	THORIUM	0.10	UG/L	0.028
EPA 200.8	200.8	ICP/MS	1	URANIUM	0.10	UG/L	0.046
EPA 200.8	200.8	ICP/MS	1	MERCURY	0.20	UG/L	0.048
EPA 200.9	200.0	GFAA	1	ANTIMONY	0.0050	MG/L	
EPA 200.9	200.0	GFAA	1	ARSENIC	0.0050	MG/L	0.0016
EPA 200.9	200.0	GFAA	1	CADMIUM	0.0010	MG/L	
EPA 200.9	200.0	GFAA	1	LEAD	0.0050	MG/L	0.00092
EPA 200.9	200.0	GFAA	1	SELENIUM	0.0050	MG/L	0.0032
EPA 200.9	200.0	GFAA	1	THALLIUM	0.0050	MG/L	0.0021
EPA 200.9	200.0	GFAA	4	ANTIMONY	0.25	MG/KG	NA
EPA 200.9	200.0	GFAA	4	ARSENIC	0.25	MG/KG	NA
EPA 200.9	200.0	GFAA	4	CADMIUM	0.050	MG/KG	NA
EPA 200.9	200.0	GFAA	4	LEAD	0.25	MG/KG	NA
EPA 200.9	200.0	GFAA	4	SELENIUM	0.25	MG/KG	NA
EPA 200.9	200.0	GFAA	4	THALLIUM	125	MG/KG	NA
EPA 200.9	200.0	GFAA	5	ANTIMONY	0.5	MG/KG	NA
EPA 200.9	200.0	GFAA	5	ARSENIC	0.50	MG/KG	NA
EPA 200.9	200.0	GFAA	5	CADMIUM	0.10	MG/KG	NA
EPA 200.9	200.0	GFAA	5	LEAD	0.50	MG/KG	NA
EPA 200.9	200.0	GFAA	5	SELENIUM	0.50	MG/KG	NA
EPA 200.9	200.0	GFAA	5	THALLIUM	0.50	MG/KG	NA
EPA 202.2	200.0	GFAA	1	ALUMINUM	0.020	MG/L	NA
EPA 202.2	200.0	GFAA	4	ALUMINUM	2.0	MG/KG	NA
EPA 202.2	200.0	GFAA	5	ALUMINUM	2.0	MG/KG	NA
EPA 204.2	200.0	GFAA	1	ANTIMONY	0.0050	MG/L	NA
EPA 204.2	200.0	GFAA	4	ANTIMONY	0.25	MG/KG	NA
EPA 204.2	200.0	GFAA	5	ANTIMONY	0.50	MG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 206.2	200.0	GFAA	1	ARSENIC	0.0050	MG/L	0.0016
EPA 206.2	200.0	GFAA	4	ARSENIC	0.25	MG/KG	NA
EPA 206.2	200.0	GFAA	5	ARSENIC	0.50	MG/KG	NA
EPA 210.2	200.0	GFAA	1	BERYLLIUM	0.0010	MG/L	NA
EPA 210.2	200.0	GFAA	4	BERYLLIUM	0.05	MG/L	NA
EPA 210.2	200.0	GFAA	5	BERYLLIUM	0.10	MG/L	NA
EPA 213.2	200.0	GFAA	1	CADMIUM	0.0010	MG/L	0.000098
EPA 213.2	200.0	GFAA	4	CADMIUM	0.05	MG/KG	NA
EPA 213.2	200.0	GFAA	5	CADMIUM	0.10	MG/KG	NA
EPA 218.2	200.0	GFAA	1	CHROMIUM	0.0050	MG/L	0.00099
EPA 218.2	200.0	GFAA	5	CHROMIUM	0.50	MG/KG	NA
EPA 220.2	200.0	GFAA	1	COPPER	0.010	MG/L	0.0030
EPA 220.2	200.0	GFAA	5	COPPER	0.50	MG/KG	NA
EPA 239.2	200.0	GFAA	1	LEAD	0.0050	MG/L	0.0026
EPA 239.2	200.0	GFAA	4	LEAD	0.25	MG/KG	NA
EPA 239.2	200.0	GFAA	5	LEAD	0.50	MG/KG	NA
EPA 245.1		CVAA-FIMS	1	MERCURY	0.00020	MG/L	0.000016
EPA 245.1		CVAA-FIMS	3	MERCURY	0.00020	MG/L	NA
EPA 245.5		CVAA-FIMS	4	MERCURY	0.033	MG/KG	NA
EPA 245.5		CVAA-FIMS	5	MERCURY	0.033	MG/KG	NA
EPA 249.2	200.0	GFAA	1	NICKEL	0.0050	MG/L	NA
EPA 270.2	200.0	GFAA	1	SELENIUM	0.0050	MG/L	0.0012
EPA 270.2	200.0	GFAA	4	SELENIUM	0.25	MG/KG	NA
EPA 270.2	200.0	GFAA	5	SELENIUM	0.50	MG/KG	NA
EPA 272.2	200.0	GFAA	1	SILVER	0.0020	MG/L	0.00024
EPA 272.2	200.0	GFAA	5	SILVER	0.10	MG/KG	NA
EPA 279.2	200.0	GFAA	1	THALLIUM	0.0050	MG/L	0.00052
EPA 279.2	200.0	GFAA	4	THALLIUM	0.25	MG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 279.2	200.0	GFAA	5	THALLIUM	0.50	MG/KG	NA
EPA 283.2	200.0	GFAA	1	TITANIUM	0.010	MG/L	NA
EPA 283.2	200.0	GFAA	5	TITANIUM	1.00	MG/KG	NA
EPA 286.2	200.0	GFAA	1	VANADIUM	0.0050	MG/L	NA
EPA 1631 REV.E		CVAA	1	MERCURY	1.00	NG/L	0.476
EPA 300.0		Ion Chrom.	1	BROMIDE	0.050	MG/L	0.0455
EPA 300.0		Ion Chrom.	1	CHLORIDE	0.250	MG/L	0.0451
EPA 300.0		Ion Chrom.	1	FLUORIDE	0.10	MG/L	0.0113
EPA 300.0		Ion Chrom.	1	NITROGEN, NITRATE	0.050	MG/L	0.0101
EPA 300.0		Ion Chrom.	1	NITROGEN, NITRATE-NITRITE	0.10	MG/L	
EPA 300.0		Ion Chrom.	1	NITROGEN, NITRITE	0.050	MG/L	0.010
EPA 300.0		Ion Chrom.	1	ORTHO-PHOSPHORUS	0.050	MG/L	0.0705
EPA 300.0		Ion Chrom.	1	SULFATE	0.250	MG/L	0.0819
EPA 300.0		Ion Chrom.	5	BROMIDE	0.50	MG/KG	NA
EPA 300.0		Ion Chrom.	5	CHLORIDE	2.50	MG/KG	NA
EPA 300.0		Ion Chrom.	5	FLUORIDE	1.0	MG/KG	NA
EPA 300.0		Ion Chrom.	5	IODIDE	5.0	MG/KG	NA
EPA 300.0		Ion Chrom.	5	NITROGEN, NITRATE	0.50	MG/KG	NA
EPA 300.0		Ion Chrom.	5	NITROGEN, NITRATE-NITRITE	1.0	MG/L	NA
EPA 300.0		Ion Chrom.	5	NITROGEN, NITRITE	0.50	MG/KG	NA
EPA 300.0		Ion Chrom.	5	ORTHO-PHOSPHORUS	0.50	MG/KG	NA
EPA 300.0		Ion Chrom.	5	ORTHO-PHOSPHORUS	0.50	MG/L	NA
EPA 300.0		Ion Chrom.	5	SULFATE	2.5	MG/KG	NA
EPA 305.1			1	ACIDITY	1.0	MG/L	NA
EPA 305.1			5	ACIDITY	100	MG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 310.1			1	ALKALINITY	1.0	MG/L	NA
EPA 310.1			1	CARBON DIOXIDE	1.0	MG/L	
EPA 310.1			5	ALKALINITY	100	MG/KG	NA
EPA 325.1		Auto Analyzer	5	CHLORIDE	10	MG/KG	NA
EPA 325.2		Auto Analyzer	1	CHLORIDE	1.0	MG/L	0.18
EPA 330.5			1	CHLORINE	0.050	MG/L	0.015
EPA 330.5			4	CHLORINE		MG/KG	NA
EPA 330.5			5	CHLORINE	20	MG/KG	NA
EPA 335.1		Auto Analyzer	1	CYANIDE, AMENABLE	0.0050	MG/L	NA
EPA 335.1		Auto Analyzer	4	CYANIDE, AMENABLE	0.13	MG/KG	NA
EPA 335.1		Auto Analyzer	5	CYANIDE, AMENABLE	0.13	MG/KG	NA
EPA 335.3	335.2	Auto Analyzer	1	CYANIDE	0.0050	MG/L	0.0030
EPA 335.3	335.2	Auto Analyzer	4	CYANIDE	0.13	MG/KG	NA
EPA 335.3	335.2	Auto Analyzer	5	CYANIDE	0.13	MG/KG	NA
EPA 335.4	335.2	Auto Analyzer	1	CYANIDE	0.0050	MG/L	0.0030
EPA 340.2	340.1	ISE	1	FLUORIDE	0.10	MG/L	NA
EPA 340.2	340.1	ISE	5	FLUORIDE	10	MG/KG	NA
EPA 350.3	350.2	ISE	1	NITROGEN, AMMONIA	0.12	MG/L	0.029
EPA 350.3	350.2	ISE	4	NITROGEN, AMMONIA	2.5	MG/KG	NA
EPA 350.3	350.2	ISE	5	NITROGEN, AMMONIA	10	MG/KG	NA
EPA 351.3		ISE	1	NITROGEN, ORGANIC	0.30	MG/L	NA
EPA 351.3		ISE	4	NITROGEN, ORGANIC	30	MG/KG	NA
EPA 351.3		ISE	5	NITROGEN, ORGANIC	30	MG/KG	NA
EPA 351.4		ISE	1	NITROGEN, KJELDAHL	0.30	MG/L	0.166
EPA 351.4		ISE	5	NITROGEN, KJELDAHL	30	MG/KG	NA
EPA 353.2		Auto Analyzer	1	NITROGEN, NITRATE	0.010	MG/L	0.001
EPA 353.2		Auto Analyzer	1	NITROGEN, NITRATE-NITRITE	0.010	MG/L	0.001
EPA 353.2		Auto Analyzer	1	NITROGEN, NITRITE	0.010	MG/L	0.0014

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 353.2		Auto Analyzer	4	NITROGEN, NITRITE	1.0	MG/KG	NA
EPA 353.2		Auto Analyzer	5	NITROGEN, NITRATE	1.0	MG/KG	NA
EPA 353.2		Auto Analyzer	5	NITROGEN, NITRATE-NITRITE	1.0	MG/KG	NA
EPA 353.2		Auto Analyzer	5	NITROGEN, NITRITE	1.0	MG/L	NA
EPA 360.1		Electrode	1	DISSOLVED OXYGEN	0.050	MG/L	
EPA 360.2		Winkler	1	DISSOLVED OXYGEN	0.10	MG/L	
EPA 365.1		Auto Analyzer	1	ORTHO-PHOSPHORUS	0.010	MG/L	0.003
EPA 365.1		Auto Analyzer	1	PHOSPHORUS	0.030	MG/L	0.025
EPA 365.1		Auto Analyzer	4	ORTHO-PHOSPHORUS	1.0	MG/KG	NA
EPA 365.1		Auto Analyzer	4	PHOSPHORUS	3.0	MG/KG	NA
EPA 365.1		Auto Analyzer	5	ORTHO-PHOSPHORUS	1.0	MG/KG	NA
EPA 365.1		Auto Analyzer	5	PHOSPHORUS	3.0	MG/KG	NA
EPA 370.1			1	SILICA	1.0	MG/L	
EPA 370.1			5	SILICA	100	MG/KG	
EPA 375.4		Turbidimeter	1	SULFATE	5.0	MG/L	3.879
EPA 375.4		Turbidimeter	5	SULFATE	500	MG/KG	NA
EPA 376.1			1	SULFIDE	1.0	MG/L	
EPA 376.1			5	SULFIDE	10	MG/KG	NA
EPA 377.1			1	SULFITE	1.0	MG/L	
EPA 377.1			5	SULFITE	10	MG/KG	NA
EPA 405.1		Electrode	1	BIOCHEMICAL OXYGEN DEMAND	2.0	MG/L	NA
EPA 405.1		Electrode	5	BIOCHEMICAL OXYGEN DEMAND	200	MG/KG	NA
EPA 410.4		Spectrometr.	1	CHEMICAL OXYGEN DEMAND	10	MG/L	2.2
EPA 410.4		Spectrometr.	5	CHEMICAL OXYGEN DEMAND	1000	MG/KG	NA
EPA 1664A			1	OIL AND GREASE	5.0	MG/L	0.602
EPA 1664A			4	OIL AND GREASE	100	MG/KG	NA
EPA 1664A			5	OIL AND GREASE	100	MG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 415.1		Combust.-IR	1	TOTAL ORGANIC CARBON (TOC)	1.0	MG/L	0.346
EPA 415.1		Combust.-IR	5	TOTAL ORGANIC CARBON (TOC)	100	MG/KG	NA
EPA 420.2	420.1	Auto Analyzer	1	PHENOLICS	0.010	MG/L	0.007
EPA 420.2	420.1	Auto Analyzer	4	PHENOLICS	0.10	MG/KG	NA
EPA 420.2	420.1	Auto Analyzer	5	PHENOLICS	0.10	MG/KG	NA
EPA 425.1			1	SURFACTANTS, MBAS	0.10	MG/L	0.047
EPA 425.1			5	SURFACTANTS, MBAS	10	MG/KG	NA
EPA 504.1		GC/ECD	1	1,2-DIBROMO-3-CHLOROPROPANE	0.02	UG/L	0.0108
EPA 504.1		GC/ECD	1	1,2-DIBROMOETHANE (EDB)	0.01	UG/L	0.0084
EPA 504.1		GC/ECD	1	TRICHLOROPROPANE	0.02	UG/L	0.0068
EPA 507		GC/NPD	1	2-NITRO-M-XYLENE	NA	% REC	NA
EPA 507		GC/NPD	1	ALACHLOR	0.20	UG/L	
EPA 507		GC/NPD	1	ATRAZINE	0.10	UGL	
EPA 507		GC/NPD	1	SIMAZINE	0.07	UG/L	
EPA 508		GC/ECD	1	CHLORDANE	0.2	UG/L	
EPA 508		GC/ECD	1	DECACHLOROBIPHENYL (DCB)	NA	% REC	NA
EPA 508		GC/ECD	1	ENDRIN	0.01	UG/L	0.042
EPA 508		GC/ECD	1	GAMMA-BHC (LINDANE)	0.02	UG/L	0.0111
EPA 508		GC/ECD	1	HEPTACHLOR	0.04	UG/L	0.0154
EPA 508		GC/ECD	1	HEPTACHLOR EPOXIDE	0.02	UG/L	0.00977
EPA 508		GC/ECD	1	HEXACHLOROBENZENE	0.1	UG/L	0.00701
EPA 508		GC/ECD	1	HEXACHLOROCYCLOPENTADIENE	0.1	UG/L	0.06084
EPA 508		GC/ECD	1	METHOXYCHLOR	0.1	UG/L	0.1838
EPA 508		GC/ECD	1	PCB AROCLOR 1016	0.1	UG/L	0.0324
EPA 508		GC/ECD	1	PCB AROCLOR 1221	0.1	UG/L	0.0311
EPA 508		GC/ECD	1	PCB AROCLOR 1232	0.1	UG/L	0.0324
EPA 508		GC/ECD	1	PCB AROCLOR 1242	0.1	UG/L	0.0293
EPA 508		GC/ECD	1	PCB AROCLOR 1248	0.1	UG/L	0.0279

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 508		GC/ECD	1	PCB AROCLOR 1254	0.1	UG/L	0.0293
EPA 508		GC/ECD	1	PCB AROCLOR 1260	0.1	UG/L	0.0311
EPA 508		GC/ECD	1	DECACHLOROBIPHENYL	NA	% REC	NA
EPA 508		GC/ECD	1	TOXAPHENE	1.0	UG/L	0.24158
EPA 508A		GC/ECD	1	DECACHLOROBIPHENYL		UG/L	0.3665
EPA 515.1		GC/ECD	1	2,4-DICHLOROPHENOXYACETIC ACID	0.1	UG/L	0.599
EPA 515.1		GC/ECD	1	2,4-DICHLOROPHENYLACETIC ACID	NA	% REC	NA
EPA 515.1		GC/ECD	1	DCCA	NA	% REC	NA
EPA 515.1		GC/ECD	1	DALAPON	1.0	UG/L	0.347
EPA 515.1		GC/ECD	1	DINOSEB	0.2	UG/L	0.328
EPA 515.1		GC/ECD	1	PENTACHLOROPHENOL	0.04	UG/L	0.166
EPA 515.1		GC/ECD	1	PICLORAM	0.10	UG/L	0.998
EPA 515.1		GC/ECD	1	SILVEX (2,4,5-TP)	0.2	UG/L	0.167
EPA 524.2		GC/MS #17	1	1,1,1,2-TETRACHLOROETHANE	0.5	UG/L	0.22
EPA 524.2		GC/MS #17	1	1,1,1-TRICHLOROETHANE	0.5	UG/L	0.17
EPA 524.2		GC/MS #17	1	1,1,2,2-TETRACHLOROETHANE	0.5	UG/L	0.3
EPA 524.2		GC/MS #17	1	1,1,2-TRICHLOROETHANE	0.5	UG/L	0.21
EPA 524.2		GC/MS #17	1	1,1-DICHLOROETHANE	0.5	UG/L	0.31
EPA 524.2		GC/MS #17	1	1,1-DICHLOROETHENE	0.5	UG/L	0.18
EPA 524.2		GC/MS #17	1	1,1-DICHLOROPROPENE	0.5	UG/L	0.23
EPA 524.2		GC/MS #17	1	1,2,3-TRICHLOROBENZENE	0.5	UG/L	0.89
EPA 524.2		GC/MS #17	1	1,2,3-TRICHLOROPROPANE	0.5	UG/L	0.41
EPA 524.2		GC/MS #17	1	1,2,4-TRICHLOROBENZENE	0.5	UG/L	0.82
EPA 524.2		GC/MS #17	1	1,2,4-TRIMETHYLBENZENE	0.5	UG/L	0.19
EPA 524.2		GC/MS #17	1	1,2-DIBROMO-3-CHLOROPROPANE	0.5	UG/L	0.84

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 524.2		GC/MS #17	1	1,2-DIBROMOETHANE (EDB)	0.5	UG/L	0.19
EPA 524.2		GC/MS #17	1	1,2-DICHLOROBENZENE	0.5	UG/L	0.2
EPA 524.2		GC/MS #17	1	1,2-DICHLOROETHANE	0.5	UG/L	0.36
EPA 524.2		GC/MS #17	1	1,2-DICHLOROPROPANE	0.5	UG/L	0.12
EPA 524.2		GC/MS #17	1	1,3,5-TRIMETHYLBENZENE	0.5	UG/L	0.17
EPA 524.2		GC/MS #17	1	1,3-DICHLOROBENZENE	0.5	UG/L	0.19
EPA 524.2		GC/MS #17	1	1,3-DICHLOROPROPANE	0.5	UG/L	0.22
EPA 524.2		GC/MS #17	1	1,4-DICHLOROBENZENE	0.2	UG/L	0.2
EPA 524.2		GC/MS #17	1	2,2-DICHLOROPROPANE	0.5	UG/L	0.26
EPA 524.2		GC/MS #17	1	2-CHLOROTOLUENE	0.5	UG/L	0.22
EPA 524.2		GC/MS #17	1	4-BROMOFLUOROBENZENE	NA	% REC	NA
EPA 524.2		GC/MS #17	1	4-CHLOROTOLUENE	0.5	UG/L	0.21
EPA 524.2		GC/MS #17	1	4-ISOPROPYLTOLUENE	0.5	UG/L	0.22
EPA 524.2		GC/MS #17	1	BENZENE	0.5	UG/L	0.14
EPA 524.2		GC/MS #17	1	BROMOBENZENE	0.5	UG/L	0.15
EPA 524.2		GC/MS #17	1	BROMOCHLOROMETHANE	0.5	UG/L	0.34
EPA 524.2		GC/MS #17	1	BROMODICHLOROMETHANE	0.5	UG/L	0.13
EPA 524.2		GC/MS #17	1	BROMOFORM	0.5	UG/L	0.14
EPA 524.2		GC/MS #17	1	BROMOMETHANE	0.5	UG/L	0.29
EPA 524.2		GC/MS #17	1	CARBON TETRACHLORIDE	0.5	UG/L	0.18
EPA 524.2		GC/MS #17	1	CHLOROBENZENE	0.5	UG/L	0.14
EPA 524.2		GC/MS #17	1	CHLORODIBROMOMETHANE	0.5	UG/L	0.16
EPA 524.2		GC/MS #17	1	CHLOROETHANE	0.5	UG/L	0.19
EPA 524.2		GC/MS #17	1	CHLOROFORM	0.5	UG/L	0.23
EPA 524.2		GC/MS #17	1	CHLOROMETHANE	0.5	UG/L	0.37
EPA 524.2		GC/MS #17	1	CIS-1,2-DICHLOROETHENE	0.5	UG/L	0.16
EPA 524.2		GC/MS #17	1	CIS-1,3-DICHLOROPROPENE	0.5	UG/L	0.17
EPA 524.2		GC/MS #17	1	DIBROMOMETHANE	0.5	UG/L	0.12

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 524.2		GC/MS #17	1	DICHLORODIFLUOROMETHANE	0.5	UG/L	0.23
EPA 524.2		GC/MS #17	1	DICHLOROETHANE-D4	NA	% REC	NA
EPA 524.2		GC/MS #17	1	DICHLOROMETHANE (METHYLENE CHLORIDE)	0.5	UG/L	0.3
EPA 524.2		GC/MS #17	1	ETHYL BENZENE	0.5	UG/L	0.13
EPA 524.2		GC/MS #17	1	HEXACHLOROBUTADIENE	0.5	UG/L	0.97
EPA 524.2		GC/MS #17	1	ISOPROPYLBENZENE (CUMENE)	0.5	UG/L	0.38
EPA 524.2		GC/MS #17	1	M/P-XYLENE	0.5	UG/L	0.26
EPA 524.2		GC/MS #17	1	METHYL-T-BUTYL ETHER (MTBE)	0.5	UG/L	0.57
EPA 524.2		GC/MS #17	1	N-BUTYLBENZENE	0.5	UG/L	0.22
EPA 524.2		GC/MS #17	1	N-PROPYLBENZENE	0.5	UG/L	0.08
EPA 524.2		GC/MS #17	1	NAPHTHALENE	0.5	UG/L	0.39
EPA 524.2		GC/MS #17	1	O-XYLENE	0.5	UG/L	0.12
EPA 524.2		GC/MS #17	1	SEC-BUTYLBENZENE	0.5	UG/L	0.14
EPA 524.2		GC/MS #17	1	STYRENE	0.5	UG/L	0.15
EPA 524.2		GC/MS #17	1	TERT-BUTYLBENZENE	0.5	UG/L	0.1
EPA 524.2		GC/MS #17	1	TETRACHLOROETHENE	0.5	UG/L	0.23
EPA 524.2		GC/MS #17	1	TOLUENE	0.5	UG/L	0.16
EPA 524.2		GC/MS #17	1	TOLUENE-D8	NA	% REC	NA
EPA 524.2		GC/MS #17	1	TOTAL TRIHALOMETHANES	0.5	UG/L	NA
EPA 524.2		GC/MS #17	1	TRANS-1,2 -DICHLOROETHENE	0.5	UG/L	0.21
EPA 524.2		GC/MS #17	1	TRANS-1,3 -DICHLOROPROPENE	0.5	UG/L	0.46
EPA 524.2		GC/MS #17	1	TRICHLOROETHENE	0.2	UG/L	0.15
EPA 524.2		GC/MS #17	1	TRICHLOROFLUOROMETHANE	0.5	UG/L	0.26
EPA 524.2		GC/MS #17	1	VINYL CHLORIDE	0.5	UG/L	0.23
EPA 525.2		GC/MS	1	2,2',3',4,6-PENTACHLOROBIPHENYL	0.5	UG/L	0.17

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 525.2		GC/MS	1	2,2',3,3',4,4',6-HEPTACHLOROBIPHENYL	0.5	UG/L	0.12
EPA 525.2		GC/MS	1	2,2',3,3',4,5',6,6'-OCTACHLOROBIPHENYL	0.5	UG/L	0.20
EPA 525.2		GC/MS	1	2,2',4,4',5,6'-HEXACHLOROBIPHENYL	0.5	UG/L	0.18
EPA 525.2		GC/MS	1	2,3-DICHLOROBIPHENYL (5)	0.5	UG/L	0.10
EPA 525.2		GC/MS	1	2,4,5-TRICHLOROBIPHENYL	0.5	UG/L	0.10
EPA 525.2		GC/MS	1	2,4,6-TRIBROMOPHENOL	NA	% REC	NA
EPA 525.2		GC/MS	1	2-CHLOROBIPHENYL (1)	0.5	UG/L	0.11
EPA 525.2		GC/MS	1	2-FLUOROBIPHENYL	NA	% REC	NA
EPA 525.2		GC/MS	1	ACENAPHTHYLENE	0.5	UG/L	0.12
EPA 525.2		GC/MS	1	ALACHLOR	0.2	UG/L	0.044
EPA 525.2		GC/MS	1	ALPHA-CHLORDANE	0.5	UG/L	0.22
EPA 525.2		GC/MS	1	ANTHRACENE	0.5	UG/L	0.11
EPA 525.2		GC/MS	1	ATRAZINE	0.10	UG/L	0.052
EPA 525.2		GC/MS	1	BENZO(A)ANTHRACENE	0.5	UG/L	0.10
EPA 525.2		GC/MS	1	BENZO(A)PYRENE	0.02	UG/L	0.038
EPA 525.2		GC/MS	1	BENZO(B)FLUORANTHENE	0.5	UG/L	0.13
EPA 525.2		GC/MS	1	BENZO(G,H,I)PERYLENE	0.5	UG/L	0.13
EPA 525.2		GC/MS	1	BENZO(K)FLUORANTHENE	0.5	UG/L	0.12
EPA 525.2		GC/MS	1	BENZYLBUTYLPHTHALATE	0.5	UG/L	0.06
EPA 525.2		GC/MS	1	BIS(2-ETHYLHEXYL)PHTHALATE	0.5	UG/L	0.20
EPA 525.2		GC/MS	1	BUTACHLOR	0.5	UG/L	0.16
EPA 525.2		GC/MS	1	CHRYSENE	0.5	UG/L	0.13
EPA 525.2		GC/MS	1	DI(2-ETHYLHEXYL)ADIPATE	0.5	UG/L	0.08
EPA 525.2		GC/MS	1	DI-N-BUTYLPHTHALATE	0.5	UG/L	0.11
EPA 525.2		GC/MS	1	DIBENZ(A,H)ANTHRACENE	0.5	UG/L	0.11

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 525.2		GC/MS	1	DIETHYLPHTHALATE	0.5	UG/L	0.11
EPA 525.2		GC/MS	1	DIMETHYLPHTHALATE	0.5	UG/L	0.11
EPA 525.2		GC/MS	1	FLUORENE	0.5	UG/L	0.11
EPA 525.2		GC/MS	1	GAMMA-BHC (LINDANE)	0.02	UG/L	0.14
EPA 525.2		GC/MS	1	GAMMA-CHLORDANE	0.5	UG/L	0.15
EPA 525.2		GC/MS	1	HEXACHLOROCYCLOPENTADIENE	0.1	UG/L	0.09
EPA 525.2		GC/MS	1	INDENO(1,2,3-CD)PYRENE	0.5	UG/L	0.10
EPA 525.2		GC/MS	1	METHOXYCHLOR	0.1	UG/L	0.07
EPA 525.2		GC/MS	1	METOLACHLOR (DUAL)	0.5	UG/L	0.14
EPA 525.2		GC/MS	1	METRIBUZIN (LEXONE)	0.5	UG/L	
EPA 525.2		GC/MS	1	PHENANTHRENE	0.50	UG/L	0.11
EPA 525.2		GC/MS	1	PROPACHLOR	0.50	UG/L	0.10
EPA 525.2		GC/MS	1	PYRENE	0.50	UG/L	0.12
EPA 525.2		GC/MS	1	SIMAZINE (PRINCEP)	0.07	UG/L	0.055
EPA 525.2		GC/MS	1	TERPHENYL-D14	NA	% REC	NA
EPA 525.2		GC/MS	1	TRANS-NONACHLOR	0.50	UG/L	0.18
EPA 531.1		HPLC	1	4-BROMO-3,5-DIMETHYLPHENYL N-METHYLCARBAMATE	NA	% REC	NA
EPA 531.1		HPLC	1	CARBOFURAN	0.9	UG/L	0.6233
EPA 531.1		HPLC	1	OXAMYL (VYDATE)	2.0	UG/L	0.5418
EPA 531.1		HPLC	1	ALDICARB	2.0	UG/L	
EPA 531.1		HPLC	1	ALDICARB SULFONE	2.0	UG/L	
EPA 531.1		HPLC	1	ALDICARB SULFOXIDE	2.0	UG/L	
EPA 531.1		HPLC	1	CARBARYL	2.0	UG/L	
EPA 531.1		HPLC	1	3-HYDROXYCARBOFURAN	1.0	UG/L	
EPA 531.1		HPLC	1	METHOMYL	0.50	UG/L	
EPA 547		HPLC	1	GLYPHOSATE	6.0	UG/L	1.5369

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 548.1		GC/MS	1	ENDOTHALL	10	UG/L	
EPA 549.2		HPLC	1	DIQUAT	0.40	UG/L	0.220
EPA 551.1		GC/ECD	1	CHLORAL HYDRATE		UG/L	
EPA 552.2		GC/ECD	1	MONOCHLOROACETIC ACID	2.0	UG/L	0.1686
EPA 552.2		GC/ECD	1	DICHLOROACETIC ACID	1.0	UG/L	0.2513
EPA 552.2		GC/ECD	1	TRICHLOROACETIC ACID	1.0	UG/L	0.1014
EPA 552.2		GC/ECD	1	BROMOACETIC ACID	1.0	UG/L	0.0680
EPA 552.2		GC/ECD	1	DIBROMOACETIC ACID	1.0	UG/L	0.0707
EPA 552.2		GC/ECD	1	BROMOCHLOROACETIC ACID	1.0	UG/L	0.1253
EPA 552.2		GC/ECD	1	2,3-DIRBROMOPROPIONIC ACID	NA	UG/L	NA
EPA 601		GC/ELCD #271	1	1,1,1-TRICHLOROETHANE	1	UG/L	0.72
EPA 601		GC/ELCD #271	1	1,1,2,2-TETRACHLOROETHANE	1	UG/L	0.61
EPA 601		GC/ELCD #271	1	1,1,2-TRICHLOROETHANE	1	UG/L	0.75
EPA 601		GC/ELCD #271	1	1,1-DICHLOROETHANE	1	UG/L	0.67
EPA 601		GC/ELCD #271	1	1,1-DICHLOROETHENE	1	UG/L	0.56
EPA 601		GC/ELCD #271	1	1,2-DICHLOROBENZENE	1	UG/L	0.15
EPA 601		GC/ELCD #271	1	1,2-DICHLOROETHANE	1	UG/L	0.70
EPA 601		GC/ELCD #271	1	1,2-DICHLOROPROPANE	1	UG/L	0.73
EPA 601		GC/ELCD #271	1	1,3-DICHLOROBENZENE	1	UG/L	0.13
EPA 601		GC/ELCD #271	1	1,4-DICHLOROBENZENE	1	UG/L	0.11
EPA 601		GC/ELCD #271	1	2-CHLOROETHYLVINYLETHER	1	UG/L	0.11
EPA 601		GC/ELCD #271	1	BROMODICHLOROMETHANE	1	UG/L	0.81
EPA 601		GC/ELCD #271	1	BROMOFORM	1	UG/L	0.42
EPA 601		GC/ELCD #271	1	BROMOMETHANE	1	UG/L	0.49
EPA 601		GC/ELCD #271	1	CARBON TETRACHLORIDE	1	UG/L	0.80
EPA 601		GC/ELCD #271	1	CHLOROBENZENE	1	UG/L	0.69
EPA 601		GC/ELCD #271	1	CHLOROETHANE	1	UG/L	0.61
EPA 601		GC/ELCD #271	1	CHLOROFLUOROBENZENE	NA	% REC	0.36

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 601		GC/ELCD #271	1	CHLOROFORM	1	UG/L	0.76
EPA 601		GC/ELCD #271	1	CHLOROMETHANE	1	UG/L	0.76
EPA 601		GC/ELCD #271	1	CIS-1,3-DICHLOROPROPENE	1	UG/L	0.61
EPA 601		GC/ELCD #271	1	DIBROMOCHLOROMETHANE	1	UG/L	0.64
EPA 601		GC/ELCD #271	1	DICHLORODIFLUOROMETHANE	1	UG/L	0.48
EPA 601		GC/ELCD #271	1	DICHLOROMETHANE (METHYLENE CHLORIDE)	2.5	UG/L	0.59
EPA 601		GC/ELCD #271	1	FLUOROBENZENE	NA	% REC	0.27
EPA 601		GC/ELCD #271	1	TETRACHLOROETHENE	1	UG/L	0.83
EPA 601		GC/ELCD #271	1	TRANS-1,2-DICHLOROETHENE	1	UG/L	0.69
EPA 601		GC/ELCD #271	1	TRANS-1,3-DICHLOROPROPENE	1	UG/L	0.66
EPA 601		GC/ELCD #271	1	TRICHLOROETHENE	1	UG/L	0.84
EPA 601		GC/ELCD #271	1	TRICHLOROFLUOROMETHANE	1	UG/L	0.58
EPA 601		GC/ELCD #271	1	VINYL CHLORIDE	1	UG/L	0.55
EPA 601		GC/ELCD	4	1,1,1-TRICHLOROETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	1,1,2,2-TETRACHLOROETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	1,1,2-TRICHLOROETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	1,1-DICHLOROETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	1,1-DICHLOROETHENE	500	MG/KG	NA
EPA 601		GC/ELCD	4	1,2-DICHLOROBENZENE	500	MG/KG	NA
EPA 601		GC/ELCD	4	1,2-DICHLOROETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	1,2-DICHLOROPROPANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	1,3-DICHLOROBENZENE	500	MG/KG	NA
EPA 601		GC/ELCD	4	1,4-DICHLOROBENZENE	500	MG/KG	NA
EPA 601		GC/ELCD	4	2-CHLOROETHYLVINYLETHER	500	MG/KG	NA
EPA 601		GC/ELCD	4	BROMODICHLOROMETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	BROMOFORM	500	MG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 601		GC/ELCD	4	BROMOMETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	CARBON TETRACHLORIDE	500	MG/KG	NA
EPA 601		GC/ELCD	4	CHLOROBENZENE	500	MG/KG	NA
EPA 601		GC/ELCD	4	CHLOROETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	CHLOROFLUOROBENZENE	NA	% REC	NA
EPA 601		GC/ELCD	4	CHLOROFORM	500	MG/KG	NA
EPA 601		GC/ELCD	4	CHLOROMETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	CIS-1,3-DICHLOROPROPENE	500	MG/KG	NA
EPA 601		GC/ELCD	4	DIBROMOCHLOROMETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	DICHLORODIFLUOROMETHANE	1250	MG/KG	NA
EPA 601		GC/ELCD	4	DICHLOROMETHANE (METHYLENE CHLORIDE)	1200	MG/KG	NA
EPA 601		GC/ELCD	4	DICHLOROMETHANE (METHYLENE CHLORIDE)	500	MG/KG	NA
EPA 601		GC/ELCD	4	FLUOROBENZENE	NA	% REC	NA
EPA 601		GC/ELCD	4	TETRACHLOROETHENE	500	MG/KG	NA
EPA 601		GC/ELCD	4	TRANS-1,2-DICHLOROETHENE	500	MG/KG	NA
EPA 601		GC/ELCD	4	TRANS-1,3-DICHLOROPROPENE	500	MG/KG	NA
EPA 601		GC/ELCD	4	TRICHLOROETHENE	500	MG/KG	NA
EPA 601		GC/ELCD	4	TRICHLOROFLUOROMETHANE	500	MG/KG	NA
EPA 601		GC/ELCD	4	VINYL CHLORIDE	500	MG/KG	NA
EPA 601		GC/ELCD	5	1,1,1-TRICHLOROETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	1,1,1-TRICHLOROETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	1,1,2,2-TETRACHLOROETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	1,1,2,2-TETRACHLOROETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	1,1,2-TRICHLOROETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	1,1,2-TRICHLOROETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	1,1-DICHLOROETHANE	5	UG/KG	NA

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 601		GC/ELCD	5	1,1-DICHLOROETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	1,1-DICHLOROETHENE	5	UG/KG	NA
EPA 601		GC/ELCD	5	1,1-DICHLOROETHENE	50	UG/KG	NA
EPA 601		GC/ELCD	5	1,2-DICHLOROBENZENE	5	UG/KG	NA
EPA 601		GC/ELCD	5	1,2-DICHLOROBENZENE	50	UG/KG	NA
EPA 601		GC/ELCD	5	1,2-DICHLOROETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	1,2-DICHLOROETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	1,2-DICHLOROPROPANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	1,2-DICHLOROPROPANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	1,3-DICHLOROBENZENE	5	UG/KG	NA
EPA 601		GC/ELCD	5	1,3-DICHLOROBENZENE	50	UG/KG	NA
EPA 601		GC/ELCD	5	1,4-DICHLOROBENZENE	5	UG/KG	NA
EPA 601		GC/ELCD	5	1,4-DICHLOROBENZENE	50	UG/KG	NA
EPA 601		GC/ELCD	5	2-CHLOROETHYLVINYLETHER	5	UG/KG	NA
EPA 601		GC/ELCD	5	2-CHLOROETHYLVINYLETHER	50	UG/KG	NA
EPA 601		GC/ELCD	5	BROMODICHLOROMETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	BROMODICHLOROMETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	BROMOFORM	5	UG/KG	NA
EPA 601		GC/ELCD	5	BROMOFORM	50	UG/KG	NA
EPA 601		GC/ELCD	5	BROMOMETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	BROMOMETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	CARBON TETRACHLORIDE	5	UG/KG	NA
EPA 601		GC/ELCD	5	CARBON TETRACHLORIDE	50	UG/KG	NA
EPA 601		GC/ELCD	5	CHLOROBENZENE	5	UG/KG	NA
EPA 601		GC/ELCD	5	CHLOROBENZENE	50	UG/KG	NA
EPA 601		GC/ELCD	5	CHLOROETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	CHLOROETHANE	50	UG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 601		GC/ELCD	5	CHLOROFLUOROBENZENE	NA	% REC	NA
EPA 601		GC/ELCD	5	CHLOROFORM	5	UG/KG	NA
EPA 601		GC/ELCD	5	CHLOROFORM	50	UG/KG	NA
EPA 601		GC/ELCD	5	CHLOROMETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	CHLOROMETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	CIS-1,3-DICHLOROPROPENE	5	UG/KG	NA
EPA 601		GC/ELCD	5	CIS-1,3-DICHLOROPROPENE	50	UG/KG	NA
EPA 601		GC/ELCD	5	DIBROMOCHLOROMETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	DIBROMOCHLOROMETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	DICHLORODIFLUOROMETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	DICHLORODIFLUOROMETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	DICHLOROMETHANE (METHYLENE CHLORIDE)	12.5	UG/KG	NA
EPA 601		GC/ELCD	5	FLUOROBENZENE	NA	% REC	NA
EPA 601		GC/ELCD	5	TETRACHLOROETHENE	5	UG/KG	NA
EPA 601		GC/ELCD	5	TETRACHLOROETHENE	50	UG/KG	NA
EPA 601		GC/ELCD	5	TRANS-1,2-DICHLOROETHENE	5	UG/KG	NA
EPA 601		GC/ELCD	5	TRANS-1,2-DICHLOROETHENE	50	UG/KG	NA
EPA 601		GC/ELCD	5	TRANS-1,3-DICHLOROPROPENE	5	UG/KG	NA
EPA 601		GC/ELCD	5	TRANS-1,3-DICHLOROPROPENE	50	UG/KG	NA
EPA 601		GC/ELCD	5	TRICHLOROETHENE	5	UG/KG	NA
EPA 601		GC/ELCD	5	TRICHLOROETHENE	50	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,1,2,2-TETRACHLOROETHANE	1	UG/L	0.61
EPA 601		GC/ELCD	5	TRICHLOROFLUOROMETHANE	5	UG/KG	NA
EPA 601		GC/ELCD	5	TRICHLOROFLUOROMETHANE	50	UG/KG	NA
EPA 601		GC/ELCD	5	VINYL CHLORIDE	5	UG/KG	NA
EPA 601		GC/ELCD	5	VINYL CHLORIDE	50	UG/KG	NA

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,1,1-TRICHLOROETHANE	1	UG/L	0.72
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,1,2-TRICHLOROETHANE	1	UG/L	0.75
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,1-DICHLOROETHANE	1	UG/L	0.67
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,1-DICHLOROETHENE	1	UG/L	0.56
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,1-DICHLOROPROPENE	1	UG/L	0.77
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,2-DIBROMOETHANE (EDB)	1	UG/L	0.57
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	1	UG/L	0.15
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,2-DICHLOROETHANE	1	UG/L	0.70
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,2-DICHLOROPROPANE	1	UG/L	0.73
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)	1	UG/L	0.13
EPA 601/602 MOD		GC/PID/ELCD #271	1	1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	1	UG/L	0.11
EPA 601/602 MOD		GC/PID/ELCD #271	1	BENZENE	1	UG/L	0.71
EPA 601/602 MOD		GC/PID/ELCD #271	1	BROMOCHLOROMETHANE	1	UG/L	0.65
EPA 601/602 MOD		GC/PID/ELCD #271	1	BROMODICHLOROMETHANE	1	UG/L	0.81

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 601/602 MOD		GC/PID/ELCD #271	1	BROMOFORM	1	UG/L	0.42
EPA 601/602 MOD		GC/PID/ELCD #271	1	BROMOMETHANE	1	UG/L	0.49
EPA 601/602 MOD		GC/PID/ELCD #271	1	CARBON TETRACHLORIDE	1	UG/L	0.80
EPA 601/602 MOD		GC/PID/ELCD #271	1	CHLOROBENZENE	1	UG/L	0.69
EPA 601/602 MOD		GC/PID/ELCD #271	1	CHLOROETHANE	1	UG/L	0.61
EPA 601/602 MOD		GC/PID/ELCD #271	1	CHLOROFLUOROBENZENE	NA	% REC	0.36
EPA 601/602 MOD		GC/PID/ELCD #271	1	CHLOROFORM	1	UG/L	0.76
EPA 601/602 MOD		GC/PID/ELCD #271	1	CHLOROMETHANE	1	UG/L	0.76
EPA 601/602 MOD		GC/PID/ELCD #271	1	CIS-1,3-DICHLOROPROPENE	1	UG/L	0.61
EPA 601/602 MOD		GC/PID/ELCD #271	1	DI-ISOPROPYL ETHER (IPE)	1	UG/L	
EPA 601/602 MOD		GC/PID/ELCD #271	1	DIBROMOCHLOROMETHANE	1	UG/L	0.64
EPA 601/602 MOD		GC/PID/ELCD #271	1	DIBROMOMETHANE	1	UG/L	0.52
EPA 601/602 MOD		GC/PID/ELCD #271	1	DICHLORODIFLUOROMETHANE	1	UG/L	0.48
EPA 601/602 MOD		GC/PID/ELCD #271	1	DICHLOROMETHANE (METHYLENE CHLORIDE)	2.5	UG/L	0.59

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 601/602 MOD		GC/PID/ELCD #271	1	ETHYL BENZENE	1	UG/L	0.75
EPA 601/602 MOD		GC/PID/ELCD #271	1	FLUOROBENZENE	NA	% REC	0.27
EPA 601/602 MOD		GC/PID/ELCD #271	1	M/P-XYLENE	1	UG/L	0.22
EPA 601/602 MOD		GC/PID/ELCD #271	1	METHYL-T-BUTYL ETHER (MTBE)	1	UG/L	
EPA 601/602 MOD		GC/PID/ELCD #271	1	O-XYLENE	1	UG/L	0.6
EPA 601/602 MOD		GC/PID/ELCD #271	1	TETRACHLOROETHENE	1	UG/L	0.83
EPA 601/602 MOD		GC/PID/ELCD #271	1	TOLUENE	1	UG/L	0.71
EPA 601/602 MOD		GC/PID/ELCD #271	1	TRANS-1,2-DICHLOROETHENE	1	UG/L	0.69
EPA 601/602 MOD		GC/PID/ELCD #271	1	TRANS-1,3-DICHLOROPROPENE	1	UG/L	0.66
EPA 601/602 MOD		GC/PID/ELCD #271	1	TRICHLOROETHENE	1	UG/L	0.84
EPA 601/602 MOD		GC/PID/ELCD #271	1	TRICHLOROFLUOROMETHANE	1	UG/L	0.58
EPA 601/602 MOD		GC/PID/ELCD #271	1	VINYL CHLORIDE	1	UG/L	0.55
EPA 601/602 MOD		GC/PID/ELCD	5	1,1,1-TRICHLOROETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	1,1,2,2-TETRACHLOROETHANE	5	UG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 601/602 MOD		GC/PID/ELCD	5	1,1,2-TRICHLOROETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	1,1-DICHLOROETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	1,1-DICHLOROETHENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	1,1-DICHLOROPROPENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	1,2-DIBROMOETHANE (EDB)	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	1,2-DICHLOROBENZENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	1,2-DICHLOROETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	1,2-DICHLOROPROPANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	1,3-DICHLOROBENZENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	1,4-DICHLOROBENZENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	BENZENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	BROMOCHLOROMETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	BROMODICHLOROMETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	BROMOFORM	5	UG/KG	NA

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 601/602 MOD		GC/PID/ELCD	5	BROMOMETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	CARBON TETRACHLORIDE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	CHLOROBENZENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	CHLOROETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	CHLOROFLUOROBENZENE	NA	% REC	NA
EPA 601/602 MOD		GC/PID/ELCD	5	CHLOROFORM	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	CHLOROMETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	CIS-1,3-DICHLOROPROPENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	DI-ISOPROPYL ETHER (IPE)	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	DIBROMOCHLOROMETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	DIBROMOMETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	DICHLORODIFLUOROMETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	DICHLOROMETHANE (METHYLENE CHLORIDE)	12	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	ETHYL BENZENE	5	UG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 601/602 MOD		GC/PID/ELCD	5	FLUOROBENZENE	NA	% REC	NA
EPA 601/602 MOD		GC/PID/ELCD	5	M/P-XYLENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	METHYL-T-BUTYL ETHER (MTBE)	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	O-XYLENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	TETRACHLOROETHENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	TOLUENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	TRANS-1,2-DICHLOROETHENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	TRANS-1,3-DICHLOROPROPENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	TRICHLOROETHENE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	TRICHLOROFLUOROMETHANE	5	UG/KG	NA
EPA 601/602 MOD		GC/PID/ELCD	5	VINYL CHLORIDE	5	UG/KG	NA
EPA 602		GC/PID #271	1	BENZENE	1	UG/L	0.71
EPA 602		GC/PID #271	1	CHLOROFLUOROBENZENE		% REC	0.36
EPA 602		GC/PID #271	1	ETHYL BENZENE	1	UG/L	0.75
EPA 602		GC/PID #271	1	FLUOROBENZENE		% REC	0.27
EPA 602		GC/PID #271	1	TOLUENE	1	UG/L	0.71
EPA 602		GC/PID #271	1	XYLENES (O/M/P-XYLENE)	1	UG/L	0.60

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 602		GC/PID	5	BENZENE	5	UG/KG	NA
EPA 602		GC/PID	5	CHLOROFLUOROBENZENE	NA	% REC	NA
EPA 602		GC/PID	5	ETHYL BENZENE	5	UG/KG	NA
EPA 602		GC/PID	5	FLUOROBENZENE	NA	% REC	NA
EPA 602		GC/PID	5	TOLUENE	5	UG/KG	NA
EPA 602		GC/PID	5	XYLENES (O/M/P-XYLENE)	5	UG/KG	NA
EPA 608		GC/ECD	1	4,4'-DDD	0.10	UG/L	0.0391
EPA 608		GC/ECD	1	4,4'-DDE	0.10	UG/L	0.01647
EPA 608		GC/ECD	1	4,4'-DDT	0.10	UG/L	0.0369
EPA 608		GC/ECD	1	ALDRIN	0.050	UG/L	0.01087
EPA 608		GC/ECD	1	ALPHA-BHC	0.050	UG/L	0.0117
EPA 608		GC/ECD	1	ALPHA-CHLORDANE	0.10	UG/L	0.00736
EPA 608		GC/ECD	1	BETA-BHC	0.050	UG/L	0.00846
EPA 608		GC/ECD	1	DECACHLOROBIPHENYL (DCB)	NA	% REC	NA
EPA 608		GC/ECD	1	DELTA-BHC	0.050	UG/L	0.00509
EPA 608		GC/ECD	1	DIELDRIN	0.10	UG/L	0.0309
EPA 608		GC/ECD	1	ENDOSULFAN I	0.050	UG/L	0.0140
EPA 608		GC/ECD	1	ENDOSULFAN II	0.10	UG/L	0.01380
EPA 608		GC/ECD	1	ENDOSULFAN SULFATE	0.10	UG/L	0.01229
EPA 608		GC/ECD	1	ENDRIN	0.10	UG/L	0.0420
EPA 608		GC/ECD	1	ENDRIN ALDEHYDE	0.10	UG/L	0.01227
EPA 608		GC/ECD	1	GAMMA-BHC (LINDANE)	0.05	UG/L	0.0111
EPA 608		GC/ECD	1	GAMMA-CHLORDANE	0.10	UG/L	0.00509
EPA 608		GC/ECD	1	HEPTACHLOR	0.05	UG/L	0.0154
EPA 608		GC/ECD	1	HEPTACHLOR EPOXIDE	0.05	UG/L	0.00977
EPA 608		GC/ECD	1	METHOXYCHLOR	0.5	UG/L	0.1838
EPA 608		GC/ECD	1	PCB AROCLOR 1016	0.1	UG/L	0.0324

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 608		GC/ECD	1	PCB AROCLOR 1221	0.5	UG/L	0.0311
EPA 608		GC/ECD	1	PCB AROCLOR 1232	0.1	UG/L	0.0324
EPA 608		GC/ECD	1	PCB AROCLOR 1242	0.1	UG/L	0.0293
EPA 608		GC/ECD	1	PCB AROCLOR 1248	0.1	UG/L	0.0279
EPA 608		GC/ECD	1	PCB AROCLOR 1254	0.1	UG/L	0.0293
EPA 608		GC/ECD	1	PCB AROCLOR 1260	0.1	UG/L	0.0311
EPA 608		GC/ECD	1	PCB AROCLOR 1262	0.1	UG/L	0.0360
EPA 608		GC/ECD	1	TOXAPHENE	1	UG/L	0.24158
EPA 608		GC/ECD	4	DECACHLOROBIPHENYL (DCB)	NA	% REC	NA
EPA 608		GC/ECD	4	PCB AROCLOR 1016	1000	UG/KG	NA
EPA 608		GC/ECD	4	PCB AROCLOR 1221	5000	UG/KG	NA
EPA 608		GC/ECD	4	PCB AROCLOR 1232	1000	UG/KG	NA
EPA 608		GC/ECD	4	PCB AROCLOR 1242	1000	UG/KG	NA
EPA 608		GC/ECD	4	PCB AROCLOR 1248	1000	UG/KG	NA
EPA 608		GC/ECD	4	PCB AROCLOR 1254	1000	UG/KG	NA
EPA 608		GC/ECD	4	PCB AROCLOR 1260	1000	UG/KG	NA
EPA 608		GC/ECD	4	PCB AROCLOR 1262	1000	UG/KG	NA
EPA 608		GC/ECD	5	4,4'-DDD	16	UG/KG	NA
EPA 608		GC/ECD	5	4,4'-DDE	16	UG/KG	NA
EPA 608		GC/ECD	5	4,4'-DDT	16	UG/KG	NA
EPA 608		GC/ECD	5	ALDRIN	8	UG/KG	NA
EPA 608		GC/ECD	5	ALPHA-BHC	8	UG/KG	NA
EPA 608		GC/ECD	5	ALPHA-CHLORDANE	16	UG/KG	NA
EPA 608		GC/ECD	5	BETA-BHC	8	UG/KG	NA
EPA 608		GC/ECD	5	DECACHLOROBIPHENYL (DCB)	NA	% REC	NA
EPA 608		GC/ECD	5	DELTA-BHC	8	UG/KG	NA
EPA 608		GC/ECD	5	DIELDRIN	16	UG/KG	NA
EPA 608		GC/ECD	5	ENDOSULFAN I	8	UG/KG	NA

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 608		GC/ECD	5	ENDOSULFAN II	16	UG/KG	NA
EPA 608		GC/ECD	5	ENDOSULFAN SULFATE	16	UG/KG	NA
EPA 608		GC/ECD	5	ENDRIN	16	UG/KG	NA
EPA 608		GC/ECD	5	ENDRIN ALDEHYDE	16	UG/KG	NA
EPA 608		GC/ECD	5	GAMMA-BHC (LINDANE)	8	UG/KG	NA
EPA 608		GC/ECD	5	GAMMA-CHLORDANE	16	UG/KG	NA
EPA 608		GC/ECD	5	HEPTACHLOR	8	UG/KG	NA
EPA 608		GC/ECD	5	HEPTACHLOR EPOXIDE	8	UG/KG	NA
EPA 608		GC/ECD	5	METHOXYCHLOR	80	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1016	1000	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1016	80	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1221	5000	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1221	80	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1232	1000	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1232	80	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1242	1000	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1242	80	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1248	1000	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1248	80	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1254	1000	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1254	160	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1260	1000	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1260	160	UG/KG	NA
EPA 608		GC/ECD	5	PCB AROCLOR 1262	1000	UG/KG	NA
EPA 608		GC/ECD	5	TOXAPHENE	160	UG/KG	NA
EPA 609.0		GC/FID	1	2,4-DINITROTOLUENE	0.02	UG/L	
EPA 609.0		GC/FID	1	2,6-DINITROTOLUENE	0.01	UG/L	

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 610		HPLC	1	2-FLUOROBIPHENYL	NA	% REC	NA
EPA 610		HPLC	1	ACENAPHTHENE	0.16	UG/L	
EPA 610		HPLC	1	ACENAPHTHYLENE	0.4	UG/L	
EPA 610		HPLC	1	ANTHRACENE	0.08	UG/L	
EPA 610		HPLC	1	BENZO(A)ANTHRACENE	0.13	UG/L	
EPA 610		HPLC	1	BENZO(A)PYRENE	0.23	UG/L	
EPA 610		HPLC	1	BENZO(B)FLUORANTHENE	0.1	UG/L	
EPA 610		HPLC	1	BENZO(G,H,I)PERYLENE	0.2	UG/L	
EPA 610		HPLC	1	BENZO(K)FLUORANTHENE	0.06	UG/L	
EPA 610		HPLC	1	CHRYSENE	0.05	UG/L	
EPA 610		HPLC	1	DIBENZ(A,H)ANTHRACENE	0.13	UG/L	
EPA 610		HPLC	1	FLUORANTHENE	0.08	UG/L	
EPA 610		HPLC	1	FLUORENE	0.13	UG/L	
EPA 610		HPLC	1	INDENO(1,2,3-CD)PYRENE	0.13	UG/L	
EPA 610		HPLC	1	NAPHTHALENE	0.16	UG/L	
EPA 610		HPLC	1	PHENANTHRENE	0.16	UG/L	
EPA 610		HPLC	1	PYRENE	0.08	UG/L	
EPA 613		GC/MS	1	2,3,7,8-TCDD	1	NG/L	
EPA 613		GC/MS	5	2,3,7,8-TCDD	0.3	NG/G	
EPA 1613		GC/MS	1	2,3,7,8-TCDD			
EPA 624		GC/MS (#11)	1	1,1,1-TRICHLOROETHANE	5	UG/L	1.16
EPA 624		GC/MS (#11)	1	1,1,2,2-TETRACHLOROETHANE	5	UG/L	2.33
EPA 624		GC/MS (#11)	1	1,1,2-TRICHLOROETHANE	5	UG/L	1.32
EPA 624		GC/MS (#11)	1	1,1-DICHLOROETHANE	5	UG/L	1.04
EPA 624		GC/MS (#11)	1	1,1-DICHLOROETHENE	5	UG/L	1.39
EPA 624		GC/MS (#11)	1	1,2-DICHLOROBENZENE	5	UG/L	1.4
EPA 624		GC/MS (#11)	1	1,2-DICHLOROETHANE	5	UG/L	0.91

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 624		GC/MS (#11)	1	1,2-DICHLOROETHENE (CIS AND TRANS)	5	UG/L	1.42
EPA 624		GC/MS (#11)	1	1,2-DICHLOROPROPANE	5	UG/L	0.85
EPA 624		GC/MS (#11)	1	1,3-DICHLOROBENZENE	5	UG/L	1.26
EPA 624		GC/MS (#11)	1	1,4-DICHLOROBENZENE	5	UG/L	1.36
EPA 624		GC/MS (#11)	1	2-CHLOROETHYLVINYLETHER	10	UG/L	4.71
EPA 624		GC/MS (#11)	1	4-BROMOFLUOROBENZENE	NA	% REC	1.65
EPA 624		GC/MS (#11)	1	ACROLEIN	50	UG/L	38.42
EPA 624		GC/MS (#11)	1	ACRYLONITRILE	70	UG/L	31.97
EPA 624		GC/MS (#11)	1	BENZENE	5	UG/L	0.01
EPA 624		GC/MS (#11)	1	BROMODICHLOROMETHANE	5	UG/L	0.75
EPA 624		GC/MS (#11)	1	BROMOFORM	5	UG/L	1.97
EPA 624		GC/MS (#11)	1	BROMOMETHANE	10	UG/L	1.00
EPA 624		GC/MS (#11)	1	CARBON TETRACHLORIDE	5	UG/L	0.82
EPA 624		GC/MS (#11)	1	CHLOROBENZENE	5	UG/L	0.8
EPA 624		GC/MS (#11)	1	CHLOROETHANE	10	UG/L	0.96
EPA 624		GC/MS (#11)	1	CHLOROFORM	5	UG/L	0.94
EPA 624		GC/MS (#11)	1	CHLOROMETHANE	10	UG/L	0.61
EPA 624		GC/MS (#11)	1	CIS-1,3-DICHLOROPROPENE	5	UG/L	1.13
EPA 624		GC/MS (#11)	1	DIBROMOCHLOROMETHANE	5	UG/L	1.04
EPA 624		GC/MS (#11)	1	DICHLOROETHANE-D4	NA	% REC	NA
EPA 624		GC/MS (#11)	1	DICHLOROMETHANE (METHYLENE CHLORIDE)	5	UG/L	1.03
EPA 624		GC/MS (#11)	1	ETHYL BENZENE	5	UG/L	1.2
EPA 624		GC/MS (#11)	1	TETRACHLOROETHENE	5	UG/L	1.13
EPA 624		GC/MS (#11)	1	TOLUENE	5	UG/L	1.13
EPA 624		GC/MS (#11)	1	TOLUENE-D8	NA	% REC	0.71

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 624		GC/MS (#11)	1	TRANS-1,3-DICHLOROPROPENE	5	UG/L	1.01
EPA 624		GC/MS (#11)	1	TRICHLOROETHENE	5	UG/L	1.15
EPA 624		GC/MS (#11)	1	TRICHLOROFLUOROMETHANE	5	UG/L	0.86
EPA 624		GC/MS (#11)	1	VINYL CHLORIDE	10	UG/L	0.94
EPA 624		GC/MS	4	1,1,1-TRICHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	4	1,1,2,2-TETRACHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	4	1,1,2-TRICHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	4	1,1-DICHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	4	1,1-DICHLOROETHENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	1,2-DICHLOROBENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	1,2-DICHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	4	1,2-DICHLOROETHENE (CIS AND TRANS)	0.31	MG/KG	NA
EPA 624		GC/MS	4	1,2-DICHLOROPROPANE	0.31	MG/KG	NA
EPA 624		GC/MS	4	1,3-DICHLOROBENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	1,4-DICHLOROBENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	2-CHLOROETHYLVINYLETHER	0.63	MG/KG	NA
EPA 624		GC/MS	4	4-BROMOFLUOROBENZENE	NA	% REC	NA
EPA 624		GC/MS	4	ACROLEIN	3.1	MG/KG	NA
EPA 624		GC/MS	4	ACRYLONITRILE	4.4	MG/KG	NA
EPA 624		GC/MS	4	BENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	BROMODICHLOROMETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	4	BROMOFORM	0.31	MG/KG	NA
EPA 624		GC/MS	4	BROMOMETHANE	0.63	MG/KG	NA
EPA 624		GC/MS	4	CARBON TETRACHLORIDE	0.31	MG/KG	NA
EPA 624		GC/MS	4	CHLOROBENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	CHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	4	CHLOROFORM	0.31	MG/KG	NA

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 624		GC/MS	4	CHLOROMETHANE	0.63	MG/KG	NA
EPA 624		GC/MS	4	CIS-1,3-DICHLOROPROPENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	DIBROMOCHLOROMETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	4	DICHLOROETHANE-D4	NA	% REC	NA
EPA 624		GC/MS	4	DICHLOROMETHANE (METHYLENE CHLORIDE)	0.31	MG/KG	NA
EPA 624		GC/MS	4	ETHYL BENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	TETRACHLOROETHENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	TOLUENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	TOLUENE-D8	NA	% REC	NA
EPA 624		GC/MS	4	TRANS-1,3-DICHLOROPROPENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	TRICHLOROETHENE	0.31	MG/KG	NA
EPA 624		GC/MS	4	TRICHLOROFLUOROMETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	4	VINYL CHLORIDE	0.63	MG/KG	NA
EPA 624		GC/MS	5	1,1,1-TRICHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	5	1,1,2,2-TETRACHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	5	1,1,2-TRICHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	5	1,1-DICHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	5	1,1-DICHLOROETHENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	1,2-DICHLOROBENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	1,2-DICHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	5	1,2-DICHLOROETHENE (CIS AND TRANS)	0.31	MG/KG	NA
EPA 624		GC/MS	5	1,2-DICHLOROPROPANE	0.31	MG/KG	NA
EPA 624		GC/MS	5	1,3-DICHLOROBENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	1,4-DICHLOROBENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	2-CHLOROETHYLVINYLETHER	0.63	MG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 624		GC/MS	5	4-BROMOFLUOROBENZENE	NA	% REC	NA
EPA 624		GC/MS	5	ACROLEIN	3.1	MG/KG	NA
EPA 624		GC/MS	5	ACRYLONITRILE	4.4	MG/KG	NA
EPA 624		GC/MS	5	BENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	BROMODICHLOROMETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	5	BROMOFORM	0.31	MG/KG	NA
EPA 624		GC/MS	5	BROMOMETHANE	0.63	MG/KG	NA
EPA 624		GC/MS	5	CARBON TETRACHLORIDE	0.31	MG/KG	NA
EPA 624		GC/MS	5	CHLOROBENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	CHLOROETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	5	CHLOROFORM	0.31	MG/KG	NA
EPA 624		GC/MS	5	CHLOROMETHANE	0.63	MG/KG	NA
EPA 624		GC/MS	5	CIS-1,3-DICHLOROPROPENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	DIBROMOCHLOROMETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	5	DICHLOROETHANE-D4	NA	% REC	NA
EPA 624		GC/MS	5	DICHLOROMETHANE (METHYLENE CHLORIDE)	0.31	MG/KG	NA
EPA 624		GC/MS	5	ETHYL BENZENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	TETRACHLOROETHENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	TOLUENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	TOLUENE-D8	NA	% REC	NA
EPA 624		GC/MS	5	TRANS-1,3-DICHLOROPROPENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	TRICHLOROETHENE	0.31	MG/KG	NA
EPA 624		GC/MS	5	TRICHLOROFLUOROMETHANE	0.31	MG/KG	NA
EPA 624		GC/MS	5	VINYL CHLORIDE	0.63	MG/KG	NA
EPA 625		GC/MS	1	1,2,4-TRICHLOROBENZENE	10	UG/L	
EPA 625		GC/MS	1	1,2-DICHLOROBENZENE	10	UG/L	
EPA 625		GC/MS	1	1,2-DIPHENYLHYDRAZINE	10	UG/L	

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 625		GC/MS	1	1,3-DICHLOROBENZENE	10	UG/L	
EPA 625		GC/MS	1	1,4-DICHLOROBENZENE	10	UG/L	
EPA 625		GC/MS	1	2,4,6-TRIBROMOPHENOL	NA	% REC	
EPA 625		GC/MS	1	2,4,6-TRICHLOROPHENOL	10	UG/L	
EPA 625		GC/MS	1	2,4-DICHLOROPHENOL	10	UG/L	
EPA 625		GC/MS	1	2,4-DIMETHYLPHENOL	10	UG/L	
EPA 625		GC/MS	1	2,4-DINITROPHENOL	50	UG/L	
EPA 625		GC/MS	1	2,4-DINITROTOLUENE	10	UG/L	
EPA 625		GC/MS	1	2,6-DINITROTOLUENE	10	UG/L	
EPA 625		GC/MS	1	2-CHLORONAPHTHALENE	10	UG/L	
EPA 625		GC/MS	1	2-CHLOROPHENOL	10	UG/L	
EPA 625		GC/MS	1	2-FLUOROBIPHENYL	NA	% REC	
EPA 625		GC/MS	1	2-NITROPHENOL	10	UG/L	
EPA 625		GC/MS	1	3,3'-DICHLOROBENZIDINE	20	UG/L	
EPA 625		GC/MS	1	4,4'-DDD	10	UG/L	
EPA 625		GC/MS	1	4,4'-DDE	10	UG/L	
EPA 625		GC/MS	1	4,4'-DDT	10	UG/L	
EPA 625		GC/MS	1	4,6-DINITRO-O-CRESOL	50	UG/L	
EPA 625		GC/MS	1	4-BROMODIPHENYL ETHER	10	UG/L	
EPA 625		GC/MS	1	4-CHLORO-3-METHYLPHENOL	10	UG/L	
EPA 625		GC/MS	1	4-CHLOROPHENYL-PHENYLETHER	10	UG/L	
EPA 625		GC/MS	1	4-NITROPHENOL	50	UG/L	
EPA 625		GC/MS	1	ACENAPHTHENE	10	UG/L	
EPA 625		GC/MS	1	ACENAPHTHYLENE	10	UG/L	
EPA 625		GC/MS	1	ALDRIN	10	UG/L	
EPA 625		GC/MS	1	ALPHA-BHC	10	UG/L	
EPA 625		GC/MS	1	ALPHA-ENDOSULFAN	10	UG/L	

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 625		GC/MS	1	ANTHRACENE	10	UG/L	
EPA 625		GC/MS	1	BENZIDINE	20	UG/L	
EPA 625		GC/MS	1	BENZO(A)ANTHRACENE	10	UG/L	
EPA 625		GC/MS	1	BENZO(A)PYRENE	10	UG/L	
EPA 625		GC/MS	1	BENZO(B)FLUORANTHENE	10	UG/L	
EPA 625		GC/MS	1	BENZO(G,H,I)PERYLENE	10	UG/L	
EPA 625		GC/MS	1	BENZO(K)FLUORANTHENE	10	UG/L	
EPA 625		GC/MS	1	BENZYLBUTYLPHTHALATE	10	UG/L	
EPA 625		GC/MS	1	BETA-BHC	10	UG/L	
EPA 625		GC/MS	1	BETA-ENDOSULFAN	10	UG/L	
EPA 625		GC/MS	1	BIS(2-CHLOROETHOXY)METHANE	10	UG/L	
EPA 625		GC/MS	1	BIS(2-CHLOROETHYL)ETHER	10	UG/L	
EPA 625		GC/MS	1	BIS(2-CHLOROISOPROPYL)ETHER	10	UG/L	
EPA 625		GC/MS	1	BIS(2-ETHYLHEXYL)PHTHALATE	10	UG/L	
EPA 625		GC/MS	1	CHLORDANE	50	UG/L	
EPA 625		GC/MS	1	CHRYSENE	10	UG/L	
EPA 625		GC/MS	1	DELTA-BHC	10	UG/L	
EPA 625		GC/MS	1	DI-N-BUTYLPHTHALATE	10	UG/L	
EPA 625		GC/MS	1	DI-N-OCTYLPHTHALATE	10	UG/L	
EPA 625		GC/MS	1	DIBENZ(A,H)ANTHRACENE	10	UG/L	
EPA 625		GC/MS	1	DIELDRIN	10	UG/L	
EPA 625		GC/MS	1	DIETHYLPHTHALATE	10	UG/L	
EPA 625		GC/MS	1	DIMETHYLPHTHALATE	10	UG/L	
EPA 625		GC/MS	1	ENDOSULFAN SULFATE	10	UG/L	
EPA 625		GC/MS	1	ENDRIN	10	UG/L	
EPA 625		GC/MS	1	ENDRIN ALDEHYDE	10	UG/L	
EPA 625		GC/MS	1	FLUORANTHENE	10	UG/L	
EPA 625		GC/MS	1	FLUORENE	10	UG/L	

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 625		GC/MS	1	GAMMA-BHC (LINDANE)	10	UG/L	
EPA 625		GC/MS	1	HEPTACHLOR	10	UG/L	
EPA 625		GC/MS	1	HEPTACHLOR EPOXIDE	10	UG/L	
EPA 625		GC/MS	1	HEXACHLOROBENZENE	10	UG/L	
EPA 625		GC/MS	1	HEXACHLOROBUTADIENE	10	UG/L	
EPA 625		GC/MS	1	HEXACHLOROCYCLOPENTADIENE	10	UG/L	
EPA 625		GC/MS	1	HEXACHLOROETHANE	10	UG/L	
EPA 625		GC/MS	1	INDENO(1,2,3-CD)PYRENE	10	UG/L	
EPA 625		GC/MS	1	ISOPHORONE	10	UG/L	
EPA 625		GC/MS	1	N-NITROSO-DIPROPYLAMINE	10	UG/L	
EPA 625		GC/MS	1	N-NITROSODIMETHYLAMINE	10	UG/L	
EPA 625		GC/MS	1	N-NITROSODIPHENYLAMINE	10	UG/L	
EPA 625		GC/MS	1	NAPHTHALENE	10	UG/L	
EPA 625		GC/MS	1	NITROBENZENE	10	UG/L	
EPA 625		GC/MS	1	NITROBENZENE-D5	NA	% REC	NA
EPA 625		GC/MS	1	PCB AROCLOR 1016	50	UG/L	
EPA 625		GC/MS	1	PCB AROCLOR 1221	50	UG/L	
EPA 625		GC/MS	1	PCB AROCLOR 1232	50	UG/L	
EPA 625		GC/MS	1	PCB AROCLOR 1242	50	UG/L	
EPA 625		GC/MS	1	PCB AROCLOR 1248	50	UG/L	
EPA 625		GC/MS	1	PCB AROCLOR 1254	50	UG/L	
EPA 625		GC/MS	1	PCB AROCLOR 1260	50	UG/L	
EPA 625		GC/MS	1	PENTACHLOROPHENOL	50	UG/L	
EPA 625		GC/MS	1	PHENANTHRENE	10	UG/L	
EPA 625		GC/MS	1	PHENOL	10	UG/L	
EPA 625		GC/MS	1	PHENOL-D5	NA	% REC	NA
EPA 625		GC/MS	1	PYRENE	10	UG/L	

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 625		GC/MS	1	TERPHENYL-D14	NA	% REC	NA
EPA 625		GC/MS	1	TOXAPHENE	50	UG/L	
EPA 625		GC/MS	5	1,2,4-TRICHLOROBENZENE	330	UG/KG	NA
EPA 625		GC/MS	5	1,2-DICHLOROBENZENE	330	UG/KG	NA
EPA 625		GC/MS	5	1,2-DIPHENYLHYDRAZINE		UG/KG	NA
EPA 625		GC/MS	5	1,3-DICHLOROBENZENE	330	UG/KG	NA
EPA 625		GC/MS	5	1,4-DICHLOROBENZENE	330	UG/KG	NA
EPA 625		GC/MS	5	2,4,6-TRIBROMOPHENOL	NA	% REC	NA
EPA 625		GC/MS	5	2,4,6-TRICHLOROPHENOL	330	UG/KG	NA
EPA 625		GC/MS	5	2,4-DICHLOROPHENOL	330	UG/KG	NA
EPA 625		GC/MS	5	2,4-DIMETHYLPHENOL	330	UG/KG	NA
EPA 625		GC/MS	5	2,4-DINITROPHENOL	1600	UG/KG	NA
EPA 625		GC/MS	5	2,4-DINITROTOLUENE	330	UG/KG	NA
EPA 625		GC/MS	5	2,6-DINITROTOLUENE	330	UG/KG	NA
EPA 625		GC/MS	5	2-CHLORONAPHTHALENE	330	UG/KG	NA
EPA 625		GC/MS	5	2-CHLOROPHENOL	330	UG/KG	NA
EPA 625		GC/MS	5	2-FLUOROBIPHENYL	NA	% REC	NA
EPA 625		GC/MS	5	2-FLUOROPHENOL	NA	% REC	NA
EPA 625		GC/MS	5	2-NITROPHENOL	330	UG/KG	NA
EPA 625		GC/MS	5	3,3'-DICHLOROBENZIDINE	660	UG/KG	NA
EPA 625		GC/MS	5	4,4'-DDD	330	UG/KG	NA
EPA 625		GC/MS	5	4,4'-DDE	330	UG/KG	NA
EPA 625		GC/MS	5	4,4'-DDT	330	UG/KG	NA
EPA 625		GC/MS	5	4,6-DINITRO-O-CRESOL	1600	UG/KG	NA
EPA 625		GC/MS	5	4-BROMODIPHENYL ETHER	330	UG/KG	NA
EPA 625		GC/MS	5	4-CHLORO-3-METHYLPHENOL	330	UG/KG	NA
EPA 625		GC/MS	5	4-CHLOROPHENYL-PHENYLETHER	330	UG/KG	NA
EPA 625		GC/MS	5	4-NITROPHENOL	1600	UG/KG	NA

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 625		GC/MS	5	ACENAPHTHENE	330	UG/KG	NA
EPA 625		GC/MS	5	ACENAPHTHYLENE	330	UG/KG	NA
EPA 625		GC/MS	5	ALDRIN	330	UG/KG	NA
EPA 625		GC/MS	5	ALPHA-BHC	330	UG/KG	NA
EPA 625		GC/MS	5	ALPHA-ENDOSULFAN	330	UG/KG	NA
EPA 625		GC/MS	5	ANTHRACENE	330	UG/KG	NA
EPA 625		GC/MS	5	BENZIDINE	660	UG/KG	NA
EPA 625		GC/MS	5	BENZO(A)ANTHRACENE	330	UG/KG	NA
EPA 625		GC/MS	5	BENZO(A)PYRENE	330	UG/KG	NA
EPA 625		GC/MS	5	BENZO(B)FLUORANTHENE	330	UG/KG	NA
EPA 625		GC/MS	5	BENZO(G,H,I)PERYLENE	330	UG/KG	NA
EPA 625		GC/MS	5	BENZO(K)FLUORANTHENE	330	UG/KG	NA
EPA 625		GC/MS	5	BENZYLBUTYLPHTHALATE)	330	UG/KG	NA
EPA 625		GC/MS	5	BETA-BHC	330	UG/KG	NA
EPA 625		GC/MS	5	BETA-ENDOSULFAN	330	UG/KG	NA
EPA 625		GC/MS	5	BIS(2-CHLOROETHOXY)METHANE	330	UG/KG	NA
EPA 625		GC/MS	5	BIS(2-CHLOROETHYL)ETHER	330	UG/KG	NA
EPA 625		GC/MS	5	BIS(2-CHLOROISOPROPYL)ETHER	330	UG/KG	NA
EPA 625		GC/MS	5	BIS(2-ETHYLHEXYL)PHTHALATE	330	UG/KG	NA
EPA 625		GC/MS	5	CHLORDANE	1600	UG/KG	NA
EPA 625		GC/MS	5	CHRYSENE	330	UG/KG	NA
EPA 625		GC/MS	5	DELTA-BHC	330	UG/KG	NA
EPA 625		GC/MS	5	DI-N-BUTYLPHTHALATE	330	UG/KG	NA
EPA 625		GC/MS	5	DI-N-OCTYLPHTHALATE	330	UG/KG	NA
EPA 625		GC/MS	5	DIBENZ(A,H)ANTHRACENE	330	UG/KG	NA
EPA 625		GC/MS	5	DIELDRIN	330	UG/KG	NA
EPA 625		GC/MS	5	DIETHYLPHTHALATE	330	UG/KG	NA

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Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 625		GC/MS	5	DIMETHYLPHTHALATE	330	UG/KG	NA
EPA 625		GC/MS	5	ENDOSULFAN SULFATE	330	UG/KG	NA
EPA 625		GC/MS	5	ENDRIN	330	UG/KG	NA
EPA 625		GC/MS	5	ENDRIN ALDEHYDE	330	UG/KG	NA
EPA 625		GC/MS	5	FLUORANTHENE	330	UG/KG	NA
EPA 625		GC/MS	5	FLUORENE	330	UG/KG	NA
EPA 625		GC/MS	5	GAMMA-BHC (LINDANE)	330	UG/KG	NA
EPA 625		GC/MS	5	HEPTACHLOR	330	UG/KG	NA
EPA 625		GC/MS	5	HEPTACHLOR EPOXIDE	330	UG/KG	NA
EPA 625		GC/MS	5	HEXACHLOROBENZENE	330	UG/KG	NA
EPA 625		GC/MS	5	HEXACHLOROBUTADIENE	330	UG/KG	NA
EPA 625		GC/MS	5	HEXACHLOROCYCLOPENTADIENE	330	UG/KG	NA
EPA 625		GC/MS	5	HEXACHLOROETHANE	330	UG/KG	NA
EPA 625		GC/MS	5	INDENO(1,2,3-CD)PYRENE	330	UG/KG	NA
EPA 625		GC/MS	5	ISOPHORONE	330	UG/KG	NA
EPA 625		GC/MS	5	N-NITROSO-DIPROPYLAMINE	330	UG/KG	NA
EPA 625		GC/MS	5	N-NITROSODIMETHYLAMINE	330	UG/KG	NA
EPA 625		GC/MS	5	N-NITROSODIPHENYLAMINE	330	UG/KG	NA
EPA 625		GC/MS	5	NAPHTHALENE	330	UG/KG	NA
EPA 625		GC/MS	5	NITROBENZENE	330	UG/KG	NA
EPA 625		GC/MS	5	NITROBENZENE-D5	NA	% REC	NA
EPA 625		GC/MS	5	PCB AROCLOR 1016	1600	UG/KG	NA
EPA 625		GC/MS	5	PCB AROCLOR 1221	1600	UG/KG	NA
EPA 625		GC/MS	5	PCB AROCLOR 1232	1600	UG/KG	NA
EPA 625		GC/MS	5	PCB AROCLOR 1242	1600	UG/KG	NA
EPA 625		GC/MS	5	PCB AROCLOR 1248	1600	UG/KG	NA
EPA 625		GC/MS	5	PCB AROCLOR 1254	1600	UG/KG	NA
EPA 625		GC/MS	5	PCB AROCLOR 1260	1600	UG/KG	NA

Table 5.2
CWA AND SDWA Method Detection and Practical Quantitation Limits
for EPA Methods

METHOD	PREP METHOD	INSTRUMENT	MX	PARAMETER	PQL	UNITS	MDL
EPA 625		GC/MS	5	PENTACHLOROPHENOL	1600	UG/KG	NA
EPA 625		GC/MS	5	PHENANTHRENE	330	UG/KG	NA
EPA 625		GC/MS	5	PHENOL	330	UG/KG	NA
EPA 625		GC/MS	5	PHENOL-D5	NA	% REC	NA
EPA 625		GC/MS	5	PYRENE	330	UG/KG	NA
EPA 625		GC/MS	5	TERPHENYL-D14		% REC	NA
EPA 625		GC/MS	5	TOXAPHENE	1600	UG/KG	NA
EPA 900.0		GFPC	1	GROSS ALPHA	3.0	PCI/L	1.5
EPA 900.0		GFPC	1	GROSS BETA	4.0	PCI/L	3.0
EPA 900.0		GFPC	5	GROSS ALPHA		PCI/KG	NA
EPA 900.0		GFPC	5	GROSS BETA		PCI/KG	NA
EPA 900.1			1	RADIUM	1.0	PCI/L	NA
EPA 900.1			1	RADIUM	1.0	PCI/L	NA
EPA 900.1			5	RADIUM		PCI/KG	NA
EPA 900.1			5	RADIUM		PCI/KG	NA
EPA 903.1		Lucas Cell	1	RADIUM-226	1.0	PCI/L	0.94
EPA 903.1		Lucas Cell	5	RADIUM-226		PCI/KG	NA
EPA 904.0		GFPC	1	RADIUM-228	3.0	PCI/L	1.54
EPA 904.0		GFPC	1	RADIUM-228	3.0	PCI/L	1.54
EPA 905.0		GFPC	1	STRONTIUM-89	2.0	PCI/L	1.2
EPA 905.0		GFPC	1	STRONTIUM-89/90	2.0	PCI/L	1.2
EPA 905.0		GFPC	1	STRONTIUM-90	2.0	PCI/L	1.3
EPA 906.0	Dist.	Liquid Scint.	1	TRITIUM	700	PCI/L	400
EPA 908.0			1	URANIUM	1.0	PCI/L	

NA=Not Applicable

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Table 5.3
CWA AND SDWA Method Detection and Practical Quantitation Limits for Standard Methods

METHOD	Prep Method	Instrument	Mx	PARAMETER	PQL	UNITS	MDL
APHA 213E			1	SPECIFIC GRAVITY			NA
APHA 213E			1	TEMPERATURE		DEGREES C	NA
APHA 213E			5	SPECIFIC GRAVITY			NA
APHA 213E			5	TEMPERATURE		DEGREES F	NA
APHA 909A (MOD)			1	COLIFORM BACTERIA	1	COL./100ML	1
APHA 909A (MOD)			5	COLIFORM BACTERIA		COLONIES	1
SM 203 16TH ED			1	SATURATION INDEX		STD. UNITS	NA
SM 207			1	ODOR (THRESHOLD ODOR NUMBER, TON)			NA
SM 2340B 18TH			1	HARDNESS	1.0	MG CACO3/L	NA
SM 2340B 18TH			5	HARDNESS	100	MG/KG	NA
SM 3500-CR D			1	HEXAVALENT CHROMIUM	0.0050	MG/L	0.002
SM 3500-CR D			1	TRIVALENT CHROMIUM (BY CALC.)	0.010	MG/L	NA
SM 3500-CR D			5	HEXAVALENT CHROMIUM	0.50	MG/KG	NA
SM 3500-CR D			5	TRIVALENT CHROMIUM (BY CALC.)	1.0	MG/KG	NA
SM 3500-FE D			1	IRON, FERROUS	0.10	MG/L	
SM 405			1	BROMIDE	0.20	MG/L	
SM 405			5	BROMIDE	10	MG/KG	NA
SM 407A 16TH			1	CHLORIDE	5.0	MG/L	
SM 407A 16TH			5	CHLORIDE	100	MG/KG	NA
SM 4500-CL G			1	CHLORINE	0.20	MG/L	
SM 504B			1	VOLATILE ACIDS	100	MG/L	
SM 504B			5	VOLATILE ACIDS	100	MG/KG	NA
SM 5210 18TH ED			1	CARBONACEOUS BIOCHEMICAL OXYGEN DEMAND	2.0	MG/L	NA
SM 9215 18TH ED			1	HETEROTROPHIC PLATE COUNT	1	COL./ML	NA
SM 9215 18TH ED			5	HETEROTROPHIC PLATE COUNT	1	COL./G	NA

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Table 5.3
CWA AND SDWA Method Detection and Practical Quantitation Limits for Standard Methods

METHOD	Prep Method	Instrument	Mx	PARAMETER	PQL	UNITS	MDL
SM 9221 18TH ED			1	COLIFORM BACTERIA, TOTAL & E.COLI		POS/NEG	NA
SM 9221 18TH ED			2	COLIFORM BACTERIA, TOTAL & E.COLI		POS/NEG	NA
SM 9221 18TH ED			3	COLIFORM BACTERIA, TOTAL & E.COLI		POS/NEG	NA
SM 9222D-MOD			1	COLIFORM BACTERIA, FECAL	1	COL./100ML	NA
SM 9222D-MOD			5	COLIFORM BACTERIA, FECAL	1	COL./G	NA
SM 9223 18TH ED			1	COLIFORM BACTERIA, FECAL		POS/NEG	NA
SM 9223 18TH ED			1	E. COLI		POS/NEG	NA
SM 9223 18TH ED			1	TOTAL COLIFORM		POS/NEG	NA
SM-4500-CN-G		Auto Analyzer	1	CYANIDE, AMENABLE	0.0050	MG/L	0.003
SM-4500-CN-G		Auto Analyzer	4	CYANIDE, AMENABLE	0.13	MG/KG	NA
SM-4500-CN-G		Auto Analyzer	5	CYANIDE, AMENABLE	0.13	MG/KG	NA
SM-4500-CN.I		Auto Analyzer	1	CYANIDE, WEAK ACID DISSOCIABLE	0.0050	MG/L	0.003
SM-4500-CN.I		Auto Analyzer	4	CYANIDE, WEAK ACID DISSOCIABLE	0.13	MG/KG	NA
SM-4500-CN.I		Auto Analyzer	5	CYANIDE, WEAK ACID DISSOCIABLE	0.13	MG/KG	NA
SM2320B 18TH ED			1	ALKALINITY	1.0	MG/L	NA
SM2510B 18TH ED			1	CONDUCTIVITY	5.0	UMHOS/CM	NA
SM2540C 18TH ED			1	DISSOLVED SOLIDS	10	MG/L	NA
SM2580B-18TH ED			1	OXIDATION/REDUCTION POTENTIAL		MV	NA
SM2580B-18TH ED			1	TEMPERATURE		DEGREES C	NA
SM4110B 18TH ED		Ion Chromatography	1	BROMIDE	0.05	MG/L	0.0455
SM4110B 18TH ED		Ion Chromatography	1	CHLORIDE	0.25	MG/L	0.0451
SM4110B 18TH ED		Ion Chromatography	1	FLUORIDE	0.10	MG/L	0.0113
SM4110B 18TH ED		Ion Chromatography	1	NITROGEN, NITRATE	0.05	MG/L	0.0101
SM4110B 18TH ED		Ion Chromatography	1	NITROGEN, NITRATE-NITRITE	0.10	MG/L	0.01
SM4110B 18TH ED		Ion Chromatography	1	NITROGEN, NITRITE	0.05	MG/L	0.01
SM4110B 18TH ED		Ion Chromatography	1	ORTHO-PHOSPHORUS	0.05	MG/L	0.0705
SM4110B 18TH ED		Ion Chromatography	1	SULFATE	0.25	MG/L	0.0819

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Table 5.3
CWA AND SDWA Method Detection and Practical Quantitation Limits for Standard Methods

METHOD	Prep Method	Instrument	Mx	PARAMETER	PQL	UNITS	MDL
SM4110B 18TH ED		Ion Chromatography	5	BROMIDE	0.50	MG/KG	NA
SM4110B 18TH ED		Ion Chromatography	5	CHLORIDE	2.5	MG/KG	NA
SM4110B 18TH ED		Ion Chromatography	5	FLUORIDE	1.0	MG/KG	NA
SM4110B 18TH ED		Ion Chromatography	5	IODIDE	5.0	MG/L	NA
SM4110B 18TH ED		Ion Chromatography	5	NITROGEN, NITRATE	0.50	MG/KG	NA
SM4110B 18TH ED		Ion Chromatography	5	NITROGEN, NITRATE-NITRITE	1.0	MG/KG	NA
SM4110B 18TH ED		Ion Chromatography	5	NITROGEN, NITRITE	0.50	MG/KG	NA
SM4110B 18TH ED		Ion Chromatography	5	ORTHO-PHOSPHORUS	0.50	MG/KG	NA
SM4110B 18TH ED		Ion Chromatography	5	SULFATE	2.5	MG/KG	NA
SM4500E 19TH		Ion Selective Electr.	1	NITROGEN, AMMONIA	0.12	MG/L	0.029
SM4500E 19TH		Ion Selective Electr.	4	NITROGEN, AMMONIA	10	MG/KG	NA
SM4500E 19TH		Ion Selective Electr.	5	NITROGEN, AMMONIA	10	MG/KG	NA
SM4500F-C 18TH		Ion Selective Electr.	1	FLUORIDE	0.10	MG/L	0.085

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Table 5.4

US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
ILM02/ILM04	1	ICP	ALUMINUM	0.050	MG/L
ILM02/ILM04	1	GFAA	ANTIMONY	0.0050	MG/L
ILM02/ILM04	1	Trace	ANTIMONY	0.0050	MG/L
ILM02/ILM04	1	ICP	ANTIMONY	0.030	MG/L
ILM02/ILM04	1	GFAA	ARSENIC	0.0050	MG/L
ILM02/ILM04	1	Trace	ARSENIC	0.0050	MG/L
ILM02/ILM04	1	ICP	BARIUM	0.010	MG/L
ILM02/ILM04	1	GFAA	BERYLLIUM	0.0010	MG/L
ILM02/ILM04	1	Trace	BERYLLIUM	0.0010	MG/L
ILM02/ILM04	1	ICP	BERYLLIUM	0.0040	MG/L
ILM02/ILM04	1	GFAA	CADMIUM	0.0010	MG/L
ILM02/ILM04	1	ICP	CADMIUM	0.0050	MG/L
ILM02/ILM04	1	Trace	CADMIUM	0.0010	MG/L
ILM02/ILM04	1	ICP	CALCIUM	0.20	MG/L
ILM02/ILM04	1	GFAA	CHROMIUM	0.005	MG/L
ILM02/ILM04	1	Trace	CHROMIUM	0.0020	MG/L
ILM02/ILM04	1	ICP	CHROMIUM	0.010	MG/L
ILM02/ILM04	1	Trace	COBALT	0.0010	MG/L
ILM02/ILM04	1	ICP	COBALT	0.010	MG/L
ILM02/ILM04	1	GFAA	COPPER	0.0050	MG/L
ILM02/ILM04	1	ICP	COPPER	0.025	MG/L
ILM02/ILM04	1	Color.	CYANIDE	0.0050	MG/L
ILM02/ILM04	1	ICP	IRON	0.025	MG/L
ILM02/ILM04	1	GFAA	LEAD	0.0050	MG/L
ILM02/ILM04	1	Trace	LEAD	0.0050	MG/L
ILM02/ILM04	1	ICP	LEAD	0.050	MG/L
ILM02/ILM04	1	ICP	MAGNESIUM	0.20	MG/L
ILM02/ILM04	1	ICP	MANGANESE	0.010	MG/L

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Table 5.4

US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
ILM02/ILM04	1	CVAA	MERCURY	0.00020	MG/L
ILM02/ILM04	1	ICP	NICKEL	0.010	MG/L
ILM02/ILM04	1	ICP	POTASSIUM	0.20	MG/L
ILM02/ILM04	1	Trace	SELENIUM	0.0050	MG/L
ILM02/ILM04	1	GFAA	SELENIUM	0.0050	MG/L
ILM02/ILM04	1	GFAA	SILVER	0.0010	MG/L
ILM02/ILM04	1	Trace	SILVER	0.0020	MG/L
ILM02/ILM04	1	ICP	SILVER	0.010	MG/L
ILM02/ILM04	1	ICP	SODIUM	0.20	MG/L
ILM02/ILM04	1	Trace	THALLIUM	0.010	MG/L
ILM02/ILM04	1	GFAA	THALLIUM	0.0050	MG/L
ILM02/ILM04	1	ICP	VANADIUM	0.010	MG/L
ILM02/ILM04	1	Trace	VANADIUM	0.0010	MG/L
ILM02/ILM04	1	GFAA	VANADIUM	0.0050	MG/L
ILM02/ILM04	1	ICP	ZINC	0.020	MG/L
ILM02/ILM04	5	ICP	ALUMINUM	5.0	MG/KG
ILM02/ILM04	5	GFAA	ANTIMONY	0.50	MG/KG
ILM02/ILM05	5	Trace	ANTIMONY	0.50	MG/KG
ILM02/ILM04	5	ICP	ANTIMONY	3.0	MG/KG
ILM02/ILM05	5	Trace	ARSENIC	0.50	MG/KG
ILM02/ILM04	5	GFAA	ARSENIC	0.50	MG/KG
ILM02/ILM04	5	ICP	BARIUM	1.0	MG/KG
ILM02/ILM05	5	Trace	BERYLLIUM	0.10	MG/KG
ILM02/ILM04	5	ICP	BERYLLIUM	0.40	MG/KG
ILM02/ILM04	5	GFAA	CADMIUM	0.10	MG/KG
ILM02/ILM05	5	Trace	CADMIUM	0.10	MG/KG
ILM02/ILM04	5	ICP	CADMIUM	0.50	MG/KG
ILM02/ILM04	5	ICP	CALCIUM	20	MG/KG
ILM02/ILM04	5	GFAA	CHROMIUM	0.50	MG/KG

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
ILM02/ILM04	5	ICP	CHROMIUM	1.0	MG/KG
ILM02/ILM04	5	Trace	CHROMIUM	0.20	MG/KG
ILM02/ILM05	5	Trace	COBALT	0.10	MG/KG
ILM02/ILM04	5	ICP	COBALT	0.50	MG/KG
ILM02/ILM04	5	ICP	COPPER	2.0	MG/KG
ILM02/ILM04	5	Color.	CYANIDE	0.13	MG/KG
ILM02/ILM04	5	ICP	IRON	2.5	MG/KG
ILM02/ILM04	5	Trace	LEAD	0.50	MG/KG
ILM02/ILM04	5	GFAA	LEAD	0.50	MG/KG
ILM02/ILM04	5	ICP	LEAD	5.0	MG/KG
ILM02/ILM04	5	ICP	MAGNESIUM	20	MG/KG
ILM02/ILM04	5	ICP	MANGANESE	1.0	MG/KG
ILM02/ILM04	5	CVAA	MERCURY	0.033	MG/KG
ILM02/ILM04	5	ICP	NICKEL	1.0	MG/KG
ILM02/ILM04	5	ICP	POTASSIUM	20	MG/KG
ILM02/ILM04	5	Trace	SELENIUM	0.50	MG/KG
ILM02/ILM04	5	GFAA	SELENIUM	0.50	MG/KG
ILM02/ILM04	5	ICP	SILVER	1.0	MG/KG
ILM02/ILM04	5	ICP	SODIUM	20	MG/KG
ILM02/ILM04	5	GFAA	THALLIUM	0.50	MG/KG
ILM02/ILM04	5	Trace	THALLIUM	0.50	MG/KG
ILM02/ILM04	5	ICP	VANADIUM	1.0	MG/KG
ILM02/ILM04	5	ICP	ZINC	2.0	MG/KG
OLC01	1	GC/MS	1,1,1-TRICHLOROETHANE	1	UG/L
OLC01	1	GC/MS	1,1,2,2-TETRACHLOROETHANE	1	UG/L
OLC01	1	GC/MS	1,1,2-TRICHLOROETHANE	1	UG/L
OLC01	1	GC/MS	1,1-DICHLOROETHANE	1	UG/L
OLC01	1	GC/MS	1,1-DICHLOROETHENE	1	UG/L

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
OLC01	1	GC/MS	1,2,4-TRICHLOROBENZENE	5	UG/L
OLC01	1	GC/MS	1,2-DIBROMO-3-CHLOROPROPANE (DBCP)	1	UG/L
OLC01	1	GC/MS	1,2-DIBROMOETHANE (EDB)	1	UG/L
OLC01	1	GC/MS	1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	1	UG/L
OLC01	1	GC/MS	1,2-DICHLOROETHANE	1	UG/L
OLC01	1	GC/MS	1,2-DICHLOROPROPANE	1	UG/L
OLC01	1	GC/MS	1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)	1	UG/L
OLC01	1	GC/MS	1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	1	UG/L
OLC01	1	GC/MS	2,4,5-TRICHLOROPHENOL	20	UG/L
OLC01	1	GC/MS	2,4,6-TRIBROMOPHENOL		% RECOVERY
OLC01	1	GC/MS	2,4,6-TRICHLOROPHENOL	5	UG/L
OLC01	1	GC/MS	2,4-DICHLOROPHENOL	5	UG/L
OLC01	1	GC/MS	2,4-DIMETHYLPHENOL	5	UG/L
OLC01	1	GC/MS	2,4-DINITROPHENOL	20	UG/L
OLC01	1	GC/MS	2,4-DINITROTOLUENE	5	UG/L
OLC01	1	GC/MS	2,6-DINITROTOLUENE	5	UG/L
OLC01	1	GC/MS	2-BUTANONE	5	UG/L
OLC01	1	GC/MS	2-CHLORONAPHTHALENE	5	UG/L
OLC01	1	GC/MS	2-CHLOROPHENOL	5	UG/L
OLC01	1	GC/MS	2-FLUOROBIPHENYL		% RECOVERY
OLC01	1	GC/MS	2-FLUOROPHENOL		% RECOVERY
OLC01	1	GC/MS	2-HEXANONE	5	UG/L
OLC01	1	GC/MS	2-METHYLNAPHTHALENE	5	UG/L
OLC01	1	GC/MS	2-METHYLPHENOL (O-CRESOL)	5	UG/L
OLC01	1	GC/MS	2-NITROANILINE (O-NITROANILINE)	20	UG/L
OLC01	1	GC/MS	2-NITROPHENOL	5	UG/L
OLC01	1	GC/MS	3,3'-DICHLOROBENZIDINE	5	UG/L
OLC01	1	GC/MS	3-NITROANILINE (M-NITROANILINE)	20	UG/L
OLC01	1	GC/ECD	4,4'-DDD	0.1	UG/L

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
OLC01	1	GC/ECD	4,4'-DDE	0.1	UG/L
OLC01	1	GC/ECD	4,4'-DDT	0.1	UG/L
OLC01	1	GC/MS	4,6-DINITRO-O-CRESOL(2-METHYL-4,6-DINITROPHENOL)	20	UG/L
OLC01	1	GC/MS	4-BROMODIPHENYL ETHER	5	UG/L
OLC01	1	GC/MS	4-BROMOFLUOROBENZENE		% RECOVERY
OLC01	1	GC/MS	4-CHLORO-3-METHYLPHENOL (P-CHLORO-M-CRESOL)	5	UG/L
OLC01	1	GC/MS	4-CHLOROANILINE	5	UG/L
OLC01	1	GC/MS	4-CHLOROPHENYL-PHENYLETHER	5	UG/L
OLC01	1	GC/MS	4-METHYL-2-PENTANONE	5	UG/L
OLC01	1	GC/MS	4-METHYLPHENOL (P-CRESOL)	5	UG/L
OLC01	1	GC/MS	4-NITROANILINE (P-NITROANILINE)	20	UG/L
OLC01	1	GC/MS	4-NITROPHENOL	20	UG/L
OLC01	1	GC/MS	ACENAPHTHENE	5	UG/L
OLC01	1	GC/MS	ACENAPHTHYLENE	5	UG/L
OLC01	1	GC/MS	ACETONE (2-PROPANONE)	5	UG/L
OLC01	1	GC/ECD	ALDRIN	0.05	UG/L
OLC01	1	GC/ECD	ALPHA-BHC	0.05	UG/L
OLC01	1	GC/MS	ALPHA-CHLORDANE	0.05	UG/L
OLC01	1	GC/MS	ANTHRACENE	5	UG/L
OLC01	1	GC/MS	BENZENE	1	UG/L
OLC01	1	GC/MS	BENZO(A)ANTHRACENE [(BENZO(A)ANTHRACENE]	5	UG/L
OLC01	1	GC/MS	BENZO(A)PYRENE	5	UG/L
OLC01	1	GC/MS	BENZO(B)FLUORANTHENE (3,4-BENZOFLUORANTHENE)	5	UG/L
OLC01	1	GC/MS	BENZO(G,H,I)PERYLENE	5	UG/L
OLC01	1	GC/MS	BENZO(K)FLUORANTHENE	5	UG/L
OLC01	1	GC/MS	BENZYLBUTYLPHTHALATE (BUTYLBENZYLPHTHALATE)	5	UG/L
OLC01	1	GC/ECD	BETA-BHC	0.05	UG/L
OLC01	1	GC/MS	BIS(2-CHLOROETHOXY)METHANE	5	UG/L

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
OLC01	1	GC/MS	BIS(2-CHLOROETHYL)ETHER	5	UG/L
OLC01	1	GC/MS	BIS(2-CHLOROISOPROPYL)ETHER	5	UG/L
OLC01	1	GC/MS	BIS(2-ETHYLHEXYL)PHTHALATE	5	UG/L
OLC01	1	GC/MS	BROMOCHLOROMETHANE	1	UG/L
OLC01	1	GC/MS	BROMODICHLOROMETHANE	1	UG/L
OLC01	1	GC/MS	BROMOFORM	1	UG/L
OLC01	1	GC/MS	BROMOMETHANE	1	UG/L
OLC01	1	GC/MS	CARBON DISULFIDE	1	UG/L
OLC01	1	GC/MS	CARBON TETRACHLORIDE	1	UG/L
OLC01	1	GC/MS	CHLOROBENZENE	1	UG/L
OLC01	1	GC/MS	CHLORODIBROMOMETHANE	1	UG/L
OLC01	1	GC/MS	CHLOROETHANE	1	UG/L
OLC01	1	GC/MS	CHLOROFORM	1	UG/L
OLC01	1	GC/MS	CHLOROMETHANE	1	UG/L
OLC01	1	GC/MS	CHRYSENE	5	UG/L
OLC01	1	GC/MS	CIS-1,2-DICHLOROETHENE	1	UG/L
OLC01	1	GC/MS	CIS-1,3-DICHLOROPROPENE	1	UG/L
OLC01	1	GC/ECD	DELTA-BHC	0.05	UG/L
OLC01	1	GC/MS	DI-N-BUTYLPHTHALATE	5	UG/L
OLC01	1	GC/MS	DI-N-OCTYLPHTHALATE	5	UG/L
OLC01	1	GC/MS	DIBENZ(A,H)ANTHRACENE	5	UG/L
OLC01	1	GC/MS	DIBENZOFURAN	5	UG/L
OLC01	1	GC/MS	DICHLOROETHANE-D4		% RECOVERY
OLC01	1	GC/MS	DICHLOROMETHANE (METHYLENE CHLORIDE)	2	UG/L
OLC01	1	GC/ECD	DIELDRIN	0.1	UG/L
OLC01	1	GC/MS	DIETHYLPHTHALATE	5	UG/L
OLC01	1	GC/MS	DIMETHYLPHTHALATE	5	UG/L
OLC01	1	GC/ECD	ENDOSULFAN I	0.05	UG/L
OLC01	1	GC/ECD	ENDOSULFAN II	0.1	UG/L

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
OLC01	1	GC/ECD	ENDOSULFAN SULFATE	0.1	UG/L
OLC01	1	GC/ECD	ENDRIN	0.1	UG/L
OLC01	1	GC/ECD	ENDRIN ALDEHYDE	0.1	UG/L
OLC01	1	GC/ECD	ENDRIN KETONE	0.1	UG/L
OLC01	1	GC/MS	ETHYL BENZENE	1	UG/L
OLC01	1	GC/MS	FLUORANTHENE	5	MG/L
OLC01	1	GC/MS	FLUORENE	5	UG/L
OLC01	1	GC/ECD	GAMMA-BHC (LINDANE)	0.05	UG/L
OLC01	1	GC/ECD	GAMMA-CHLORDANE	0.05	UG/L
OLC01	1	GC/ECD	HEPTACHLOR	0.05	UG/L
OLC01	1	GC/ECD	HEPTACHLOR EPOXIDE	0.05	UG/L
OLC01	1	GC/MS	HEXACHLOROBENZENE	5	UG/L
OLC01	1	GC/MS	HEXACHLOROBUTADIENE	5	UG/L
OLC01	1	GC/MS	HEXACHLOROCYCLOPENTADIENE	5	UG/L
OLC01	1	GC/MS	HEXACHLOROETHANE	5	UG/L
OLC01	1	GC/MS	INDENO(1,2,3-CD)PYRENE	5	UG/L
OLC01	1	GC/MS	ISOPHORONE	5	UG/L
OLC01	1	GC/MS	METHOXYCHLOR	0.5	UG/L
OLC01	1	GC/MS	N-NITROSO-DI-N-PROPYLAMINE	5	UG/L
OLC01	1	GC/MS	N-NITROSODIPHENYLAMINE	5	UG/L
OLC01	1	GC/MS	NAPHTHALENE	5	UG/L
OLC01	1	GC/MS	NITROBENZENE	5	UG/L
OLC01	1	GC/MS	NITROBENZENE-D5		% RECOVERY
OLC01	1	GC/ECD	PCB AROCLOR 1016	1	UG/L
OLC01	1	GC/ECD	PCB AROCLOR 1221	2	UG/L
OLC01	1	GC/ECD	PCB AROCLOR 1232	1	UG/L
OLC01	1	GC/ECD	PCB AROCLOR 1242	1	UG/L
OLC01	1	GC/ECD	PCB AROCLOR 1248	1	UG/L

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
OLC01	1	GC/ECD	PCB AROCLOR 1254	1	UG/L
OLC01	1	GC/ECD	PCB AROCLOR 1260	1	UG/L
OLC01	1	GC/MS	PENTACHLOROPHENOL	20	UG/L
OLC01	1	GC/MS	PHENANTHRENE	5	UG/L
OLC01	1	GC/MS	PHENOL	5	UG/L
OLC01	1	GC/MS	PHENOL-D5		% RECOVERY
OLC01	1	GC/MS	PYRENE	5	UG/L
OLC01	1	GC/MS	STYRENE	1	UG/L
OLC01	1	GC/MS	TERPHENYL-D14		% RECOVERY
OLC01	1	GC/MS	TETRACHLOROETHENE	1	UG/L
OLC01	1	GC/MS	TOLUENE	1	UG/L
OLC01	1	GC/MS	TOLUENE-D8		% RECOVERY
OLC01	1	GC/MS	TOXAPHENE	5	UG/L
OLC01	1	GC/MS	TRANS-1,2-DICHLOROETHENE	1	UG/L
OLC01	1	GC/MS	TRANS-1,3-DICHLOROPROPENE	1	UG/L
OLC01	1	GC/MS	TRICHLOROETHENE	1	UG/L
OLC01	1	GC/MS	VINYL CHLORIDE	1	UG/L
OLC01	1	GC/MS	XYLENES (TOTAL)	1	UG/L
OLM03	5	GC/MS	1,1,2,2-TETRACHLOROETHANE	10	UG/KG
OLM03	5	GC/MS	1,1,2-TRICHLOROETHANE	10	UG/KG
OLM03	5	GC/MS	1,1-DICHLOROETHANE	10	UG/KG
OLM03	5	GC/MS	1,1-DICHLOROETHENE	10	UG/KG
OLM03	5	GC/MS	1,2,4-TRICHLOROBENZENE	330	UG/KG
OLM03	5	GC/MS	1,2-DICHLOROBENZENE	330	UG/KG
OLM03	5	GC/MS	1,2-DICHLOROBENZENE-D4		% REC
OLM03	5	GC/MS	1,2-DICHLOROETHANE	10	UG/KG
OLM03	5	GC/MS	1,2-DICHLOROETHENE (CIS AND TRANS)	10	UG/KG
OLM03	5	GC/MS	1,2-DICHLOROPROPANE	10	UG/KG
OLM03	5	GC/MS	1,3-DICHLOROBENZENE	330	UG/KG

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
OLM03	5	GC/MS	1,4-DICHLOROBENZENE	330	UG/KG
OLM03	5	GC/MS	2,4,5-TRICHLOROPHENOL	800	UG/KG
OLM03	5	GC/MS	2,4,6-TRIBROMOPHENOL		% REC
OLM03	5	GC/MS	2,4,6-TRICHLOROPHENOL	330	UG/KG
OLM03	5	GC/MS	2,4-DICHLOROPHENOL	330	UG/KG
OLM03	5	GC/MS	2,4-DIMETHYLPHENOL	330	UG/KG
OLM03	5	GC/MS	2,4-DINITROPHENOL	800	UG/KG
OLM03	5	GC/MS	2,4-DINITROTOLUENE	330	UG/KG
OLM03	5	GC/MS	2,6-DINITROTOLUENE	330	UG/KG
OLM03	5	GC/MS	2-BUTANONE	10	UG/KG
OLM03	5	GC/MS	2-CHLORONAPHTHALENE	330	UG/KG
OLM03	5	GC/MS	2-CHLOROPHENOL	330	UG/KG
OLM03	5	GC/MS	2-CHLOROPHENOL-D4		% REC
OLM03	5	GC/MS	2-FLUOROBIPHENYL		% REC
OLM03	5	GC/MS	2-FLUOROPHENOL		% REC
OLM03	5	GC/MS	2-HEXANONE	10	UG/KG
OLM03	5	GC/MS	2-METHYLNAPHTHALENE	330	UG/KG
OLM03	5	GC/MS	2-METHYLPHENOL (O-CRESOL)	330	UG/KG
OLM03	5	GC/MS	2-NITROANILINE (O-NITROANILINE)	800	UG/KG
OLM03	5	GC/MS	2-NITROPHENOL	330	UG/KG
OLM03	5	GC/MS	3,3'-DICHLOROBENZIDINE	330	UG/KG
OLM03	5	GC/MS	3-NITROANILINE (M-NITROANILINE)	800	UG/KG
OLM03	5	GC/ECD	4,4'-DDD	3.3	UG/KG
OLM03	5	GC/ECD	4,4'-DDE	3.3	UG/KG
OLM03	5	GC/ECD	4,4'-DDT	3.3	UG/KG
OLM03	5	GC/MS	4,6-DINITRO-O-CRESOL	800	UG/KG
OLM03	5	GC/MS	4-BROMODIPHENYL ETHER	330	UG/KG
OLM03	5	GC/MS	4-BROMOFLUOROBENZENE		% REC

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
OLM03	5	GC/MS	4-CHLORO-3-METHYLPHENOL	330	UG/KG
OLM03	5	GC/MS	4-CHLOROANILINE	330	UG/KG
OLM03	5	GC/MS	4-CHLOROPHENYL-PHENYLETHER	330	UG/KG
OLM03	5	GC/MS	4-METHYL-2-PENTANONE	10	UG/KG
OLM03	5	GC/MS	4-METHYLPHENOL (P-CRESOL)	330	UG/KG
OLM03	5	GC/MS	4-NITROANILINE (P-NITROANILINE)	800	UG/KG
OLM03	5	GC/MS	4-NITROPHENOL	800	UG/KG
OLM03	5	GC/MS	ACENAPHTHENE	330	UG/KG
OLM03	5	GC/MS	ACENAPHTHYLENE	330	UG/KG
OLM03	5	GC/MS	ACETONE (2-PROPANONE)	10	UG/KG
OLM03	5	GC/ECD	ALDRIN	1.7	UG/KG
OLM03	5	GC/ECD	ALPHA-BHC	1.7	UG/KG
OLM03	5	GC/ECD	ALPHA-CHLORDANE	1.7	UG/KG
OLM03	5	GC/MS	ANTHRACENE	330	UG/KG
OLM03	5	GC/MS	BENZENE	10	UG/KG
OLM03	5	GC/MS	BENZO(A)ANTHRACENE	330	UG/KG
OLM03	5	GC/MS	BENZO(A)PYRENE	330	UG/KG
OLM03	5	GC/MS	BENZO(B)FLUORANTHENE	330	UG/KG
OLM03	5	GC/MS	BENZO(G,H,I)PERYLENE	330	UG/KG
OLM03	5	GC/MS	BENZO(K)FLUORANTHENE	330	UG/KG
OLM03	5	GC/MS	BENZYLBUTYLPHTHALATE	330	UG/KG
OLM03	5	GC/ECD	BETA-BHC	1.7	UG/KG
OLM03	5	GC/MS	BIS(2-CHLOROETHOXY)METHANE	330	UG/KG
OLM03	5	GC/MS	BIS(2-CHLOROETHYL)ETHER	330	UG/KG
OLM03	5	GC/MS	BIS(2-CHLOROISOPROPYL)ETHER	330	UG/KG
OLM03	5	GC/MS	BIS(2-ETHYLHEXYL)PHTHALATE	330	UG/KG
OLM03	5	GC/MS	BROMODICHLOROMETHANE	10	UG/KG
OLM03	5	GC/MS	BROMOFORM	10	UG/KG
OLM03	5	GC/MS	BROMOMETHANE	10	UG/KG

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
OLM03	5	GC/MS	CARBAZOLE	330	UG/KG
OLM03	5	GC/MS	CARBON DISULFIDE	10	UG/KG
OLM03	5	GC/MS	CARBON TETRACHLORIDE	10	UG/KG
OLM03	5	GC/MS	CHLOROBENZENE	10	UG/KG
OLM03	5	GC/MS	CHLOROETHANE	10	UG/KG
OLM03	5	GC/MS	CHLOROFORM	10	UG/KG
OLM03	5	GC/MS	CHLOROMETHANE	10	UG/KG
OLM03	5	GC/MS	CHRYSENE	330	UG/KG
OLM03	5	GC/MS	CIS-1,3-DICHLOROPROPENE	10	UG/KG
OLM03	5	GC/ECD	DELTA-BHC	1.7	UG/KG
OLM03	5	GC/MS	DI-N-BUTYLPHTHALATE	330	UG/KG
OLM03	5	GC/MS	DI-N-OCTYLPHTHALATE	330	UG/KG
OLM03	5	GC/MS	DIBENZ(A,H)ANTHRACENE	330	UG/KG
OLM03	5	GC/MS	DIBENZOFURAN	330	UG/KG
OLM03	5	GC/MS	DIBROMOCHLOROMETHANE	10	UG/KG
OLM03	5	GC/MS	DICHLOROETHANE-D4		% REC
OLM03	5	GC/MS	DICHLOROMETHANE (METHYLENE CHLORIDE)	10	UG/KG
OLM03	5	GC/ECD	DIELDRIN	3.3	UG/KG
OLM03	5	GC/MS	DIETHYLPHTHALATE	330	UG/KG
OLM03	5	GC/MS	DIMETHYLPHTHALATE	330	UG/KG
OLM03	5	GC/ECD	ENDOSULFAN I	1.7	UG/KG
OLM03	5	GC/ECD	ENDOSULFAN II	3.3	UG/KG
OLM03	5	GC/ECD	ENDOSULFAN SULFATE	3.3	UG/KG
OLM03	5	GC/ECD	ENDRIN	3.3	UG/KG
OLM03	5	GC/ECD	ENDRIN ALDEHYDE	3.3	UG/KG
OLM03	5	GC/ECD	ENDRIN KETONE	3.3	UG/KG
OLM03	5	GC/MS	ETHYL BENZENE	10	UG/KG
OLM03	5	GC/MS	FLUORANTHENE	330	UG/KG

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
OLM03	5	GC/MS	FLUORENE	330	UG/KG
OLM03	5	GC/ECD	GAMMA-BHC (LINDANE)	1.7	UG/KG
OLM03	5	GC/ECD	GAMMA-CHLORDANE	1.7	UG/KG
OLM03	5	GC/ECD	HEPTACHLOR	1.7	UG/KG
OLM03	5	GC/ECD	HEPTACHLOR EPOXIDE	1.7	UG/KG
OLM03	5	GC/MS	HEXACHLOROBENZENE	330	UG/KG
OLM03	5	GC/MS	HEXACHLOROBUTADIENE	330	UG/KG
OLM03	5	GC/MS	HEXACHLOROCYCLOPENTADIENE	330	UG/KG
OLM03	5	GC/MS	HEXACHLOROETHANE	330	UG/KG
OLM03	5	GC/MS	INDENO(1,2,3-CD)PYRENE	330	UG/KG
OLM03	5	GC/MS	ISOPHORONE	330	UG/KG
OLM03	5	GC/MS	METHOXYCHLOR	17	UG/KG
OLM03	5	GC/MS	N-NITROSO-DI-N-PROPYLAMINE	330	UG/KG
OLM03	5	GC/MS	N-NITROSODIPHENYLAMINE	330	UG/KG
OLM03	5	GC/MS	NAPHTHALENE	330	UG/KG
OLM03	5	GC/MS	NITROBENZENE	330	UG/KG
OLM03	5	GC/MS	NITROBENZENE-D5		% REC
OLM03	5	GC/ECD	PCB AROCLOR 1016	33	UG/KG
OLM03	5	GC/ECD	PCB AROCLOR 1221	67	UG/KG
OLM03	5	GC/ECD	PCB AROCLOR 1232	33	UG/KG
OLM03	5	GC/ECD	PCB AROCLOR 1242	33	UG/KG
OLM03	5	GC/ECD	PCB AROCLOR 1248	33	UG/KG
OLM03	5	GC/ECD	PCB AROCLOR 1254	33	UG/KG
OLM03	5	GC/ECD	PCB AROCLOR 1260	33	UG/KG
OLM03	5	GC/MS	PENTACHLOROPHENOL	800	UG/KG
OLM03	5	GC/MS	PHENANTHRENE	330	UG/KG
OLM03	5	GC/MS	PHENOL	330	UG/KG
OLM03	5	GC/MS	PHENOL-D5		% REC
OLM03	5	GC/MS	PYRENE	330	UG/KG

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Table 5.4
US EPA Contract Laboratory Program Practical Quantitation Limits

METHOD	MX	INSTRUMENT	PARAMETER	PQL	UNITS
OLM03	5	GC/MS	STYRENE	10	UG/KG
OLM03	5	GC/MS	TERPHENYL-D14		% REC
OLM03	5	GC/MS	TETRACHLOROETHENE	10	UG/KG
OLM03	5	GC/MS	TOLUENE	10	UG/KG
OLM03	5	GC/MS	TOLUENE-D8		% REC
OLM03	5	GC/MS	TOXAPHENE	170	UG/KG
OLM03	5	GC/MS	TRANS-1,3-DICHLOROPROPENE	10	UG/KG
OLM03	5	GC/MS	TRICHLOROETHENE	10	UG/KG
OLM03	5	GC/MS	VINYL CHLORIDE	10	UG/KG
OLM03	5	GC/MS	XYLENES (O/M/P-XYLENE)	10	UG/KG

MX = Matrix
1= Water
4= Oil
5= Solid

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Table 5.5			
Matrix Accuracy (% Recovery) Control Criteria			
Analyte Group	**Aqueous**	**Oil**	**Soil/Sludge/Sed**
Volatile Organics	75-125	75-125	75-125
Metals	75-125	60-130	75-125
Inorganic Wet Chemistry	75-125	75-125	75-125
Organic Wet Chemistry	75-125	75-125	75-125
Base/Neutral Extractable Organics	25-150	25-150	25-150
Acid Extractable Organics	10-100	10-100	10-100

Table 5.6			
Matrix Precision (RPD) Control Criteria			
Analyte Group	**Aqueous**	**Oil**	**Soil/Sludge/Sed**
Volatile Organics	20	30	30
Metals	20	25	20
Inorganic Wet Chemistry	20	25	20
Organic Wet Chemistry	20	25	20
Base/Neutral Extractable Organics	25	30	30
Acid Extractable Organic	25	30	30
All Analytes w/Concentrations less than 10 times the PQL	± PQL	± PQL	± PQL

6.0 Sampling Procedures

6.1 Introduction

Sampling is performed at the client's request by Heritage or by an approved sub-contractor. Any sub-contractor must meet the requirements of this Comp QAP. Heritage recognizes the EPA Region IV Ecological Assessment Standard Operating Procedures and Quality Assurance Manual (January 2002) as the primary reference and source of approved sampling procedures. Additionally, certain SOP's written by the QA Section of the Florida Department of Environmental Regulation (DER) are adopted by reference.

6.2 Sampling Capabilities

Table 6.1, Sampling Capabilities lists the sampling source and the major analyte groups that Heritage is capable of sampling.

6.3 General Sampling Procedures

6.3.1 General Sampling Procedures

This category includes the following topics:

- Sample collection order
- Use of protective gloves
- Container and equipment rinsing
- Dedicated equipment storage
- Fuel powered equipment and related activities
- Sampling procedure references
- Preservation

General sampling procedures will be followed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.0, revised 9-92

6.3.2 Decontamination - General Considerations and Reagents

This category includes the following:

- Protocol
- Reagents
- Decontamination/cleaning procedures

General decontamination procedures will be followed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.1.1 through Section 4.1.3, revised 9-92.

6.3.3 Decontamination/Cleaning Protocols - Sampling Equipment

Sampling equipment will be cleaned/decontaminated in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.1.4, revised 9-92.

6.3.4 Automatic Wastewater Samplers, Sampling Trains and Bottles - Cleaning

All ISCO or equivalent automatic samplers will be cleaned in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.1.5, revised 9-92.

6.3.5 Filtration Equipment

Dissolved constituents (primarily metals) will use in-line, molded and disposable filter units. The peristaltic pump, silastic pump tubing, Teflon tubing and other tubing types, used for filtration is cleaned per DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Sections 4.1.8.2 b, 4.1.7.2, 4.1.7.1 and 4.1.7 (revised 9-92) respectively.

Other types of equipment that utilize in-line, molded and disposable filters shall follow the appropriate cleaning regimen specified in DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Sections 4.1.4.1 through 4.1.4.6, revised 9-92.

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An intermediate container for metals filtration will be utilized to collect the sample from the source, when necessary. The container chosen to hold the pre-filtration sample will be cleaned using the appropriate DER protocol for the container type.

Dissolved constituents using non-disposable filtration units (i.e. syringes, "tripod assembly", etc.) will be used in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Sections 4.1.4.1 and 4.1.7, revised 9-92.

6.3.6 Teflon Tubing Decontamination

Teflon tubing will be cleaned in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.1.7.1, revised 9-92.

6.3.7 Non-Teflon Tubing Decontamination

Silastic rubber pump tubing, stainless steel tubing, glass tubing and miscellaneous non-inert tubing types (tygon, rubber, HDPE, PVC, etc.) will be cleaned in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Sections 4.1.7.2 through 4.1.7.5, revised 9-92.

6.3.8 Submersible and Above-Ground Pumps - Cleaning/Decontamination

Pumps for purging and sampling will be cleaned in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Sections 4.1.8.1 and 4.1.8.2, revised 9-92.

6.3.9 Field Instruments and Drilling Equipment

Field instruments and drilling equipment will be cleaned in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.1.9, revised 9-92.

6.3.10 Analyte-Free Water Containers

New and re-used reagent water containers will be cleaned in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.1.10, revised 9-92.

6.3.11 Ice Chests and Shipping Containers

Ice chests and shipping containers will be handled in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.1.11, revised 9-92.

6.4 Aqueous Sampling Procedures

6.4.1 There are several requirements that are common to all types of surface water sampling events that are independent of technique. These general concerns and special parameter sample handling procedures are discussed and handled in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.2.1 and 4.2.2, revised 9-92.

6.4.2 Surface Water Sampling

Surface water sampling will be performed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.2.3, revised 9-92.

6.4.3 Wastewater Sampling

Wastewater sampling will be performed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.2.4, revised 9-92.

6.4.4 Groundwater Sampling

Groundwater sampling will be performed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.2.5, revised 9-92.

6.4.5 Wells with In-Place Plumbing

Wells with in-place plumbing are generally encountered at wellfields, industrial facilities and private residences; sampling will be performed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.2.6, revised 9-92.

6.4.6 Potable Well Sampling

Drinking water sampling from private potable wells will be performed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.2.7, revised 9-92.

6.4.7 Drinking Water Supply System Sampling

Drinking water supply system sampling will be performed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.2.8, revised 9-92.

6.4.8 Temporary Well Points

Temporary well points will be sampled in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.2.9, revised 9-92.

6.4.9 Airstripper and Remedial Treatment System Sampling

Airstripper effluent samples will be collected in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.2.10, revised 9-92.

6.4.10 Bioassay

Samples collected for bioassay will be in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.2.11, revised 9-92.

6.5 Solid Matrix Sampling Procedures

6.5.1 General Concerns and Special Sample Handling Procedures

Sample collection procedures for a solid matrix will be performed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Sections 4.2.1 and 4.2.2., revised 9-92.

6.5.2 Soil Sampling

Soil sample collection procedures will be performed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.3.4, revised 9-92.

6.5.3 Sediment Sampling

Sediment sample collection procedures will be performed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.3.5, revised 9-92.

6.5.4 Residual Sampling

Residuals matrix is defined as domestic waste sludge residuals. All sampling will be conducted by following EPA's POTW Sludge Sampling and Analysis Guidance Document, 1989, as referenced in DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.3.8, revised 9-92.

6.5.5 Solid and Hazardous Waste Sampling

Hazardous waste sampling shall follow the protocols outlined in the US EPA Region IV Ecological Assessment Standard Operating Procedures and Quality Assurance Manual, January 2002. Also, guidance contained in SW846 will be used for sampling not covered in the Region IV document.

6.6 Sampling Equipment - Construction and Use

Sampling equipment used is identified in the DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.0, Table 4.1, revised 9-92.

6.7 Sample Containers

Heritage provides sample containers and preservatives to clients. Sample containers will be for one-time use only, therefore no sample bottle cleaning will be performed at Heritage unless pre-cleaned containers are required and are not available in a timely manner. Sample containers are prepared as "kits". A kit consists of all the containers needed for a sample with multiple tests to be performed, including additional containers required for QC sample analysis. Containers for low-level mercury are purchased from a commercial supplier and each lot certified to be clean. Bottles from the lot must be tested as bottle blanks and demonstrated to be free of mercury at the MDL of the method. If mercury is present above this level in any bottle, either the lot must be rejected or the bottles must be re-cleaned.

Clients requiring coolers are shipped kits in a Styrofoam cooler (or hard cooler if specified) packed inside of a cardboard box. The laboratory barcode system assigns a unique field ID code to each container. Custody tape is included on all outgoing sample kits as well as providing custody seals for returned sample containers. Those clients using their own coolers for delivery may be shipped containers in their original shipping box (bulk container shipments). All shipments are sealed such that any tampering or attempt to open the shipping container is evident.

There are four general types of container categories:

1) pre-cleaned and pre-certified and
2) pre-cleaned only
3) new containers, not pre-cleaned
4) new containers, not pre-cleaned, but pre-certified by the laboratory.

6.7.1 A system of records or codes (lot numbers) shall be used to link cleaning records, preservation or reagent preparation records and trip blanks (if applicable) to the associated equipment, containers, pre-preserved containers, analyte-free water and preservatives which may be shipped in sampling kits.

The contents of each prepared sampling kit shall be documented. A packing list or similar record shall be transmitted to the receiving party with the sampling kit and a copy or the preparing party shall retain other record.

If the sampling kits are prepared for internal use (i.e. they are not being shipped to any external party, including branch offices of the lab) and the sampling kits are used for collecting routine (i.e. daily, weekly or monthly monitoring) samples, the records will contain the following:

6.7.1.1 Cleaning records for sampling equipment and/or sample containers shall indicate who received the cleaned containers or equipment and the date of receipt.

6.7.1.2 Preservation and/or reagent preparation records shall indicate that the preservative or reagent was prepared for use in the field.

6.7.2 Pre-Cleaned Containers and Pre-Cleaned/Pre-certified

Pre-cleaned containers will be used when the client's Data Quality Objectives (DQO's) demand them and for low-level mercury analysis or when the client or QA Unit requests pre-cleaned containers. Pre-cleaned containers will primarily be used for clients performing Superfund (CERCLA) type investigations (EPA, CLP methodology) or any other sensitive sampling event. Cleaning procedures used are broken down into protocols for different test requirements (see Table 6.2, Sample Container Preparation Protocols). Pre-cleaned containers may be purchased either with or without a certificate of analysis (QA analyzed) pertaining to the container lot from the vendor. The use of QA analyzed containers may not be required in cases where the client will submit field blanks.

Containers that have been pre-cleaned or pre-cleaned and pre-certified (QA analyzed) will be shipped to Heritage with custody seal(s). The certificate of analysis (if and when certified containers are purchased) will

be shipped inside the shipping container (box) and will remain there until the box is opened (custody seal is broken). The certificate of analysis for bottle cleanliness will be retained by the lab and filed for future reference. The containers will be re-sealed to establish a proper chain of custody.

All sample containers will be stored in their original packing containers. When packages of un-capped sample containers or closures are opened, they will be stored in plastic bags and sealed to prevent contamination during storage. Only Heritage employees will have unsupervised access to the storage area. A Heritage employee must accompany all other persons while in the container storage area.

6.8 Preservation

A basic requirement for preservation of samples for many types of analyses includes sample shipping and storage at 4° C immediately after collection. Wet ice is the only acceptable means of reducing temperature for all environmental samples with the exception of any biological tissue samples (i.e. fish). Biological tissue samples may be shipped with dry ice. Samples requiring thermal preservation shall be stored at +/- 2 ° C of the specified preservation temperature unless method specific criteria exist. For samples with a specified storage temperature of 4° C, storage at a temperature of 0.1 to 6° C is acceptable, except for Wisconsin regulated samples, where the temperature requirement is from not frozen to 4° C. Temperature blanks will be included in the sample kits for those customers requiring them (North Carolina, U.S. Army Corps, etc.). Any sample requiring thermal preservation that does not meet the specified criteria may be reported only with a qualifier such as "Temperature measured upon receipt exceeds acceptable NELAC criteria."

Chemical preservatives are to be added on-site at the time of sample collection with some exceptions. Drinking water customers may not be accustomed to working with concentrated acids, therefore metals for drinking water customers will be preserved upon receipt at the laboratory, as permitted by drinking water regulations (preserved in the lab and held for 16 hours after preservation, prior to analysis). As a convenience to our clients and an assurance that chemical preservation is not omitted, Heritage supplies containers that already contain the required preservative in the proper (assuming normal neutral pH conditions) amount and concentration. All preservatives consist of reagent grade chemicals. Lot numbers of all chemical used are placed on the containers so that any questions relating to the reagent (preservatives) used are traceable to the lot of reagent used for preservation.

All samples collected by Heritage will be checked for the properly preserved pH in the field, immediately after collection. If additional preservation is required, it will be added from the same source and lot of reagent, if possible. The pH will be checked using narrow range pH paper. Final reports will contain a comment as to what was done to the sample upon receipt in the cases where samples receive additional preservation in the lab.

For reagent and standard storage requirements, see Table 8.3, Reagent and Standard Storage.

The chemical preservatives used for preserving samples are listed in Table 6.3, Aqueous Sample Preservatives.

Table 6.4, Sample Requirements, includes all of the parameters listed in Tables 5.1 through 5.4 (QA Targets for Precision, Accuracy and Method Detection Limits) for aqueous samples and specifies:

- Container type
- Required sample amounts for analysis
- Preservation requirements
- Holding times
- Methods

Table 6.5, Sample Containers, Preservation Techniques And Holding Times for Non-Aqueous Samples And TCLP, lists the requirements for concentrated waste samples, soil, sediment, sludge and any non-aqueous sample received in the laboratory.

6.9 Sample Dispatch

Sample documentation, packing and transport will be performed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.4.3, revised 9-92.

6.10 Field Reagent Handling

Field reagents and standards will be handled in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.4.4, revised 9-92.

6.11 Field Waste Disposal

Field generated wastes will be handled in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 4.4.5, revised 9-92.

TABLE 6.1
SAMPLING CAPABILITIES

Parameter Group	Sample Source
Extractable Organics	Drinking water, surface water, storm water run-off, groundwater, sediments, soils, hazardous waste sludge, wastewater, domestic wastewater sludge, liquid hazardous wastes
Volatile Organics	Drinking water, surface water, storm water run-off, groundwater, sediments, domestic wastewater sludge, liquid hazardous wastes, soils
Metals	Drinking water, storm water run-off, surface water, wastewater, groundwater, sediments, soils, hazardous waste sludge, domestic wastewater sludge, liquid hazardous wastes
Physical Properties	Surface water, wastewater, groundwater, drinking water, storm water run-off, soils
Cyanide	Groundwater, surface water, sediments, drinking water, hazardous waste sludge, storm water run-off, wastewater, soils, domestic wastewater sludge, liquid hazardous wastes
Microbiology	Drinking water, groundwater, surface water, wastewater
Inorganic Anions	Drinking water, surface water, storm water run-off, wastewater, groundwater, soils, sediments, hazardous waste sludge, domestic wastewater sludge, liquid hazardous wastes
Organics	Surface water, storm water run-off, wastewater, groundwater, soils, sediments, domestic wastewater sludge, hazardous waste sludge, liquid hazardous wastes
Radionuclides	Surface water, wastewater, groundwater, soils, sediments, hazardous waste sludge, liquid hazardous wastes

Table 6.2
Sample Container Preparation Protocols

-Protocol A-

- Amber Glass Bottles
- Clear Glass Bottles
- Wide Mouth Amber Glass Jars
- Wide Mouth Clear Glass Jars
- Flint Glass Jars
- Wide Mouth Packer Jars

Cleaning Protocol A Specifications:

1. Containers are physically inspected for defects or visible contamination.
2. Rinse with 1:1 nitric acid
3. Rinse three times with tap water.
4. Wash containers, closures, and Teflon liners in hot tap water with laboratory grade, non-phosphate, and biodegradable detergent.
5. Rinse with tap water.
6. Rinse four times with deionized water (> 10m Ω).
7. Oven dry at 125 C. Allow to cool
8. Place Teflon liners in closures and place closures on container. Attendant to wear gloves and containers are not to be removed from preparation room until sealed.

Sample Containers Prepared According to Protocol A Are For Use In The Analysis Of:

Acidity/Alkalinity	Hardness	Settable Residue/Suspended Solids	Mercury
Sulfate	Chloride	BOD (Biological Oxygen Demand)	Metals
Color	Oil & Grease	COD (Chemical Oxygen Demand)	Sulfide
Phenols	pH	Sulfite	Conductivity
Phosphate	Turbidity	TOC (Total Organic Carbon)	Cyanide
		Extractable Organics	

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Table 6.2
Sample Container Preparation Protocols

-Protocol B-

•40 ml Borosilicate Clear and Amber Glass Vials •10 ml Polyethylene Vials

•40 ml and 20 ml Flint Glass Vials •8 oz. and 4 oz. Septum Bottles

•Wide Mouth Clear Glass Jars*
and High Density Polyethylene Bottles (allow extra time for delivery)
*Wide Mouth Clear Glass Jars prepared according to Protocol B are supplied with Teflon-lined polypropylene closures attached

Cleaning Protocol B Specifications:

1. Containers are physically inspected for defects or visible contamination.
2. Wash containers, septa, and closures in hot water with laboratory grade, non-phosphate, biodegradable detergent.
3. Rinse four times with deionized water. (>10m Ω)
4. Oven dry containers, septa and closures at 125 C.
5. Remove containers, septa, and closures, at 125 C.
6. Place liners in closures, Teflon side down, and place on containers. Attendant to wear gloves and containers are not to be removed from preparation room until sealed.

Sample Containers Prepared According to Protocol B Are For Use In The Analysis Of:

COD (Chemical Oxygen Demand) Purgeable (Volatile) Organics
Trihalomethanes Nitrate-Nitrite TOC (Total Organic Carbon)

Note: Protocol B cleaning is performed in an environmentally controlled facility, free of volatile organic vapors.

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Table 6.2
Sample Container Preparation Protocols

-Protocol C-

- High Density Polyethylene Bottles and jars
- Polyethylene Cubitainers
- High Density Polyethylene Wide Mouth Jars
- High Density Polyethylene Products

Cleaning Protocol C Specifications:

1. Containers are physically inspected for defects or visible contamination.
2. Rinse with 1:1 nitric acid.
3. Rinse three times with tap water
4. Wash containers, closures, and Teflon liners in hot tap water with laboratory grade, non-phosphate, and biodegradable detergent.
5. Rinse three times with tap water.
6. Rinse four times with deionized water.
7. Air-dry in contaminant-free environment.
8. Place liners in closures and place closures on containers. Attendant to wear gloves and containers are not to be removed from preparation room until sealed.

Sample Containers Prepared According to Protocol C Are For Use In The Analysis Of:

All analysis noted for Protocol A except:
Phenols; Oils & Grease; TOC (Total Organic Carbon)

Sample container protocols are modified from those specified for the Superfund Sample Container Repository program as noted in QEC edition May 1, 1996.

Table 6.3
Aqueous Sample Preservatives

Reagent	Concentration	Pre-Preserved[1] Container Amount	Required pH	Test Categories
Hydrochloric Acid	Concentrated	0.1 mL/40mL	<2	Volatile Organics
Hydrochloric Acid	Concentrated	5 mL/Liter	<2	Low Level Mercury
Hydrochloric Acid	0.1M	See Footnote [2]	4 to 5	Acrolein, Acrylonitrile
Hydrochloric Acid	1:1	5 mL/Liter	<2	Oil & Grease, TPH
Nitric Acid	Concentrated	5 mL/Liter	<2	Metals, Alpha, Beta, Radium
Sulfuric acid	Concentrated	1 mL/Liter	<2	Phenols, T-Phosphorus, Ammonia, COD, TKN, Nitrate-Nitrite, Oil & Grease, TOC
Sodium Hydroxide	Pellets	2 pellets/Liter	>9	Sulfide
Sodium Hydroxide	Pellets	2 pellets/Liter	>12	Cyanide
Zinc Acetate	Solid	0.1 g/Liter	NA	Sulfide
Sodium Thiosulfate	Solid	80 mg/Liter	NA	Coliforms, Organics
Ascorbic Acid	Solid	25 mg/40mL	NA	SDWA Volatile Organics, Cyanide
Monochloroacetic Acid Buffer	See Footnote [3]	1.2 mL/40mL	3	Carbamates

1 Preservative added per sample amount
2 To be adjusted in the field
3 156 mL of 2.5M Monochloroacetic acid and 100mL of 2.5M potassium acetate

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container	Water Sample Preservation[2]	Required Sample Quantity[3]		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
General Chemistry								
Acidity	Titrimetric	EPA 305.1	P,G	Cool, 4° C	200 mL	50g	14 days	None
Algae Count	Microbiological	SAS	P, G-Sterile	Cool, 4° C	100 mL	NA	6 hours	NA
Alkalinity	Titrimetric	EPA 310.1 EPA 310.2 SM2320B 18th Ed	P,G	Cool, 4° C	200 mL	50g	14 days	None
Anion Chromatography	Ion Chromatography	SW846-9056 EPA 300.0	P,G	None	100 mL	50g	48 hours	48 hours
API Gravity	60 degrees F	ASTM D-287	P,G	None	200 mL	10g	None	None
Asbestos	Trans. Electron Microscopy	EPA 600 /400-83-043 EPA 100.1, 100.2	P	Cool, 4° C	1 L	NA	48 Hours	NA
Asbestos	Polarized Light Microscopy	NVLAP 18-A01	P,G	None	1 L	1g	NA	NA
Biochemical Oxygen Demand	Potentiometric	EPA 405.1	P,G	Cool, 4° C	1 L	NA	48 hours	NA
Biochemical Oxygen Demand, Nitrification Inhibited (CBOD)	Potentiometric	SM 5210 18th ed	P, G	Cool, 4° C	1 L	NA	48 hours	NA
Boron	Colorimetric	EPA 212.3	P	Cool , 4° C H_2SO_4 to pH <2	200 mL	NA	28 days	NA
Bromide	Ion Chromatography	EPA 300.0 SM4110B 18th ed /SW846-9056	P,G	None	0.05mg/L	0.5mg/kg	28 days	28 days
Carbon Dioxide	Titrimetric	EPA 310.1	P,G	Cool, 4° C	200mL	50g	14 days	None

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container	Water Sample Preservation	Required Sample Quantity		Maximum Holding Time Water[1]	Maximum Holding Time S/S/S
					Water	SW		
Cation Exchange Capacity		SW846-9081, AOAC 57-3	P,G	None	NA	10g	None	None
Chemical Oxygen Demand	Block Digester, Colorimetric	EPA 410.4	P,G	Cool, 4° C H_2SO_4 to pH <2	100mL	100g	28 days	28 days
Chloride	Lachate-- Colorimetric, Automated	EPA 325.1	P,G	None	100mL	5g	28 days	28 days
Chloride	Colorimetric, Automated	EPA 325.2	P,G	None	500mL	5g	28 days	28 days
Chloride	Ion Chromatography	EPA 300.0 SM4110B 18th Ed./SW846-9056	P,G	None	0.25mg/L	25mg/kg	28 days	28days
Chloride	Potentiometric	SM4500D 18th Edition	P,G	None	200mL	5g	28 days	28 days
Chlorine Demand	Starch-Iodine Titration	SAS	P,G	None	1 L	NA	28 days	NA
Chlorine, Residual	Colorimetric	EPA 330.5	P, G	No Headspace	200mL	NA	Analyze Immediately	NA
Chlorine, Total	XRF	ASTM D-5839	P,G	NA	NA	10g	NA	28 days
Coliform Bacteria, Fecal	Microbiological	SM 909C	P,G	0.008% $Na_2S_2O_3$[5] Cool, 4° C	125mL	NA	6 hours	NA
Coliform Bacteria, Total	Microbiological	SM 909A	P,G-Sterile	0.008% $Na_2S_2O_3$[5] Cool, 4° C	125mL	NA	6 hours	NA
Coliform, Total / E. Coli	Microbiological	18th Ed SM 9223	P,G	0.008% $Na_2S_2O_3$[5] Cool, 4° C	100mL	NA	6 hours	NA

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity[1,2]		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Color Determination	Cobalt-Platinum	EPA 110.2	P,G	Cool, 4° C	250mL	NA	48 hours	NA
Cyanide, Amenable	Titrimetric, Spectrophotometric	EPA 335.1 + EPA 335.2 SW 846-9010	P,G	Cool, 4° C NaOH to pH >12 Ascorbic Acid if Chlorinated	1 L	50g	14 days[6]	14 days
Cyanide, Amenable	Colorimetric, Automated	EPA 335.2 + EPA 335.3 SW 846-9012	P,G	Cool, 4° C NaOH to pH >12 Ascorbic Acid if Chlorinated	1L	50g	14 days[6]	14 days
Cyanide, Total	Colorimetric, Automated	EPA 335.3 / EPA 335.4 SW 846-9012	P,G	Cool, 4° C NaOH to pH >12 Ascorbic Acid if Chlorinated	500mL	50g	14 days[6]	14 days
Cyanide, Total Available	Automated or Manual	SW 7.3.3.2	P,G	Cool, 4° C NaOH to pH >12	1 L	100g	14 days[6]	14 days
Cyanide, Weak and Dissociable	Automated	SM 4500-CN.I	P,G	Cool, 4° C NaOH to pH >12 Ascorbic Acid if Chlorinated	1000mL	50g	14 days[6]	14 days
Density	Pycnometer	ASTM D-70	G	None	100mL	10g	None	None
Dissolved Oxygen	Membrane Electrode	EPA 360.1	P,G	None	300mL	NA	Analyze Immediately	NA
Dissolved Oxygen	Winkler	EPA 360.2	P,G	Fix on site and store in dark	300mL	NA	8 hours	NA
Fluoride	Ion Selective Electrode	EPA 340.2 SM4500C 18th Edition	P,G	Cool, 4° C	500mL	50g	28 days	28 days

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference[1]	Container[2]	Water Sample Preservation[3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Fluoride	Ion Chromatography	SW 846-9056 / EPA300.0	P ,G	None	100mL	30g	28 days	28 days
Hardness	Calculation	SM2340B	P,G	HNO_3 to pH < 2	200mL	NA	6 months	NA
Hardness	EDTA, Titrimetric	EPA 130.2	P,G	HNO_3 to pH < 2	100mL	NA	6 months	NA
Heat of Combustion, BTU/LB	Bomb Calorimeter	ASTM D-240	P,G	NA	NA	50mL or 20g	NA	None
Heterotrophic Plate Count	Microbiological	SM 9215 18th Edition	P	Cool, 4° C	125mL	NA	48 hours	48 hours
Hexavalent Chromium	Colorimetric	SM 3500-CR D	P,G	Cool, 4° C	300mL	100g	24 hours	7 days
Hexavalent Chromium	Colorimetric, Manual	SW 846-7196A	P,G	Cool, 4° C	300mL	100g	24 hours	7 days
Ignitability	Solid-Assessment Exposure to flame	ASTM D-4982 A	G	Cool, 4° C	100mL	20g	NA	NA
Ignitability	Solid Assessment Exposure to spark	ASTM 4982 D	G	Cool, 4° C	100mL	20g	NA	NA
Ignitability	Cleveland Open Cup	ASTM-D-92	G	None	NA	10 g	None	None
Ignitability	Liquid, Pensky-Martens	SW846-1010	G	Cool, 4° C	65mL (x2 for Duplicate)	65mL (x2 for Duplicate)	28 days	28 days
Ignitability	Setaflash	SW846-1020A	P,G	Cool, 4°C	4 oz.	4 oz.	28 days	28 days
Ignitability	Ignitability of Solids	SW 846-1030	P,G	NA	NA	500g	NA	None
Initial Boiling Point	Manual	ASTM D-86	P, G	None	100mL	NA	None	None

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Iodide	Ion Chromatography	EPA 300.0 / SM4110B 18th Ed./SW846-9056	P,G	None	100mL	30g	28 days	28 days
Langelier Saturation Index	Calculation	SM2330B 18th Edition	P,G	NA	NA	NA	NA	NA
Membrane Filter Technique for Coliform Bacteria	Microbiological	SM9222D 18th Edition	P, G-Sterile	Cool, 4° C	100mL	10g	30 hours	30 hours
Multiple Tube Fermentation for Coliform Bacteria	Microbiological	SM 9221 18th Edition	P, G Sterile	Cool, 4° C	100mL	10g	30 hours	30 hours
Mineral Acids	Ion Chromatography	SW846-9056	P,G	None	100mL	30g	28 days	None
Moisture, Ash, & Organic Matter	Gravimetric	ASTM D-2974-87	P,G	Cool, 4° C	100mL	10g	14 days	14 days
Nitrate-Nitrite by Ion Chromatography	Ion Chromatography	EPA 300.0 SW846-9056 SM4110B 18th Ed	P,G	Cool, 4° C H_2SO_4 to pH <2	100mL	30g	28 days	28 days
Nitrogen, Ammonia	Colorimetric, Titrimetric, Potentiometric w/distillation	EPA 350.2	P,G	Cool, 4° C H_2SO_4 to pH <2	1 L	100g	28 days	28 days
Nitrogen, Ammonia	Potentiometric (ISE)	EPA 350.3	P,G	Cool, 4° C H_2SO_4 to pH <2	1 L	5g	28 days	28 days
Nitrogen, Total Kjeldahl	Potentiometric	EPA 351.4	P,G	Cool, 4° C H_2SO_4 to pH <2	100mL	50g	28 days	28 days
Nitrogen, Total Organic	Calculation	EPA 351.4	P,G		1 L	100g	28 days	28 days

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Nitrogen, Nitrate	Colorimetric, Automated - Cd Red.	EPA 353.2	P,G	Cool, 4° C	100mL	50g	48 hours or 14 days if Chlorinated	None
Nitrogen, Nitrite	Colorimetric, Automated	EPA 353.2	P,G	Cool, 4° C	100mL	50g	48 hours	None
Nitrogen, Nitrite	Ion Chromatography	EPA 300.0 / SM4110B 18th Edition / SW846-9056	P,G	Cool, 4° C	100mL	30g	48 hours	28 days
Nitrogen, Nitrate-Nitrite	Colorimetric-Cd Red. Manual	EPA 353.2	P,G	Cool, 4° C H_2SO_4 to pH <2	100mL	50g	28 days	None
Nitrogen, Nitrate	Colorimetric, Automated-Hydrazine	EPA 353.1	P,G	Cool, 4° C	100mL	50g	48 hours or 14 days if Chlorinated	None
Nuisance Dust	Analytical Micro-Balance	NIOSH 500	Air Filter	NA	NA	NA	NA	NA
Odor	Manual	SM2150B 18th Edition	P,G	None	1 L	NA	48 hours	None
Odor, Threshold	Manual	EPA 140.1	P,G	None	1 L	NA	48 hours	None
(Oil & Grease) Hexane Extractable Material –HEM	Gravimetric	EPA 1664, Rev. A	G	Cool, 4° C H_2SO_4 (or HCl) to pH <2	1 L + MS/MSD 1/20 samples	NA	28 days	NA
Oxidation-Reduction Potential	Electrode	SM2580B 18th Edition	P,G	NA	100mL	NA	NA	NA
Paint Filter Test	Paint Filter	SW 846-9095	G	NA	NA	500g	NA	NA
Particle Size	Hydrometer	ASTM D422-63	P,G	None	100mL	100g	None	None
Percent Hydrofluoric Acid	Ion Chromatography	SAS	P	None	100mL	100g	None	None

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2]	Required Sample Quantity[3]		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Percent Moisture	Gravimetric	SAS	P,G	None	NA	100g	None	None
Percent Nitric Acid	Ion Chromatography	SAS	P	None	100mL	100g	None	None
Percent Oil	Centrifuge	ASTM D-96	P,G	None	100mL	100g	None	None
Percent Solids	Gravimetric	SM2540B 18th Edition	P,G	Cool, 4° C	250mL	50g	7 days	7 days
Percent Solids	Solubility in Trichloroethylene	ASTM D-2042	G	NA	NA	2g	NA	NA
Percent Water	Xylene Trap	ASTM D-96	P,G	None	None	10g	None	None
Percent Water	Centrifuge	ASTM D-96	P, G	Cool, 4° C	100mL	10g	None	None
Percent Water	Karl Fischer Titration	ASTM 1744	P, G	Cool, 4° C	100mL	10g	None	None
Bottom Sediment and Water	Centrifuge	ASTM D-96	P,G	None	500mL	500g	None	None
PH (aqueous)	Electrode	EPA 150.1, SW 846-9040B	P,G	Cool, 4° C	50mL	NA	Analyze Immediately	NA
PH (paper method)	Paper	SW 846-9041A	P,G	Cool, 4° C	50mL	NA	Analyze Immediately	NA
PH (S/S/S)	Electrode	SW 846-9045C	P,G	Cool, 4° C	NA	50g	Analyze Immediately	Analyze Immediately
Phenols	Manual, 4AAP	EPA 420.1 SW 846-9065	G	Cool, 4° C, H_2SO_4	500mL	100g	28 days	28 days
Phenols	Manual Distillation w/Automated, 4AAP	EPA 420.2, SW 846-9066	G	Cool, 4° C, H_2SO_4	500mL	50g	28 days	28 days

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Phosphorus, Ortho	Colorimetric, Automated	EPA 365.1	P,G	Cool, 4° C	500mL	50g	48 hours	None
Ortho-Phosphorus	Ion Chromatography	EPA 300.0 / SM4110B 18th Edition / SW846-9056	G	Cool, 4° C	100mL	30g	48 hours	48 hours
Phosphorus, Total	Colorimetric, Automated	EPA 365.1	P,G	Cool, 4° C H_2SO_4 to pH <2	500mL	50g	28 days	28 days
Pour Point	Manual	ASTM D-97	G	Cool, 4° C	NA	10 g	None	None
Radium	Proportional Counter	EPA 903.0	P,G	HNO_3 to pH <2	1 Gallon	NA	6 months	NA
Radium 226, 228	Proportional Counter	EPA 903.1	P,G	HNO_3 to pH <2	1 Gallon	NA	6 months	NA
Residual Chlorine	Spectrophotometric	EPA 330.5	P,G	None	100mL	NA	6 hours	NA
Saturation Index (Calculated from pH, Alkalinity, TDS, Calcium, Temperature)	Langlier	SM 203	P,G	Cool, 4° C	1000mL	NA	NA	NA
Saybolt Furol Viscosity @122 F	Manual	ASTM D-244	G	None	100mL	10g	None	None
Saybolt Universal Viscosity @100 F	Manual	ASTM D-445	G	None	100mL	10g	None	None
Settleable Matter	Imhoff Cone	EPA 160.5	P,G	Cool, 4° C	1000mL	NA	48 hours	NA
Silica, Total	Colorimetric	EPA 370.1	P	Cool, 4° C	200mL	NA	28 days	NA

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Solids, Dissolved Total	Gravimetric	EPA 160.1 / SM2540C 18th Ed.	P,G	Cool, 4° C	500mL	NA	7 days	NA
Specific Conductance	Conductivity Bridge	EPA 120.1 / SW 846-9050 / SM2510B 18th Ed.	P,G	Cool, 4° C	100mL	NA	28 days	NA
Sulfate	Turbidimetric	EPA 375.4 / SW 846-9038/ SM4110B	P,G	Cool, 4° C	100mL	NA	28 days	NA
Sulfate	Ion Chromatography	EPA 300.0 / SM4110B 18th Edition SW 846-9056	P,G	None	100mL	30g	28 days	28 days
Sulfide, Available Extraction	Manual	SW 7.3.4.1	P,G	Cool, 4° C $NaOH/ZnC_4H_6O$ to pH >9	200mL	50g	7 days	7 days
Sulfide	Colorimetric, Methylene Blue	EPA 376.2	P,G	Cool, 4° C $NaOH/ZnC_4H_6O$ to pH >9	1L	100g	7 days	7 days
Sulfide	Titrimetric, Iodine	EPA 376.1 SW 846-9030	P,G	Cool, 4° C $NaOH/ZnC_4H_6O$ to pH >9	1L	100g	7 days	7 days
Sulfite	Titrimetric	EPA 377.1	P,G	None	500mL	NA	Analyze Immediately	NA
Sulfur	Bomb	ASTM D-129	P,G	NA	NA	Oil:2g	NA	NA
Surfactants	MBAS	EPA 425.1	P,G	Cool, 4° C	500mL	NA	48 hours	NA
Temperature	Manual	EPA 170.1	P,G	None	100mL	--	Analyze Immediately	--

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container	Water Sample Preservation	Required Sample Quantity		Max. Maximum Holding Time Water[1]	Maximum Holding Time S/S/S
					Water	SW		
Thiocyanate	Colorimetric	SM 412L	P,G	Cool, 4° C (See Method) H_2SO_4 to pH <2 or NaOH to pH >12	500mL	100g	See Method	See Method
Total Dissolved Solids	Gravimetric	EPA 160.1	P,G	Cool, 4° C	500mL	NA	7 days	NA
Total Halogen	Bomb	ASTM D-808	P,G	None	NA	10g	NA	None
Total Organic Carbon	Combustion-IR	EPA 415.1 SW 846-9060	P,G	Cool, 4° C HCl or H_2SO_4 to pH <2	250mL	10g	28 days	28 days
Total Organic Halides	Micro-Coulometric	SW 846-9020	G/Teflon Liner	Cool, 4° C	500mL	10g	28 days	28 days
Total Solids	Gravimetric	EPA 160.3	P,G	Cool, 4° C	250mL	50g	7 days	7 days
Total Suspended Solids	Gravimetric	EPA 160.2	P,G	Cool, 4° C	500mL	NA	7 days	NA
Total Volatile Solids	550 °C Oven	EPA 160.4	P,G	Cool, 4° C	250mL	10g	7 days	7 days
Total Volatile Solids	Weight Percent	ASTM 2369	P,G	Cool, 4° C	250mL	10g	7 days	7 days
Turbidity	Nephelometric	EPA 180.1	P,G	Cool, 4° C	100mL	NA	48 hours	NA
Volatile Acids	Distillation / Titration	SM 504B	G Liter	Cool, 4° C	1 L	NA	None	NA
Volatile Suspended Solids	550C Oven	EPA 160.4	P,G	Cool, 4° C	250mL	NA	7 days	NA
Metals:								
Metals	ICP, FAA, GFAA, ICP/MS	SW846-7000 series EPA 200.7, 200.8, 200.9 SW846-6010B, 6020	P,G	HNO_3 to pH <2	500mL	100g	180 days	180 days

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Mercury	Manual CVAA (245.1 CLP-M)	CLP SOW	P,G	Cool, 4° C	500mL	NA	26 days	NA
Mercury	Manual CVAA (245.5 CLP-M)	CLP SOW	P,G	Soil/Sediment Cool, 4° C	NA	10g	NA	26 days
Mercury	CVAA - Manual	SW 846-7470, EPA245.1	P,G	HNO_3 to pH <2	500mL	NA	13 days[7]	NA
Mercury	CVAA - Manual, S/S/S	SW 846-7471	P,G	None	NA	10g	28 days	28 days
Mercury	CVAFS-Automated	EPA 1631E	G, Teflon	HCl, 5 mL/L	250 mL	NA	28 days	NA
All Metals, N. Carolina Groundwater Only	Prep Acid Extractable	SM 3030C (Prep)	P,G	Cool, 4° C, 5mL Conc. HNO_3L	500mL	NA	72 hours	NA
Organic Tests[10,11]								
2,3,7,8 TCDD[14]	GC/MS	EPA 1613	G Liter	Cool, 4° C	2L	NA	7 days to extract, 40 days to analysis	NA
2,3,7,8 TCDD[14]	GC/MS/MS	CLP SOW 8/88	G Liter	Cool, 4° C	2 L	100g	NA	NA
Organochlorine Pesticides/PCBs	GC/ECD	CLP SOW	G Liter	Cool, 4° C	3 L	100g	Extraction 5 days from receipt--40 days to analysis	Extraction 10 days from VTSR**, 40 days to analysis

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[1,4]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Semi-Volatile Organics	GC/MS	CLP SOW	G Liter	Cool, 4° C	2 L	100g	Extraction 5 days from VTSR, 40 days to analysis	Extraction 10 days from VTSR**, 40 days to analysis
Volatile Organics	GC/MS	CLP SOW	GV	HCl to pH2	2 x 40mL	40g	14 days	14 days
Purgeable Halocarbons	GC/ELCD	EPA 601	GV	Cool, 4° C, 0.008% $Na_2S_2O_3$[5]	2 x 40mL	40g	14 days	14 days
Halogenated and Aromatic Volatile Organics	GC/PID/ ELCD	EPA 601/602 Modified	GV	Cool, 4° C, 0.008% $Na_2S_2O_3$[5]	2 x 40mL	40g	14 days	14 days
Purgeable Aromatics	GC/PID	EPA 602	GV	Cool, 4° C, 0.008% $Na_2S_2O_3$[5] HCl to pH2[12]	2 x 40mL	40 g	14 days	14 days
Nitrosamines[11, 17]	GC/NPD	EPA 607	G Liter	Cool, 4° C, 0.008% $Na_2S_2O_3$[5]	2 L	NA	7 days to extraction, 40 days to analysis	NA
Organochlorine Pesticides/ PCBs[14]	GC/ECD	EPA 608	G Liter	Cool, 4° C, pH 5-9[18]	3 L	100g	7 days to extraction, 40 days to analysis	7 days to extraction, 40 days to analysis
Volatile Priority Pollutants	GC/MS	EPA 624	GV	Cool, 4° C, HCl to pH2, 0.008% $Na_2S_2O_3$[5,12]	2 x 40mL	40g	14 days	14 days

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[1]	Maximum Holding Time S/S/S
					Water	SW		
Semi-Volatile Priority Pollutants (BNA)[14]	GC/MS	EPA 625	G Liter	Cool, 4° C, 0.008% $Na_2S_2O_{34}$[5]	2 L	100g	7 days to extraction, 40 days to analysis[16]	7 days to extraction, 40 days to analysis[16]
Hydrocarbon Scan	GC/FID	SW 846-8000	GV	Cool, 4° C	3 x 40mL	100g	14 days	14 days
RCRA Listed Solvents	GC/FID	SW 846-8000	GV	Cool, 4° C	2 x 40mL	40g	14 days	14 days
Halogenated Volatile Organics	GC/ELCD	SW 846-8021B	GV	Cool, 4° C, 0.008% $Na_2S_2O_3$	2 x 40mL	40g	14 days	14 days
Alcohols	GC/FID	SW 846-8015B	GV	Cool, 4° C	2 x 40mL	40g	14 days	14 days
Petroleum Fuels	GC/FID	SW 846-8015B Modified	GV	Cool, 4° C HCl to pH 2	3 x 40mL	100g	14 days	14 days
Total Petroleum Hydrocarbons	GC/FID	SW 846-8015B Modified	GV	Cool, 4° C HCl to pH 2	3 x 40 mL	100 g	14 days	14 days
Total Petroleum Hydrocarbons	FTIR or Gravimetric	EPA 418.1, SM 5520F 18th Ed.	G Liter	Cool, 4° C HCl to pH 2	2 L	100g	28 days	28 days
Diesel Range Organics	GC/FID	SW 846-8015B, SW 846-3510C, SW 846-3550B Iowa OA-2	G, GV	Cool, 4° C	3 L	30 g	14 days	14 days
Diesel Range Organics	GC/FID	Wisconsin Modified DRO-	Wide Mouth 60 ml GV or 120 ml GV. Amber 1L for Water or ENCORE	5 mls of 1:1 HCl in 1 liter Cool, 4°C. Carbonate Aquifers require Sodium Azide.	3 L	25 gms / 60 ml GV. 25 gms or 50 gms / 120 ml GV	7 days to extract and 40 days to analysis (Max. 47 days)	Solvent addition within 72 hours. Extraction and Analysis within 47 days

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Gasoline Range Organics (GRO or VPH) (MA/NC/PA/TN)	GC/FID/PID	SW 846-8015B, SW846-5030B- (low level and med. Level)	GV or Encore or Pre-weighed MeOH vial	Cool, 4° C HCL to pH 2	3 x 40 mL	3 x 40 ml 15 gms soil /15 ml MeOH in field (GV) or ENCORE required *Additional Sample for Moist.*	14 days	28 days for soils in MeOH
Gasoline Range Organics (CA/IA/IN/OK/WI)	GC/FID	SW846-8015B (Modified Wisccnsin) SW846-5030B Iowa OA-1	GV or Encore or Pre-weighed MeOH vial	Cool, 4° C, pH 2	3 x 40 mL	Fill GV, 0 headspace *In Wisc.: >8<20 gms /GV. MeOH in field or ENCORE required (No low level) Additional Sample for Moist.*	14 days	14 days *WI-Mod GRO: 21 day Soils in ENCORE must have MeOH added within 48 hrs.*
Halogenated and Aromatic Volatile Organics	GC/PID/ ELCD	SW 846-8021B	GV	Cool, 4° C HCl to pH2, 0.008% $Na_2S_2O_3$[5,12]	2 x 40mL + MS/MSD 1/20	40g	14 days	14 days
Acrolein, Acrylonitrile, Acetonitrile	GC/FID	SW 846-8030	GV	Cool, 4° C, 0.008% $Na_2S_2O_3$[5] Adjust pH to 4-5[13]	2 x 40mL + MS/MSD 1/20	40g	14 days	14 days
Organochlorine Pesticides & PCBs[14]	GC/ECD	SW 846-8081A SW846-8082	G Liter	Cool, 4° C pH 5-9[18]	1 L + MS/MSD 1/20	100g	7 days to extract, 40 days to analysis	14 days to extract, 40 days to analysis

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[3]	Water Sample Preservation[21]	Required Sample Quantity[2]		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
PCBs[14]	GC/ECD	SW 846-8081A SW846-8082	G Liter	Cool, 4° C	2 L + MS/MSD 1/20	100g	7 days to extract, 40 days to analysis	14 days to extract, 40 days to analysis
Nitroaromatics and Cyclic Ketones	GC/ECD	SW 846-8090	G Liter	None	2 x 1 L + MS/MSD 1/20	100 g	7 days to extract, 40 days to analysis	14 days to extract, 40 days to analysis
Nitroaromatics and nitrosamines (Explosives)	HPLC	SW 846-8330	G Liter	Cool, 4° C	2 x 1 L + MS/MSD 1/20	100 g	7 days to extract, 40 days to analysis	14 days to extract, 40 days to analysis
Nitroaromatics	GC/ECD	EPA 609.0	G Liter	None	2 x 1 L + MS/MSD 1/20	100 g	7 days to extract, 40 days to analysis	14 days to extract, 40 days to analysis
Chlorinated Hydrocarbons	GC	SW 846-8121	G Liter	Cool, 4° C	2 x 1 L + MS/MSD 1/20	100g	7 days to extract, 40 days to analysis	14 days to extract, 40 days to analysis
Organophosphorus Pesticides[14] & Triazine Herbicides	GC/NPD	SW 846-8141A	G Liter	Cool, 4° C, pH 5-9[18]	2 L + MS/MSD 1/20	100g	7 days to extract, 40 days to analysis	14 days to extract 40 days to analysis
Chlorinated Herbicides	GC/ECD	SW 846-8151A	G Liter	Cool, 4° C	1 L + MS/MSD 1/20	100g	7 days to extract, 40 days to analysis	14 days to extract 40 days to analysis
Volatile Organics	GC/MS	SW846-8260B SW846-5035	GV or ENCORE or pre-weighed MeOH GV or Na_2SO_4 w/stirrer	Cool, 4° C, HCl to pH 2[12]	2 x 40mL + MS/MSD 1/20	5 gms/5 ml MeOH + MS/MSD 1/20. *Addnl. Sample required for moisture.*	14 days	14 days, but must preserve ENCORE samples in 48 hours with MeOH or Sodium Bisulfite and water

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Volatile Organics	GC/MS	SW 846-8260B SW 846-5030B	GV or 4 oz. G Round for S/S/S	Cool, 4° C, HCl to pH 2[12]	2 x 40mL + MS/MSD 1/20	40g – 100g	14 days	14 days
Semi-Volatile Organics[14]	GC/MS	SW 846-8270C	G Amber Liter	Cool, 4° C, 0.008% $Na_2S_2O_3$[5]	2 L + MS/MSD 1/20	100g	7 days to extract, 40 days to analysis	14 days to extract 40 days to analysis
Polychlorinated Dibenzo-P-Dioxins and Dibenzofurans[14]	GC/MS	SW 846-8280A	G Amber Liter	Cool, 4° C, 0.008% $Na_2S_2O_3$[5]	2 L + MS/MSD 1/20	100g	7 days to extract, 40 days to analysis	14 days to extract 40 days to analysis
Polynuclear Aromatic Hydrocarbons	HPLC	SW 846-8310	G Amber Liter	Cool, 4° C, 0.008% $Na_2S_2O_3$[5]	2 L + MS/MSD 1/20	100g	7 days to extraction, 40 days to analyze	14 days to extraction, 40 days to analyze
Acrylamide	HPLC	SW 846-8316	G Liter	Cool, 4° C, 0.008% $Na_2S_2O_3$[5]	2 L + MS/MSD 1/20	100g	7 days to extraction, 40 days to analyze	14 days to extraction, 40 days to analyze
Phenolics 4AAP	Automated-Colorimetric	SW846 -9066/ EPA 420.2	G Liter	Cool, 4° C, H_2SO_4	1L	NA	28 days to extraction	NA
Phenolics	GC/FID	SW 846- 8041	G Liter	None	2 x 1L + MS/MSD 1/20	100g	7 days to extract, 40 days to analysis	14 days to extract, 40 days to analysis
Perchlorate	Ion Chromatography	EPA 314.0	P	None	120 mL	100g	28 days	28 days
Volatile Organic Compounds in Drinking Water	GC/PID/ELCD	EPA 502.2	GV	Cool, 4° C, 0.008% $Na_2S_2O_3$, HCl to pH 2[5]	3 x 40mL	NA	14 days	NA
EDB & DBCP	Micro-Extraction, GC/ECD	EPA 504.1	GV	Cool, 4° C[5], .008% $Na_2S_2O_3$	3 x 40mL	NA	7 days to extract, 40 days to analysis	NA

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity[4]		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Nitrogen & Phosphorus Containing Pesticides	GC/NPD	EPA 507	G Liter	Cool, 4° C, HCl to pH <2	2 L + MS/MSD	NA	28 days after extraction	NA
Volatile Organic Compounds in Drinking Water	GC/MS	EPA 524.2	GV	Cool, 4° C, 0.008% $Na_2S_2O_3$[5], HCl to pH2[5]	3 x 40mL	NA	14 days	NA
Semi-Volatile Organic Compounds in Drinking Water	GC/MS	EPA 525.2	G Liter	Cool, 4° C, 0.008% $Na_2S_2O_3$[5], HCl to pH2[5]	2 x 1L + MS 1/20	NA	7 days to extract, 30 days to analysis from sampling	NA
Carbamates	HPLC	EPA 531.1/ SW846-8318	GV	Monochloro-acetic Acid Buffer to pH3, Cool, 4° C, 0.008% $Na_2S_2O_3$[5]	3 x 40mL	NA	28 days, frozen	NA
Herbicides	GC/ECD	EPA 515.1	G Liter	Cool, 4° C, $Na_2S_2O_3$[5] to 10 mg/L conc.	2 x 1L + MS/MSD	NA	7 days to extract, 40 days to analysis	NA
Diquat and Paraquat	LSE-HPLC	EPA 549.2	P,G	Cool, 4° C, .008% $Na_2S_2O_3$[5], H_2SO_4 to pH <2[5]	3 x 1L glass silanized or 3 x 1L PVC	NA	7 days to extract, 21 days to analysis	NA
Organochlorine Pesticides/PCB's	GC/ECD	EPA 508	G Liter	Cool, 4° C, .008% $Na_2S_2O_3$[5], HCl to pH <2	2 x 1L + MS/MSD	NA	7 days to extract, 14 days to analysis	NA
Glyphosate	HPLC	EPA 547	GV	Cool, 4° C, .008% $Na_2S_2O_3$[5]	3 x 40mL	NA	14 days. Extract within 7 days	NA

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity[2,3]		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Endothall	LSE-GC/MS	EPA 548.1	G Liter	Cool, 4° C .008% $Na_2S_2O_3$[5], HCl to pH <2 (If biologically Active)	1 L + MS 1/10	NA	14 days	NA
Polycyclic Aromatic Hydrocarbons	LLE-HPLC	EPA 550	G Liter	Cool, 4° C, .008% $Na_2S_2O_3$[5], HCl to pH <2[5]	2 x 1L + MS 1/20 or sample set	NA	7 days to extract, 30 days total	NA
Chloral Hydrate	GC/ECD	EPA 551.1	GV	Cool, 4°C 6 mg $NaSO_3$ (100 mg/L conc.)	3 x 60mL Amber Vial	NA	14 days to extract, 14 days to analysis	NA
Haloacetic Acids	GC/ECD	EPA 552.2	GV	Cool, 4°C 6 mg NH_4Cl (100 mg/L conc.)	3 x 60mL Amber Vial	NA	14 days	NA
All Radionuclides except the following:	--	--	P,G	HNO_3 or HCl to pH <2	1 L	NA	1 year	1 year
Gross Beta	Proportional Counter	EPA 900.0	P	HNO_3 to pH < 2	1 gallon	NA	6 months	NA
Radon-222	Liquid Scintillation	EPA 913.0	G	None	2 x 40mL	NA	4 days	NA
Cesium-137	Gamma	EPA 901.1	P,G	HNO_3 to pH <2	1 L	NA	1 year	NA
Iodine-131	Gamma, Proportional Counter	EPA 901.1, EPA 902.0	P,G	None	1 L	NA	7 days	NA
Tritium	Liquid Scintillation	EPA 906.0	P,G	HNO_3 to pH <2	1 L	NA	1 year	NA
Uranium	Proportional Counter	EPA 908.0	P,G	HCl to pH <2	1 L	NA	1 year	NA

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Table 6.4
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	SW		
Gamma Emitting Radionucleides	Gamma Spectrometer	EPA 901.1	P,G	HNO_3 to pH <2	1 L	NA	1 year	NA
Extractable Organic Halides (EOX)	Micro-coulometric	SW-846 9020 MOD	G	Cool, 4 C	500 mL	100g	28 days	28 days
Indiana-Neutral Leaching Method	Leachate Generation	329 IAC	G	None	100g @ 100% Solids >10kg @ ≥.5% Solids		NA	NA
Toxicity Characteristic Leaching Procedure (TCLP)-Metals Only	Leachate Generation	SW 846-1311	P,G	None	105g @ 100% Solids >5kg @ ≥.5% Solids Triple volume for MS/MSD		180 days to TCLP extraction 180 days to Analysis, except Hg - 28 days	
Toxicity Characteristic Leaching Procedure (TCLP)-All Regulated	Leachate Generation	SW 846-1311	G	None	500g @ 100% Solids 20kg @ ≥.5% Solids Triple volume for MS/MSD		See individual analyte groupings	
Toxicity Characteristic Leaching Procedure (TCLP)-Regulated Non-Volatile Organics	Leachate Generation	SW 846-1311	G	None	305g @ 100% Solids 15kg @ ≥.5% Solids Triple volume for MS/MSD		14 days to TCLP extraction, 7 days from TCLP extraction to preparative extraction, 40 days from preparative extraction to analysis	
Toxicity Characteristic Leaching Procedure (TCLP)-Regulated Volatiles	Leachate Generation	SW 846-1311	G	None	125g @ # 100% Solids 1200g @ <5% Solids		14 days to TCLP extraction, 14 days from TCLP extraction to analysis	

1. Polyethylene (P) or Glass (G) or Glass Vial (GV). All organics containers will have a Teflon-lined cap.

2. Sample preservation should be performed immediately upon sample collection. For composite chemical samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4° C until compositing and sample splitting is completed.

3. When any sample is to be shipped by common carrier or sent through the United States Mail, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of Table II, the Office of Hazardous Material, Material Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric Acid (HCl) in water solutions at

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Table 6.4
SAMPLE REQUIREMENTS

concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric Acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric Acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

4. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of samples under study are stable for the longer time, and has received a variance from the Regional Administer under § 136.3(e). Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show that this is necessary to maintain sample stability. See § 136.3(e) for details.

5. Should only be used in the presence of residual chlorine. May use ascorbic acid or sodium bisulfate as allowed per regulation/method.

6. Maximum holding time is 24 hours when sulfide is present. Optionally all samples may be tested with lead acetate paper before pH adjustments in order to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12. All drinking waters require distillation within 24 hours of collection.

7. 13 days in plastic, 28 days in glass.

8. All organics containers have Teflon lined caps. Required Sample quantity is listed to include MS or back-up sample.

9. Samples should be filtered immediately on-site before adding preservative for dissolved metals.

10. Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

11. All drinking water samples must be preserved, regardless of holding time.

12. Sample receiving no pH adjustment must be analyzed within 7 days of sampling.

13. The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.

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Table 6.4
SAMPLE REQUIREMENTS

14. When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to 4° C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6-9; samples preserved in this manner may be held for seven days before extraction and for forty days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (re: the requirement for thiosulfate reduction of residual chlorine), and footnotes 15 and 16 (re: the analysis of benzidine).

15. If 1,2-Diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0 ± 0.2 to prevent rearrangement to benzidine.

16. Extracts for benzidines may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.

17. For the analysis of diphenylnitrosamine, add 0.008% $Na_sS_sO_3$ and adjust pH to 7-10 with NaOH within 24 hours of sampling.

18. The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_sS_sO_3$.

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Table 6.5
SAMPLE CONTAINERS, PRESERVATION TECHNIQUES AND HOLDING TIMES FOR NON-AQUEOUS SAMPLES AND TCLP

Parameter	Container	Preservative	Holding Time
Volatile Organics			
Concentrated Waste Samples	Glass, w/ Teflon lined cap	None	14 days
Soil/Sediments/Sludges	Glass, w/ Teflon lined cap	Cool, 4° C	14 days
TCLP Volatiles	Glass, Teflon-lined, Zero Headspace. 40 mL Septum vials preferable	Cool, 4° C.[1]	14 days from collection to ZHE extraction. 14 days from ZHE extraction to analysis
Semivolatile Organics/Organochlorine Pesticides/ PCBs			
Concentrated Waste Samples	Glass, w/ Teflon lined cap	None	Extract within 14 days, Analysis within 40 days following extraction.
Soils/Sediments/Sludges	Glass, w/ Teflon lined cap	Cool, 4° C	Extract within 14 days, Analysis within 40 days following extraction.
TCLP Semivolatiles/Pesticides/Herbicides	Glass, Teflon-lined cap	None. Samples may be refrigerated unless refrigeration results in irreversible physical change to the waste.	14 days from collection to tumbling (TCLP) extraction. 7 days from TCLP extraction to preparative extraction (solvent). 40 days from preparative extraction to determinative analysis.
Metals/Inorganic Tests			
Concentrated Waste Samples	Plastic or Glass	None	6 months

[1] Note that the Conc. waste requirements and the TCLP waste requirements may not be consistent.

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Table 6.5
SAMPLE CONTAINERS, PRESERVATION TECHNIQUES AND HOLDING TIMES FOR NON-AQUEOUS SAMPLES AND TCLP

Parameter	Container	Preservative	Holding Time
Soils/Sediments/Sludges	Plastic or Glass	Cool, 4° C	6 months
TCLP Metals except Mercury	Plastic or Glass	None. Samples may be refrigerated unless refrigeration results in irreversible physical change to the waste.	6 months
TCLP Mercury	Plastic or Glass	None. Samples may be refrigerated unless refrigeration results in irreversible physical change to the waste.	28 days from collection to TCLP extraction. 28 days from digestion to analysis.

7.0 Sample Custody

7.1 Introduction

The maintenance of sample chain of custody is part of the laboratory QA program. Where samples and analytical results may be needed for legal purposes, it is imperative that the laboratory, client and everyone else involved in such proceedings be able to unequivocally demonstrate that analytical results were obtained from analysis of specified samples.

A sample is in someone's "custody" if:

1. It is in their actual physical possession, or
2. It is in their view, after being in their physical possession, or
3. It is in their physical possession and locked up so that no one could tamper with it, or
4. It is kept in a secured area restricted to authorized personnel only.

7.2 Facilities and Sample Security

Heritage Laboratory facilities are protected with an access control system. In this way, access to all samples remains controlled and documented at all times. Visitors to the facilities are prohibited from entering the cooler and laboratory areas unescorted. Special viewing areas have been provided to facilitate laboratory "tours".

Rules regarding custody have been established and must be followed as outlined below:

1. Samples must never be unattended in the delivery/receiving area. If the receiving area is to be left unattended, the sample-receiving door must be closed and locked.
2. All samples must be returned to their storage area/cooler at the end of the final shift.
3. All sample extracts and digestates must be placed in their respective laboratories.
4. All evidentiary samples and sub-samples will be stored in locked storage after business hours so that non-laboratory personnel are not able to gain access (janitors, security guards, etc.).
5. Samples being logged-in should remain out of the cold storage for a minimum of time.

7.3 Sample Custody Records

Sample custody will be supported by records that trace a sample from its point of origin to include container storage and shipment through disposal after analysis. These records will include, but are not limited to:

1. Field notebooks
2. Field sample I.D. tags, labels
3. Laboratory (transmittal forms), Task Orders, Request Forms
4. Chain of Custody forms
5. Laboratory Checklists
6. Sample extraction/preparation logs or worksheets
7. Analytical (instrument) logs or worksheets
8. Calibration and quality control data associated with a sample set
9. Instrument maintenance logs
10. Sample disposition logs; and,
11. Final reports

Item numbers 1, 3 and 4 above are generally the responsibility of the client unless Heritage Laboratories performs the sampling.

7.3.1 Documentation of Cleaning Procedures for Sampling Equipment and Containers for Samples, Reagents and Analyte-Free Water

Records listed below shall be maintained for all container or equipment cleaning. This requirement shall apply to all containers and equipment cleaned or prepared for use in field sampling activities. Field-meter probes or other devices contacting the sample or sample source(s) are also included in this category:

1. The material composition, size and any other description of all sample, preservative or analyte-free water containers, container closures and closure liners or sampling equipment cleaned or prepared
2. A detailed, step-by-step description of the cleaning protocols including cleaning agents, water types or other reagents used in the procedure. Reference to internal SOPs may be used
3. Date of cleaning
4. Individual(s) responsible for cleaning
5. Storage conditions (i.e. wrapped in foil, boxed, etc.) shall be described (internal SOPs may be referenced)
6. Storage location for cleaned containers and equipment
7. Unique ID numbers or codes assigned to individual containers or pieces of equipment
8. The number of cleaned containers or equipment if prepared or cleaned in groups or lots (i.e., cleaned or prepared in the same session, using the same lots of cleaning materials). A group or lot number may be assigned. This code must be linked to any individual IDs (if used), the cleaning date and any sampling kit IDs and records
9. Any quality control information concerning the cleanliness of the containers and/or equipment must be retained and must be linked to the set

10. The intended end use of the equipment and/or containers shall be indicated (e.g. Teflon bailers cleaned for organics; plastic containers cleaned for metals, etc.)

7.4 Legal Chain of Custody

The laboratory will only accept responsibility for maintaining the records of the activities it performs. Sampling documentation for samples not collected or sub-contracted for collection by Heritage will be the responsibility of the sample collector.

Heritage will follow special procedures when strict Legal Chain of Custody is required. Legal Chain of Custody is a special type of sample custody in which all events associated with a specific sample must be documented in writing. Transfer of samples, subsamples, digestates or extracts to another party are subject to all of the requirements for legal chain of custody. If the sample is part of litigation, disposal of the physical sample shall occur only with the concurrence of the affected legal authority, sample data user and/or submitter of the sample. Once sample analyses are completed, the unused portion of the sample with all identifying labels are returned to the sample custodian. The returned, tagged sample is retained in the custody room until permission to destroy the sample is received by the custodian or other authority.

Records shall indicate the date of disposal, the nature of disposal (such as sample is depleted, sample disposed in hazardous waste facility, or sample returned to client), and the name of the individual who performed the task. In addition to the records described above, chain of custody records must include the following:

1. Custody seals
2. Laboratory sample storage logs that identify date, time and individuals that remove samples from storage
3. Secure, limited access storage areas
4. Errors in all documentation are deleted by drawing one line through the error writing the correction, placing the initials of the person making the change, the date of the change and the reason for the change. All documentation is recorded in indelible black ink (no other colors allowed)

7.5 Sample Labels, Seals and Chain of Custody

All sample containers will have a sample container label attached. An example of this label is shown in Figure 7.1. This label contains fields for the required information, most of which must be transferred to the chain of custody (with the exception of preservative information, which the lab may obtain from the sample label and transferred into the LIMS database). During log in all samples have a bar-code label placed on sample containers as shown in Figure 7.2. Those samples requiring Legal Chain of Custody will have a custody seal placed on the closure mechanism (prior to sampling) on the sample such that any attempt to remove the seal will be obvious. An example of this seal is shown in Figure 7.3. All samples will be accompanied by a Chain of Custody as shown in Figure 7.4 when provided by Heritage. Clients may substitute Chain of Custody forms of their own if desired. Labels and seals may utilize alternate forms containing necessary information. Sample barcode labels will be affixed so as not to cover the original client sample ID.

7.6 Field Sampling/Custody

When Legal Chain of Custody is required, the custody documentation will begin with the preparation and/or shipment of sample containers to the sampler(s). Sampling performed by Heritage may utilize the following procedure for identifying and labeling samples in the field:

Sample Prefixes

RW	=	Residential Well
MW	=	Monitoring Well
WA	=	Water, Non-Specific
SW	=	Surface Water
SD	=	Sediment (lake, ditch, river)
SL	=	Sludge
LE	=	Leachate
SS	=	Soil Sample

Sample Suffixes

DP	=	Duplicate
FB	=	Field Blank
TB	=	Trip Blank
EB	=	Equipment Blank
BG	=	Background

When samples are already sufficiently identified by type and exact location without the need of assigning an arbitrary identification, that pre-established identification will be used. Samples requiring arbitrary field number assignments may be given consecutive numbers in the following manner:

Examples:

Soil Sample #1	=	SS0001
Background Soil Sample #1	=	SS0001BG
Surface Water Sample #3	=	SW0003
Trip Blank Sample #1	=	0001TB
Surface Water Sample #3 Duplicate	=	SW0003DP

Heritage field samplers will use the field data sheets as given in Figures 7.5 through 7.8 for sampling or any forms containing equivalent information. Field records will be stored, filed and maintained by submitter (client) and project number.

7.6.1 Copies of all COC forms or sample transmittal forms shall be maintained with the field and project records

7.6.2 Entries into all field records shall be made with waterproof ink

7.6.3 Errors in all documents shall be deleted with one line through the error, initialed and dated

7.6.4 All documentation/logs shall be signed/initialed by the appropriate personnel

7.7 Sample Dispatch

Samples to be shipped by common carrier will be properly preserved and placed in a secure shipping container. All transmittal documents including the chain of custody form will be placed inside the shipping container in watertight plastic bags taped to the inside lid. Common carriers do not sign COC forms; the COC form shall indicate the name of a common carrier, when used. The shipping bill or other documents must be retained either electronically (preferred if available) or by paper receipts. All other transferor and transferee signatures associated with common carrier transfers are required. This shall include laboratory, field and other personnel releasing or accepting materials from the common carrier. The party who opens it will relinquish COC. The COC form shall indicate the date and time that the transport container was sealed for shipment. Transport containers shall be sealed with strapping tape and a tamper proof custody seal. The custody seal will be signed and dated by the person affixing the seal.

When samples are delivered by common carrier it is only necessary to sign the documents that are required by the carrier service at the time of delivery, i.e., airbills, shipping invoices, etc. Shipments are primarily sent via either United Parcel Service or Federal Express or other major carrier. These major carriers maintain electronic records and receipts that are available to the lab and all other clients. Therefore, records from major carriers are maintained electronically. If records are not available electronically, the paper copies will be retained in the case files. The remaining steps in laboratory custody will be the same regardless of whether samples arrive via common carrier, or are hand delivered.

7.8 Laboratory Custody/Receiving

Heritage has a sample acceptance policy, which is made available to clients and sample collectors. Data from any samples that do not meet the following criteria must be flagged in an unambiguous manner clearly defining the nature and substance of the variation. The following steps are taken when samples are received.

1. Examination of the outer shipping container. Note the presence or absence of custody seals, locks, evidence tape, etc.

2. Generating any log books or checklists applicable (i.e. recording all information into a central case file, if client requests such). The type and condition of the shipping container is noted on the chain of custody. All shipping containers are inspected for presence/absence and condition of (if required for the project):

   - Custody seals
   - Locks
   - Evidence tape
   - Airbill or airbill sticker numbers
   - Chain of custody forms
   - Traffic reports or SAS packing lists
   - Laboratory task orders
   - Presence of ice or temperature blanks

   The presence/absence, condition and respective numbers of these evidentiary items is recorded on the chain of custody or other sample tracking paperwork and in the LIMS system during data entry. LIMS is essentially an electronic checklist. Some clients may require a hard copy Sample Receiving Checklist, which if required will be initiated at this time. A case file is started with the paperwork and forwarded to the Project Manager when sample login is completed.

3. Removal of samples from shipping containers and inspection of any traffic reports, chain of custody documents, etc. Chain of Custody documentation should include the sample identification, the location, date and time of collection, collector's name, preservative added, sample type and any special remarks concerning the sample. If no chain of custody is received, the lab creates a chain of custody from that point forward. If preservation is not indicated on the chain of custody, it should be documented on the bottle labels at a minimum (if Heritage supplied the containers, that information will be pre-existing on the container label). It is preferred but not required that preservation be documented on the chain of custody.

4. If a chain of custody is received, it is inspected to determine the accuracy of the document (i.e. relinquishing signatures, date and time sampled, sample locations, etc.). If any discrepancies exist, they are noted on the chain of

custody and in the case or client file if applicable. If a chain of custody is not received a lab created (from the point of receipt) chain of custody will be initiated at the point it is determined the client wishes to proceed with analysis, despite qualifications to the final report.

5. Verify that complete prior identification of the analyses to be performed, including required detection limits and the analyte list for multi-analyte tests are provided. Sample parameters to be reported separately must be submitted as separate samples and identified as such. Heritage will not delete parameters after the fact, issue multiple versions of laboratory certificates, or raise detection limits after the fact unless a laboratory error led to the incorrect information. Any altered report may only be re-issued as an amended report, with the substance and nature of the amendments clearly identified.

6. Document use of preservation and sample containers (properly filled) as required by the approved test methods. Document any headspace present in volatile sample vials or any test requiring zero headspace. Any liquid samples (requiring zero headspace) with a headspace greater than or equal to 6 mm or 0.25 inches (pea size) should be rejected. Drinking water volatiles cannot have <u>any visible</u> headspace.

7. Adhere to the maximum allowable holding time prior to analysis as specified by the approved test methods.

8. Confirm adequate sample volume is available to perform the necessary analyses. Some tests with the same preservative may be analyzed from the same container if volume allows, whereas others may require their own individual bottle in order to comply with the proper containers and preservations or special detection limits. <u>Semi-volatile organic samples requiring 1-liter volumes must be supplied in sufficient numbers to allow a minimum of three liters (3, 1-liter containers) to be extracted at a 1 in 10 sample frequency.</u> Failure to provide sufficient volume <u>will</u> result in failure to meet required detection limits.

9. Inspect sample containers for any damage. If damage has occurred it is to be noted directly on the chain of custody or a sample integrity form attached to the chain of custody, and in the case file if applicable. Notify the project manager immediately to determine corrective action required. All corrective actions are recorded on the chain of custody and in the case file. If any possibility of salvage exists, broken or otherwise compromised sample containers will be referred to the client for direction. Any request from the client to test samples not meeting temperature, preservation, container and other requirements will be qualified on the paperwork and on the final Certificate of Analysis. The State of North Carolina requires written notification if sample analysis proceeds on samples not meeting temperature or preservation criteria.

10. Examine sample bottles for their agreement with the chain of custody. Each sample container should have a unique identification of the sample and a labeling system with durable labels and indelible markings.

11. The laboratory will examine samples upon receipt for thermal preservation, if applicable. The laboratory will document the results of such examinations. All samples which require thermal preservation shall be considered acceptable if:

    a) Samples are received in coolers with the presence of wet ice. In such cases, they will be marked as ROI, (received on ice) and the actual temperature will be recorded on the chain of custody and entered into the Laboratory Information Management System (LIMS) for each sample. Samples cooled during shipping only with ice packs may not be recorded as received on ice. The laboratory will record one of the following at the time of receipt:

        1) The temperature of an actual sample from each cooler/shipping container
        2) The temperature of a temperature blank shipped with the samples
        3) The temperature of the melt water in the shipping container
        4) The lab will record the presence of melt water as an indicator that an attempt was made to keep the sample cold.

    b) The North Carolina state certification program requires the use of temperature blanks (only) and notification of the agency if samples are accepted for analysis outside of criteria. Temperature must be taken and documented from temperature blanks for each sample cooler received for North Carolina and US Army Corps of Engineers samples – the temperature will be entered in LIMS and included on the Certificate of Analysis.

    c) Samples which require **thermal preservation** will be considered acceptable if :
        1) The arrival temperature is either within +/-2 °C of the required temperature of the method specified range (for samples with a specified temperature of 4 °C, samples with a temperature of 0.1 to 6 °C shall be acceptable); or
        2) If other regulatory bodies have different thermal preservation requirements such as Wisconsin, those requirements will be applied. Wisconsin's requirement is "not frozen to 4 °C"; or
        3) The samples have been hand delivered to the laboratory within six hours after collection and there is evidence, such as arrival on ice that the chilling process has begun.

    d) The temperature will be recorded on the Chain of Custody and in LIMS. Temperatures will also be included on the Certificate of Analysis (final report). NELAP accreditation standards require that if

a sample does not meet the thermal preservation requirement, the final report be qualified at a minimum. Qualification of a sample for temperature on the final report without listing a temperature is not a desirable option. Clients will be notified by sample receiving or by the client's project manager (as required), that the samples were not received at the proper temperature and will proceed as the client requests. The State of North Carolina (or any other state placing this requirement in their regulations) must be notified in writing of any North Carolina client giving approval for sample analysis when samples are not received at the proper temperature. The final Certificate of Analysis must be qualified for the variance.

12. The laboratory will examine samples for **chemical preservation** (if applicable) upon receipt or prior to or at the time of sample preparation or analysis. The laboratory will document the results of such examinations. Deviations will be recorded and reported with the final laboratory report. North Carolina is the only state to <u>require</u> that all preservation be confirmed immediately upon receipt. Additional chemical preservation will not routinely be added unless required by regulation or permitted by the client. Additional preservation will be recorded and reported with the final laboratory report. Preservation is checked according to the following protocol:

    a. Chemical preservation will be verified by the *measurement of pH* using a broad range pH paper such as Alkacid® Test Paper (or pH meter). Any sample not registering strongly acidic or strongly alkaline (as required) will be tested using narrow range pH paper (or pH meter). Disposable pipette tips or similar will be used to withdraw a drops of sample to be applied to the pH paper. If pH meters are used, enough sample will be poured or pipetted into another container for pH measurement.

    b. Chemical preservation requiring *removal of residual chlorine* will be verified by the measurement of residual chlorine from samples that have the possibility (determined from knowledge of the client's process, etc.) of the containing residual chlorine. Most samples received will clearly not contain residual chlorine, i.e. groundwater monitoring, etc. Residual chlorine will be tested using KI Starch paper. Disposable pipette tips or similar will be used to withdraw a drop of sample to be applied to the KI Starch paper.

13. When the samples do not meet the preservation and maximum holding time requirements as stated in the approved test method, the laboratory shall notify the client for further instructions before proceeding. If the sample does not meet the sample acceptance criteria listed above, the laboratory shall either:

a. Retain correspondence and records of conversations concerning the final disposition of rejected samples; or

b. Fully document any decision to proceed with the analysis of compromised samples including but not limited to:
   1) Documenting the condition of the samples in the sample tracking records on the evidentiary chain of custody or transmittal form or on the Sample Receiving Checklist form sent to the customer and laboratory receipt documents; and
   2) Appropriately qualifying the analysis data on the Certificate of Analysis.
   3) If the samples are from North Carolina, the Project Manager will write a letter to North Carolina describing the directive to proceed with analysis.

14. The analyses requested are compared to the quote for the project, the containers provided and the preservation. If the analyses to be performed are not fully specified or if the condition of the test substance does not conform to the description provided or is different from what was expected, the Project Manager is notified immediately. The Project Manager will consult the client before proceeding.

15. The laboratory will establish whether the test substance has received all necessary preparation, or whether the client requires preparation to be undertaken or arranged by Heritage.

7.9 Sample Log-In

If refrigeration is required as preservative, samples must remain cool during the entire sample log in process. Place in the refrigerator, if necessary. Those samples with a short holding time or RUSH analyses must be logged in quickly and the appropriate group leader (or designee) notified. Record short holding time tests on the Short Holding Time Tests form (or other electronic means) (See SOP OP-4.3 or subsequent updates) for all samples received with holding times of 48 hours or less. The data entry operator enters the sample ID, draws a diagonal line in each box corresponding to the test assigned and initials that box in the top (left). The lab analyst or lab group is notified of the short hold time test and initials in the bottom (right) of the box when the samples are picked up for analysis. See the Container and Preservation Chart for holding time requirements. Samples are logged into the LIMS system with the following information:

1. A computer assigned Heritage sample number. If another sample is copied or a specific quote "Z sample" is used to log in a sample, this template sample number is recorded in addition to the unique sample number.
2. Client ID. Identification of the sample for the client as it appears on the accompanying Chain of custody.

3. Project number. This project number defines a discreet project (number assigned by the lab LIMS) for a given set of samples.
4. Quote number. A Heritage quotation, a 6-digit number beginning with the letter Z.
5. Purchase Order number. A client provided billing reference number.
6. Project ID. This project ID is required only for work performed for an internal remediation and engineering customer. This number must be obtained from the sample submitter (project engineer, etc.). This is a required entry for internal accounting purposes.
7. Act. ID. This activity ID is required only for work performed for an internal remediation and engineering customer. This number must be obtained from the sample submitter (project engineer, etc.) This is a required entry for internal accounting purposes.
8. Submitter number. This is computer shorthand for the Heritage client.[1]
9. Customer Number and Name. The customer number is a required internal accounting and billing code.
10. Regulation. This field describes the environmental program area under which the sample is submitted.[1]
11. Matrix of the sample.[1] Matrix of the sample is chosen when the samples are projected by the client and entered by the Project Manager on the sample Z template. The matrix is a required entry and not all tests assigned will be appropriate or available for a particular matrix. Therefore, some samples may need to have the matrix changed to match the characteristics of the sample. The following matrix types are available in LIMS:
    - Matrix 1 – Non-specific water
    - Matrix 2 – Ground water
    - Matrix 3 – Drinking water
    - Matrix 4 – Oils
    - Matrix 5 – Soil/Sediment/Sludge
    - Matrix 6 – Non-Aqueous liquid (organic liquids)
    - Matrix 7 – Chemical Waste (product or by-product of Industrial process)
    - Matrix 8 – Air (Tedlar bags, sorbent tubes, summa canisters, Hi-Vols, impingers, etc.)
    - Matrix 9 – Swipe samples
12. Received identification. This entry identifies the staff receiving the sample;[2]
13. Date and Time Received. This entry is the date and time received as indicated on the chain of custody.
14. Lab Days. This entry states the number of days targeted for analysis;
15. Due Date. This entry gives the report due date;
16. Status. This describes the status of the sample regarding analysis and reporting;
17. Entered. This entry identifies the staff entering the sample into LIMS;[1]
18. Project Manager. This is the assigned staff person for this sample/project;

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[1]Mandatory Entry

[2]Mandatory Entry

19. Modified. This entry shows the last person to modify a sample record;
20. Complete. This field shows the date that all tests and tasks were complete in the computer system.
21. Date sampled. Information taken from the chain of custody.
22. Time sampled. Information taken from the chain of custody.
23. Sampling Procedure. Sampling procedure used, i.e., grab, composite, statistical, etc.
24. Sampler. Identity of sampling personnel.
25. Sample received within holding time? - Yes or no.
26. Sample properly preserved? - Yes or no.
27. Sample Received on Ice? - Yes or no; If the sample does not require thermal preservation, leave this field blank. If the sample requires thermal preservation and the answer to this question is NO, then additional comments may be required, including recording the actual temperature measured from a temperature blank. The recording in LIMS of an actual temperature is client and state regulatory specific. Recording YES will result in the LIMS final report to stating that the sample was "received on ice". A null entry will not print the 'on ice' comment on the final report and should be used when thermal preservation is not required for any analyte in the shipping container.
28. Sample received in proper container? - Yes or no.
29. Chain of custody received? - Yes or no; If a chain of custody was not received, the laboratory will create one from the point of receipt forward.
30. Chain of custody number, if applicable.
31. Sample Delivery Group (SDG); This number is assigned by the Document Control Officer or by the Project Manager after log-in and serves to group data packages. This number is not usually assigned until the next day.
32. Method of disposal; 1 = Dispose of after days in next field; 2 = return to client.
33. Client sample description; This can be equivalent to the location of sample collection, as known to the client.
34. Client reporting address; This is normally pre-existing on the Z sample template.
35. Sample comments to the laboratory. This field displays any general information pertinent to the sample; the metals laboratory does not read this information, therefore the information must be repeated at the test code level (metals prep and analysis).
36. Sample comments to appear on final report. If any adjustments to samples as received are made upon receipt (addition of preservative, transfer to different containers, etc.) they are noted here and will appear on the final report. If the sample does not meet the NELAC sample acceptance criteria in Quality System Standard 5.11.3.a [preservation], 5.11.3.b [results of all checks shall be recorded] or 5.11.3.c [consult client on any discrepancies and qualify report if necessary], it will be qualified on the final test report.
    Documentation should include 1) the location of sample collection, 2) date and time of sample collection, 3) collector's name, 4) preservation type, 5) sample type and, 6) any special remarks concerning the sample:

The laboratory will retain correspondence and/or records of conversations concerning the final disposition of rejected samples or fully document any decision to proceed with the analysis of compromised samples by adding qualifiers on the final report.

The qualifiers assigned include but are not limited to:

- Sample was received outside of regulatory pre-analytical holding time.
- Temperature measured upon receipt exceeds acceptable NELAC and regulatory criteria.
- Sample was received improperly preserved.
- Sample was received in improper container(s).
- Insufficient sample volume supplied to perform analysis under normal operating procedures.

Since the qualifiers are assigned to each lab sample ID, all qualifiers resulting from inspection for sample rejection are linked to the laboratory ID code (lab sample ID number).

37. Tasks assigned. Tasks are any activity or service performed which is not a test method, i.e. a special reporting package, etc.
38. Protocol. A pre-defined grouping of tests routinely requested together.
39. Tests assigned. All tests are assigned an order number in the order they are to appear on the final report. Those tests requiring a preparation step are linked together. The location where analysis will be performed, the priority of analysis and the final discounted price for the analysis also appear here. All test documentation includes the names of the analyst, reviewer, data entry person, all associated dates, run numbers, QC and results.
40. Test Comments to Lab. All information relating to each test assigned is contained in this and the next block of the LIMS system, including the actual results.
41. Comments to Appear on Final Report. Any comments relating to the individual test performed are contained in this field of the LIMS system. See number 34 above.

7.9.1 The Heritage Lab ID number links that number to the client's sample description. After the computer has assigned the Lab ID number, that number is placed on the cap (except for volatile vials) and the side of all containers. See Figure 7.2 for an example of a laboratory barcode label for incoming samples. The LIMS barcode system assigns a unique identification code to each sample container (i.e., multiple containers for a sample) received in the laboratory. The laboratory maintains an unequivocal link with the unique field ID code assigned each container (again by the LIMS barcode system) that the laboratory sent to the client. The laboratory cannot assign a field ID code to containers it did not send to the client.

7.9.2 The laboratory ID code entered into the laboratory records is used as the link that associates the sample with related laboratory activities such as sample preparation or calibration.

7.10 Sample Storage

All samples are stored in a secured area and are accessible only to authorized personnel. Samples are to be placed in their appropriate storage area specific to the analysis to be performed. Analysts will be notified immediately of samples received with extremely short holding times, so that analysis may be performed immediately. All sample storage areas are accessible only to Heritage staff. Sample digestates and extracts will be stored in a cooler (with the exception of metals digestates) and are accessible only to Heritage staff. These digestates and extracts will also be signed in and out of storage when Legal Chain of Custody is required (see Section 7.4).

Standards are stored separately from samples and Volatile Organic Compound (VOC) samples are segregated from other samples. All concentrated wastes (i.e. waste solvents, etc.) will be segregated from low-level environmental samples. Some non-volatile sample extracts and standards may be stored in the large walk-in cooler where semi-volatile samples are kept. Samples are segregated from any extracts or standards in the cooler. Incompatible analyses are separated so that the potential for sample contamination is eliminated.

Samples containing volatile organics or those being analyzed for volatile organics are most susceptible to cross-contamination (without direct contact). Volatile organic samples are segregated in different coolers according to their type (water, soil, non-aqueous liquids, etc.) and expected concentration. No solvents (except methanol), food or other contamination sources are allowed in the VOC sample coolers. VOC cooler holding blanks are kept in each cooler and are analyzed every two weeks (by 25 ml purge SW846-8260B or similar low level method) or sooner if contamination is suspected.

7.10.1 The laboratory has a system for uniquely identifying the items to be tested, to ensure that there can be no confusion regarding the identity of such items at any time. This system includes identification for all samples, sub-samples and subsequent extracts or digestates by affixing the laboratory ID code to same. In addition, the sample digestates, extracts etc. are segregated in each laboratory group to preclude any confusion. The analysts perform this function.

7.11 Log-In Accuracy

As a crosscheck for data entry, all paperwork is reviewed against the information entered into the LIMS system either by an assisting data entry operator, their supervisor or a Project Manager. This paperwork is retained on file. Project paperwork is forwarded to the project manager for the samples received as a further check on accuracy and as a means for project management. The assigned Project Manager checks a log audit report from the LIMS system daily. This log audit report becomes part of the data package for any US Army Corps projects.

7.12 Project Schedules

Incoming samples are scheduled by sales and/or project management staff. A request to send containers, ("Z" template samples) is forwarded to the sample shipping/receiving area, where they are matched with incoming samples/projects.

Once samples are logged into the LIMS system, the work assignments will appear on an analyst's worklist according to a pre-assigned list of tests per work group. These work lists are generated and distributed daily. Analysts receive worklists as needed (bi-weekly at a minimum) which lists when the samples are due, sorted by the maximum allowable holding time from the date sampled. This helps to insure that all samples are analyzed within holding time. Analysis within holding time takes precedence over RUSH analysis requests. As work assignments are completed, they are reviewed by individual group leaders and then sent to data entry to be given the status of complete in LIMS upon completion of data entry.

7.13 Inter and Intra-Lab Shipping & Sub-contracting

When it is necessary or desirable to sub-contract analytical work to another laboratory, it is crucial that the sub-contract analytical laboratory is approved and qualified, holds the required accreditations and that they are given complete instructions and information regarding the sample(s) and analysis. The information required includes the list of analytes and the methods required for analysis. Project Managers must obtain verification of the required accreditation and written quotations, including charges for any required data packages. NELAC accredited laboratories are required to obtain written authorization from a client prior to sub-contracting of any of the client's samples for analysis.

The QA Unit must approve all analytical sub-contract laboratories used. Every attempt will be made to utilize NELAC accredited laboratories (for tests that NELAC accredits) for subcontracted analytical services. When a subcontractor is not accredited by A2LA or another organization recognized as equivalent, the laboratory should record its assessment of that laboratory's capability to meet ISO-17025 requirements on a requirement-by-requirement basis.

The laboratory will advise the client in writing of its intention to sub-contract any portion of the testing to another party. This may be done on the quotation to the client or may be in the form of a fax or letter or documented in an accepted proposal for analytical services, which will be maintained in the client files for documentation of notice. Subcontracting is permitted only when certifications, client Data Quality Objectives and/or contractual requirements are not prohibitive (e.g. CLP). A sub-contract analytical laboratory must have the following information on file with the QA Unit. The following are not requirements for non-analytical services such as field sample collection.

1. List or copy of Accreditations Held. NELAC or A2LA and/or other accredited status (audited/applied?).
2. Copy of Quality Manual (may be electronic format) or a Statement of Qualifications & Experience..
3. MDL (s) and Demonstrations of Capability for the test being contracted if the analytical method requires this demonstration (not required for bacteriological testing).
4. SOP (s) for the test being contracted, if required by the client.

Item #2, 3 and #4 above (or whatever tests a subcontract lab may do for Heritage) are not required if the lab has NELAC, A2LA or ISO-9001 accreditation.

Chain of custody procedures will be used for all sample shipments. All shipments of samples are recorded in a logbook containing:

1. Shipping date.
2. Lab sample ID numbers.
3. Field sample ID numbers.
4. Collection date and time.
5. Requested analyses.
6. Date of sample preparation (if any).
7. Client.
8. Carrier ID and shipping paper ID.
9. Destination.

Field sampling vendors (hired by the laboratory) must be evaluated and approved based on the following criteria:

1. Past history with the vendor providing consistent, high quality service.
2. Evaluation of credentials and evidence of past experience sampling.

All evaluations of vendors must be documented.

7.14 Documentation of Sample Disposition

All samples and laboratory waste are disposed of in adherence with all environmental regulations. The sample custodian or his/her designee documents sample disposition in the LIMS system. Refer to Section 8.0, Analytical Procedures for further details of Sample and Waste Disposal.

7.15 Electronic Data Records (LIMS)

Heritage utilizes a computerized Laboratory Information Management System (LIMS) to track samples, temporarily store data for integrated and/or electronic reporting, and to perform calculations as part of data reduction. Details on the use and functions of the LIMS are contained in laboratory SOP DD-16.0, Use of the Laboratory Information Management System.

This LIMS system (hardware and software) is maintained and operated by a professional staff of computer programmers, analysts and operators under the direction of a data processing manager. Laboratory management approves all LIMS policies, procedures and operations. The operating system used is UNIX® and the database program used is ORACLE®. The computer and automated equipment is maintained to ensure proper functioning and provide environmental and operating conditions necessary to maintain the integrity of calibration and test data.

7.15.1 Security System

Sections 8.1 through 8.11 of the EPA Document "2185 – Good Automated Laboratory Practices" (1995), is the standard used for microprocessors, computers and the LIMS system. In particular, procedures and practices for making changes to LIMS Raw Data are documented and provide evidence of change, preserve the original recorded documentation, are dated, indicate the reason for the change, identify the person who made the change and, if different, the person who authorized the change. The procedures are included in the laboratory's SOPs, which are reviewed periodically for continued accuracy and acceptance.

LIMS security is maintained on three levels: system resource access, information access and information manipulation access. The data base administrator (DBA) maintains the security system. Management approves all security policies and procedures. Access to information is given on a need to know basis only, and is granted according to job function. Inactive or terminated users are immediately removed from the system. All system users receive training appropriate to their job function prior to gaining access to the information.

Access to computer system resources is restricted through the assignment of a user specific login id and a confidential password to each user. No system resources are available to a user without the appropriate login id and password. This information is kept confidential and passwords are regularly modified.

Users are classified according to job function. This limits the users' access to information not specific or required for the performance of their duties. Once a user gains access to system resources as described above, the user is presented with a restricted view of all of the information available according to his/her user classification.

Data manipulation is also controlled by the user classification. For specific job functions, users may have the ability to view only, create, modify, and/or delete specific information. Users may have multiple capabilities custom tailored to their job function. As with system access, information access and manipulation is maintained by the DBA.

Once all tests on a sample are completed, the sample status becomes "released". This "released" status (8) will not allow any data manipulation except by laboratory QA staff.

7.15.2 Analytical Records Management

All raw analytical data is stored as the original hard copy. Hard copy information includes:

1. Chain of Custody and/or Sample Submission Forms.
2. Analytical Bench Sheets and Log Books.
3. Instrument Printouts and Chromatograms.

All hard copy information is uniquely identified for control purposes. Sample preparation procedures and final results are documented on forms containing all pertinent information and comments, including analyst and reviewer initials. Those forms are specific to the test being performed. Tests, which are directly downloaded into the LIMS system from the instrument, are reviewed and approved before release to LIMS; the hardcopy instrument readout is filed for reference.

Analytical records maintained in the LIMS are only temporarily stored for integrated or electronic reporting. Information may be entered into LIMS in two ways, direct computer transfer and manual data entry. Both data entry procedures are quality assured by checking the computerized information against the hard copy or the electronic output from the other computer.

7.15.3 Electronic Data Transfer

Electronic Data Transfer (EDT) may be utilized to facilitate the integration of the laboratory information with a client's own data management system. All hard copy information (i.e. Certificate of Analysis, QA Summary Report) is distributed to the client to provide source documentation for validation of information electronically transferred. A data transfer log is maintained of all electronic transfers indicating the client, date and time of transfer and the file id and contents description. Electronic copies of all information transferred are also maintained on file.

In addition to the full test report (Certificate of Analysis) and specifically formatted electronic reports, clients may access the Heritage Environmental Information System (EIS). EIS is a web-based application that provides customer queried information on-screen and downloadable to Microsoft Excel©. The system allows for electronic communication with Heritage staff as well as starting business processes on-line. The net result is a simple, reliable and rapid tool that responds to our customers' needs.

Each user of EIS will have their own user name and password and must log into the system before performing any transactions. Heritage will perform random security checks on users. Laboratory data within two hours of LIMS data entry will be posted and available to authorized clients EIS.

7.15.4 Software Documentation

The lab maintains a listing of computer software with a description of the software's intended use in the laboratory. LIMS software is documented as necessary for the proper development and maintenance of the programs. Software modifications, problems and/or failures are documented using a

System Support Request (SSR) form submitted to the data processing department. The programming staff on a priority basis manages all SSR's. Original program documentation and modifications are documented within the program logic or data structure itself. Summaries of modifications are communicated to the users using Software Maintenance Bulletins (SMB).

7.15.5 Software/Hardware Validation

All software is functionally validated including the integrity of data entry or capture, data storage, data transmission and data processing before use by the programming staff. Once software is put into production, it has essentially passed all preliminary validation criteria. Validation criteria include manual validation of calculations and manual validation of translation from data storage to report (data entry or capture). All software is re-validated following modification.

Hardware validation is accomplished using the hardware vendor's own internal checking mechanisms. No additional hardware validations are performed.

Figure 7.1

CONTAINER LABEL

1L AMBER GLASS	Na2SO3
SAMPLE ID	
DATE SAMPLED	TIME SAMPLED
SVL	
Z130461	HERITAGE

Figure 7.2

BAR-CODE LABEL

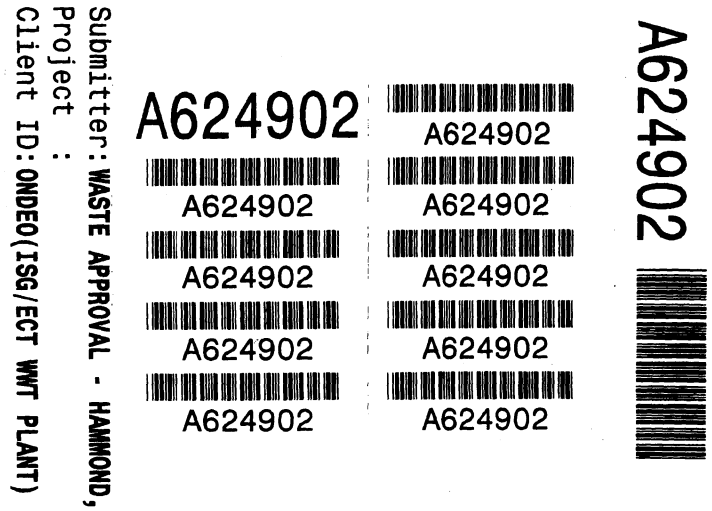

Figure 7.3

CUSTODY SEAL

EVIDENCE

DO NOT OPEN **DO NOT OPEN**

INITIALS_____
DATE_____

Figure 7.4
CHAIN OF CUSTODY

TO ENSURE PROPER HANDLING OF SAMPLES PLEASE COMPLETE THE SHADED AREAS OF THIS FORM

HERITAGE ENVIRONMENTAL SERVICES, LLC.
COMMERCIAL LABORATORY OPERATIONS
7901 West Morris Street Indianapolis IN 46231
www.heritage-enviro.com (800)827-4374 Fax: (317) 486-5095

I - 11750

Customer name/number: | Submitter #:
Project Name:
Z Quote No: (Given to you by your contact)
PO No. or Project/Activity ID:
PRINT HERITAGE TSR NAME:

CUSTOMER STATUS: New / Existing
If no previous credit has been established with Heritage, **prepayment** (check,VISA,etc) is required at the time of sample submittal to the laboratory.

Sampled By:

Analyses Requested
(Note special detection limits or methods)

Send Report To:
Co:
Add:
Attn:
Phone: ( ) Yes
Fax: ( )
E-mail:

Sample Turn Around Time
Standard:_____ Rush Date____/____/____
Mo Day Yr
(Accelerated TAT subject to Additional Charge)
(Date must be Accepted and Approved by Lab)

Date Sampled	Time sampled	Comp	Grab	Sample ID and/or Location where your sample was taken	Sample type (Matrix): DW, GW, WW, Soil, Oil, Sludge, Swipe, Other	Number of Containers										Remarks:	Lab use only Sample No.
	AM PM																
	AM PM																
	AM PM																
	AM PM																
	AM PM																
	AM PM																
	AM PM																
	AM PM																
	AM PM																
	AM PM																

Relinquished by: (Signature)	Date/Time /	Received by: (Signature)	
Relinquished by: (Signature)	Date/Time /	Received by: (Signature)	
Relinquished by: (Signature)	Date/Time /	Received by: (Signature)	
Received for Lab by: (Signature)	Date	Temp. °C	
	Time	ROI: Yes / No	

Distribution: White original and Yellow copies to accompany sample to the laboratory.
Pink copy to be retained by the client.

Laboratory use only	Yes	No
Custody seals present/intact?		
Broken containers?		
COC agree with sample labels?		
Correct containers for testing?		
Headspace issues acceptable?		
Holding time(s) acceptable?		
Preservative pH's acceptable?		
Was pH left unadjusted?		

Comments:

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GREGB

Microsoft Word - gabFIG7.5.doc
04/25/03 10:00 AM

Rename
Fig~~ure~~ 7.5.doc

Figure 7.5

SAMPLE DETAIL

Sample ID _____

Field Test Performed	Result
_____	_____
_____	_____

Sample Types (circle all applicable)

Mon. Well	Lagoon	Ash	Indus. Waste
Res. Well	Leachate	Soil	Waste Pile
Creek	Oil	Sludge	Solid
Ditch	Solvent	Sand	Liquid
Truck	Drum	other_____	
Blank (Equip./Trip)		Duplicate (of_____)	
Background			

Sample Date: __-__-__ Time: __:__ AM/PM

Containers	#
1 L plastic	_____
1 L glass	_____
500 ml glass	_____
40 ml vial	_____
_____	_____

Preservatives Added	
H_2SO_4	_____
HNO_3	_____
NaOH	_____
Zn-Acetate	_____
HCl	_____
Sample Iced	
No preservatives used for non-aqueous samples	_____

Additional Sample Location Information:_____

_____

Additional Sample Type Information/Observations: (depth taken, color, odor, size, clarity, density, suspended solids, colloidal, etc.)_____

_____

Deviations From Sampling Plan:_____

_____

Sampling Equipment Used:_____

_____

Sampler Signature _____
Date _____

Figure 7.6

SAMPLE PROJECT SUMMARY

SAMPLING PROJECT SUMMARY

Submitter: _____
Site Contact: _____
Site Identification: _____
Project Number: _____ **Z Numbers:** _____
Samplers: _____
Sampling Date: _____
Weather Conditions: _____
Sample Iced? YES NO
Preservative Used? YES NO If Yes, Preservative Used Lot #

_____ _____

_____ _____

Sample Types (circle):

Lagoon	Ash	Indus Waste	Ditch
Leachate	Soil	Waste Pile	Creek
Sludge	Solvent	Solid	Liquid
Oil	Sand	Drummed Waste	Truck
Res. Well	other _____		

Sample Plan Review: grab/composite statistical/random/judgmental
Information on equipment used, facility type, products made, etc.

_____
_____
_____

Decontamination Procedures Used: _____
_____
_____

Equipment is (dedicated/decontaminated) **Source of decon. water** _____
Source of blank reagent water _____

Miscellaneous:
Photos taken? YES NO
Environmental Program:

RCRA	CERCLA	SOLID WASTE	UST
NPDES	IWP	SURFACE WATER	
DISPOSAL	SDWA	CWA	
OTHER _____			

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Figure 7.7
EQUIPMENT DECONTAMINATION PROCEDURES

EQUIPMENT DECONTAMINATION PROCEDURES

Specific Procedures Utilized to Decontaminate Equipment for this Event:

Date(s) _____

Time(s) _____

SOP(s) used _____

Figure 7.8

FIELD INFORMATION LOG

Facility:_____ Heritage Lab ID:_____

Location:_____ Sample Point ID:_____

Sample Matrix:_____ Field Representative:_____

Gascope Calibration: % Gas_____ % LEL:_____
Gascope Reading: % Gas_____ % LEL:_____

PURGE INFORMATION:

Method of Well Purge:_____ Dedicated: Y / N

Date / Time Initiated:_____ One (1) Casing Volume, Gal:_____

Initital Water Level, Feet:_____ Total Volume Purged, Gal:_____

Ground Water Elevation, MSL:_____ Was Well Purged to Dryness:_____

Well Total Depth, Feet:_____ Water Level After Purge, Feet:_____

Casing Diameter, Inches:_____ Date / Time Completed:_____

PURGE DATA:

Time	Purge Rate (gpm/htz)	Cumulative Volume	Temp C	pH (s.u.)	Conduct. (umhos/cm)	Turb. (NTU)	Other ( )

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Figure 7.8

INFORMATION LOG (continued)

SAMPLING INFORMATION:

Method of Sampling:_____ Sample Point ID:_____
Water Level @ Sampling, Feet:_____ Dedicated: Y / N
Parameters: Annual ( ) Semi-Annual ( ) Quarterly ( ) Monthly ( ) Other ( )

SAMPLING DATA:

Date / Time	Sample Rate	Temp C	pH (s.u.)	Conduct. umhos/cm	Turb. NTU	Other ( )
	VOA					
	Other					

INSTRUMENT CHECK DATA:

Turbidity Seal #: _____ _____NTU std. = ____NTU _____NTU std. = _____NTU
pH Serial # :_____ 4.0 std. = _____ 7.0 std. = _____ 10 std. = _____
Conductivity Serial # :_____ ___uhmos/cm = _____ ___uhmos/cm =_____

GENERAL INFORMATION:

Weather Conditions @ time of sampling:_____
Sample Characteristics:_____

ANALYTE COLLECTION ORDER, CONTAINERS, PRESERVATIVES, AND TESTS PERFORMED:_____

COMMENTS AND OBSERVATIONS:_____

I certify that sampling procedures were in accordance with all applicable EPA, State and GM protocols.

Date: _/ /_ By:_____ Company:_____

8.0 Analytical Procedures

8.1 Introduction

Heritage uses EPA approved analytical methods appropriate for the regulatory program, sample type and DQO's. Table 8.1 lists current EPA approved methods, respective Heritage test codes, Heritage SOP (Standard Operating Procedure) numbers per matrix specific with any applicable prep codes or clean-ups. The routine analytical methods used and their analyte lists are given in Section 5.0. Tables 8.2 and 8.3 list the approved methods and references for the various types of matrices commonly encountered. If a client requests a method not listed in these tables, a full method validation package consisting of an initial demonstration of capability; a written SOP and Method Detection Limit (MDL) study, must be prepared before any analyses are reported for that method. If accreditation for the method is required, application is made to the proper authority. Any listed method without an approved SOP is not valid under this QA Plan.

Many of the USEPA Contract Lab Program (CLP) methods are very similar if not identical to RCRA methods with the exception of the reporting forms and the QA protocols required. Commercial clients requesting a particular CLP SOW may opt upon consultation with Heritage to accept different analytical reporting and QA protocols, which do not compromise the data, produced, but may not include all of the CLP forms, documentation and QA protocols. Samples analyzed under contract will be fully compliant with all contract requirements (not CLP requirements unless so stipulated).

It is the policy of Heritage Environmental Services, to use the most current, cost effective and state of the art methods. In all cases, whenever possible such methods will be employed. For example, ICP or ICP/MS methods will be employed in place of graphite furnace Atomic Absorption (GFAA).

8.2 Contract Review (Physical Facilities)

The laboratory has established and maintains procedures for contract review and for the coordination of these activities. A proposed contract or project is reviewed in staff meetings and or other personal communications/consultations. The review ensures that the laboratory has the appropriate facilities and resources before commencing such work. Record of such review is maintained in the client file, along with all correspondence between the laboratory and clients. Frequently, such review is also indicated by laboratory signature on the project specific Quality Assurance Project Plan (QAPjP) which details the technical requirements.

Each contract is reviewed to ensure that
a) the requirements are adequately defined and documented.
b) any requirements differing from those in the tender are resolved.
c) the laboratory has the capability to meet contractual requirements.

Contracts are reviewed based on Contract Review Ground Rules, a document containing a checklist found on the Heritage Intranet. The **"Request for Legal Review"** form may be used in order to outline questions/issues that arise -- this

will prevent the need to find the details in the contract once the request is received. The request will be forwarded to the Heritage legal department. In addition, this request form includes a checklist that should be completed (prior to submitting the form) to ensure an initial evaluation of the "Contract Review Ground Rules" has been performed.

8.3 Standard Operating Procedures

In order to obtain reliable results, adherence to prescribed analytical methodology is required. In any operation that is performed on a repetitive basis, reproducibility is best accomplished through the use of Standard Operating Procedures (SOPs). A SOP is a written document that provides directions for the step-by-step execution of an operation, analysis or action that is commonly accepted as the method for performing certain routine or repetitive tasks.

It is necessary that every aspect of an analysis or study (every step in the sample trail) be linked by one or more SOPs. Heritage has adopted a formal written SOP program for all procedures. Every SOP is to be written according to the guidelines given in the Heritage Environmental Services, LLC. "Standard Operating Procedure for the Development and Maintenance of Standard Operating Procedures". This *SOP for SOPs* will change over time and existing SOPs will be *grandfathered.* The *grandfathered* SOPs will be revised to conform to those changes normally only on the basis of content, not form. Minor changes to SOPs are effected by use of the SOP amendment addendum.

Management must approve all SOPs and distribution is strictly controlled, which precludes the use of outdated or inappropriate SOPs. Copies of all SOPs that have been replaced and retired are collected and destroyed upon their retirement. A signed master (original) copy will be maintained in archives for a minimum of 10 years. A computer accessed Intranet may be used for SOPs in lieu of signed paper copies, but document control will be maintained, clearly indicating the time period during which a procedure or document was in force.

SOPs prepared will be clear, comprehensive, up-to-date and sufficiently detailed to permit duplication of results by qualified analysts. In addition, all SOPs will be:

1. Consistent with current EPA regulations, guidelines and contract requirements.

2. Consistent with instrument manufacturer's specific instruction manuals.

3. Available to clients and regulatory personnel during On-Site Laboratory Evaluations. A complete set of SOPs shall be bound together and available for inspection at such evaluations.

4. Capable of providing for the development of documentation that is sufficiently complete to record the performance of all tasks required by the protocol.

5. Capable of demonstrating the validity of data reported.

6. Capable of describing the corrective measures and feedback mechanism utilized when analytical results do not meet protocol requirements.

7. Reviewed regularly and updated as necessary when contracts, facility, or procedural modifications are made.

8. Archived for future reference in usability or evidentiary situations; and,

9. Available at specific work stations as appropriate.

10. All SOPs will be document controlled. Changes to documents shall be reviewed and approved by the same function that performed the original review, unless specifically designated otherwise. The designated personnel shall have access to pertinent background information upon which to base their review and approval.

11. Where practicable, the altered or new text shall be identified in the document or the appropriate attachments.

12. Procedures shall be established to describe how changes in documents maintained in computerized systems are made and controlled.

13. All SOPs will contain a minimum of three authorizing signatures: originating author, lab management and lab Quality Assurance. The signature of the laboratory director will be the effective date for any SOP. Refer to the SOP for SOPs for detailed information.

8.3.1 Documented Sampling Techniques

SOPs must be in place and followed for sampling techniques and methodology as well as for sample control (including chain of custody).

8.3.2 Documented Analytical Methods

Routine analytical methods must be documented in a Standard Operating Procedure (SOP). Reference can be made to published methods, but are not a substitute for methods written specific to Heritage.

The QA Officer, QA Unit, Laboratory Director or Senior Chemist must approve modifications to methods or non-standard methods before use. Analytical methods in use must have a method detection limit established and documented. Any modified method will be reported with a comment indicating modifications. Documentation of any modifications or clarifications to the approved test method are indicated in the SOPs for any routine modification. All concerned staff will be notified of any method modifications or non-standard methods.

8.3.3 Equipment Calibration

Calibration or USEPA standards and their verification standards shall be traceable to NIST wherever possible or to another reliable source which the QA Unit may determine.

Calibration must be documented and this documentation will include:

1. Date(s) of calibration
2. Identification of standards used.
3. Results of calibration (raw data and summary statistics).
4. Corrective actions taken.

8.4 Training and Training Documentation

Heritage Laboratories must have a SOP for training and for training documentation. Personnel performing tasks in the laboratory shall be competent on the basis of appropriate education, training and/or experience. Training needs have been assessed and job requirements determined, for all positions, see Appendix E, Job Descriptions. This QAP is primarily established to document and detail the quality system, which training is a part. Additionally, to satisfy the requirement of ANSI/ISO 14001 –1996, Environmental Management Systems, all laboratory employees will be aware of:

1. The importance of conformance with the environmental policy and procedures and with the requirements of the environmental management system.
2. The significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance.
3. Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the environmental management system, including emergency preparedness and response requirements.
4. The potential consequences of departure from specified operating procedures.

The areas of potential impact to the environment relating to laboratory activities and services performed are:

1. Accuracy of results of analytical samples submitted for analysis.
2. Disposal of laboratory wastes.
3. Pollution prevention and waste minimization.

8.4.1 Requirements for specific laboratory testing techniques

Requirements for specific laboratory testing techniques are also detailed, in Section 3.1, Personnel. Training shall continue, according to written procedures, to keep all personnel aware of new methods and technologies. Attendance at symposia, training courses, and further formal education is encouraged. Training which has been completed must be documented for

each employee and kept as a part of the training records. Refer to Appendix H, Training Forms for "example" training documentation forms.

All individual training files will contain a job description that is signed by the employee and a current resume summarizing applicable training and experience/qualifications. No analyst will be permitted to perform a test procedure unsupervised until proper training and documentation of training has occurred.

8.4.2 Initial Demonstration of Method Performance

Prior to acceptance and institution of any test method, satisfactory demonstration of method capability is required of each analyst. A demonstration of capability must be completed each time there is a significant change in instrument type, personnel, or test method. The procedure for the Demonstration of Capability is detailed in Appendix C of the NELAC Quality Systems, Revision 12.1, July 1, 1999. In general, this demonstration does not test the performance of the method in real world samples, but in the applicable and available clean matrix (a sample of a matrix in which no target analytes or interferences are present at concentrations that impact the results of a specific test method), e.g., water, solids, biological tissue and air.

Heritage will use reagent water for the Initial and Continuing Demonstrations. In addition, for analytes that do not lend themselves to spiking, the demonstration of capability may be performed using quality control samples.

In laboratories with a specialized "work cell(s)" (a group consisting of analysts with specifically defined tasks that together perform the test method), the group as a unit must meet the above criteria and this demonstration of capability must be fully documented.

When a work cell(s) is employed, and the members of the cell change, the new employee(s) must work with experienced analyst(s) in the specialty area and this new work cell must demonstrate acceptable performance through acceptable continuing performance checks (appropriate sections of Appendix D, such as laboratory control samples). Such performance must be documented and the four preparation batches following the change in personnel must not result in the failure of any batch acceptance criteria, e.g., method blank and laboratory control sample, or the demonstration of capability must be repeated. In addition, if the entire work cell is changed/replaced, the work cell must repeat the demonstration of capability (Appendix C). When a work cell(s) is employed, the performance of the group must be linked to the training record of the individual members of the work cell.

The work cell concept, if employed for any group will be stated in an internal Standard Operating Procedure. Refer to Heritage SOP LO-14.1, Training And Qualifications and subsequent updates for additional information.

8.4.3 Continuing Demonstration of Method Performance

Thereafter, continuing demonstration of method performance, as per the quality control requirements in Appendix D of the NELAC Quality Systems, Revision 12.1, July 1, 1999 (such as laboratory control samples) is required. In all cases, the appropriate forms such as the Certification Statement (Appendix C) must be completed and retained by the laboratory to be made available upon request. All associated supporting data necessary to reproduce the analytical results summarized in the Certification Statement must be retained by the laboratory. (See NELAC Appendix C for Certification Statement.) Refer to Heritage SOP LO-18.0, Analyst Continuing Demonstration of Method Performance and subsequent updates for additional information.

A continuing demonstration of capability must be completed once per year (method to be used will be given in an internal Standard Operating Procedure) by at least one of the following ways:

8.4.3.1 Acceptable performance of a blind sample (single blind to the analyst).

8.4.3.2 Another demonstration of capability.

8.4.3.3 Successful analysis of a blind performance sample on a similar test method using the same technology (e.g., GC/MS volatiles by purge and trap for Methods 524.2, 624 or 5035/8260B) would only require documentation for one of the test methods.

8.4.3.4 At least four consecutive laboratory control samples with acceptable levels of precision and accuracy.

8.4.3.5 If the above cannot be performed, analysis of authentic samples that have been analyzed by another trained analyst with statistically indistinguishable results.

8.5 Laboratory Glassware Cleaning

8.5.1 Laboratory Glassware Cleaning procedures are detailed in a Heritage SOP titled Washing and Storing Glassware and Other Laboratory Equipment, SOP-0P-2.1 and subsequent updates.

8.5.2 Dishwasher Protocols are detailed in a Heritage SOP titled Metals Glassware Cleaning (Automated), SOP-AM-214.0 and subsequent updates.

8.5.3 Metals Analyses

A significant amount of glassware cleaning has been eliminated with the usage of disposable vessels and the HotBlock® Digestion system. Whatever glassware is used may be segregated in the metals section according to the following categories as required to avoid cross contamination:

1. ICP water samples
2. GFAA water samples
3. ICP/MS water samples
4. Solid samples and/or non-water matrices

5. Routine Mercury samples
6. Low Level Mercury samples

8.5.4 Extractable Organics

1. Wash with hot soapy water, taking care to not scratch w/brush.
2. Sonicate small pieces if necessary to remove all residues.
3. Rinse with hot tap water.
4. Rinse three times with DI water.
5. Air dry, or rinse with ACS Reagent Grade Acetone.
6. Rinse with Pesticide grade Methylene Chloride.
7. Store with clean glassware in a dust free environment or cap with aluminum foil.
8. Rinse with the solvent used for analysis immediately before use.

Note: Keep all plastics away from glassware.

8.5.5 Volatile/Purgeable Organics

Purge vessels are washed in hot soapy water and rinsed with hot tap water and DI water after each use unless there are no detectable analytes or to remove inorganic residues. Purge vessels are replaced in the same positions after cleaning; therefore, carryover from high concentration samples can be easily detected.

Volumetric glassware, syringes, etc. (i.e. used in standard preparation) are cleaned according to the following protocol:

1. Rinsed three times with tap water.
2. Rinse three times with Milli-Q (or equivalent) water.
3. Micro-syringes rinsed five times with methanol.
4. Placed in storage at room temperature until use.

8.5.6 Classics/Nutrients (General Chemistry)

1. Wash with a hot micro-soap solution, taking care not to scratch with the brush.
2. Rinse three times with hot tap water.
3. If glassware is to be used for TKN or Total Phosphorus, rinse with 1+1 HCl.
4. Rinse three times with DI water.
5. Air dry.
6. Store with clean glassware in a dust free environment or cap with aluminum foil.
7. Rinse with the solvent used for analysis, if applicable.
8. Refer to specific SOPs for special decontamination procedures for distillation apparatuses, etc.

8.6 Reagent and Standard Storage

All reagents and analytical standards received into the laboratory will be labeled with the date received and the expiration date. The label will also contain a space for "first opened". All reagents and analytical standards will be delivered to the appropriate group, who will store them as appropriate.

Some bulk reagents such as acids and solvents will be delivered in large cases that may be stored until use in the storeroom. The laboratory Receiving Department will be responsible for labeling the date of receipt on the outside of the un-opened case of bulk reagents. Any containers that have been opened may no longer remain in the storeroom on open shelves, and must be moved to the designated storage cabinets. All chemicals will be stored under temperature and humidity controlled conditions.

8.7 Reagent Water

Documentation shall be maintained on all sources of analyte-free water. This documentation shall include records on all maintenance, cartridge-changing and miscellaneous tasks performed for upkeep or repair of the system and all routine QC analysis protocols specifically scheduled and performed to monitor the system. Records must be maintained which identify the source and the specific use of analyte-free water that is obtained from commercial vendors.

8.8 Sample and Waste Disposal

It is the policy of Heritage Commercial Laboratory to minimize the amount of waste generated from lab operations and to comply with all regulations concerning its safe and proper handling and disposal. Clients are requested to deliver the minimum amount of material necessary for performing testing and to notify the lab about issues impacting proper sample disposal. Chemicals, reagents, standards and stock solutions are purchased in quantities that minimize the amount left after expiration. Samples and waste products are segregated by waste type, characteristics and compatibility to minimize hazardous waste generation and are handled as outlined below. See the facility specific Waste Management SOP's for more detail.

Heritage has an Environmental Management System registered to the ISO-14001 standard. The system is in place and the laboratory adheres to the requirements of the standard.

All conditions of disposal and all correspondence between all parties concerning the final disposition of the physical sample are recorded and retained. Records indicate the date of disposal, the nature of disposal (such as sample depleted, sample disposed in hazardous waste facility, or sample returned to client) and the name of the individual who performed the task.

8.8.1 **Sample Disposal**:

Samples are held for 15 days after analysis is complete unless extended storage has been pre-arranged with the client. If the sample is part of litigation, disposal of the physical sample shall occur only with the concurrence of the affected legal authority, sample data user and/or

submitter of the sample. Sample and waste disposal is handled three ways: on-site disposal, off-site disposal and return to the client.

8.8.1.1 Return to the Client - Clients may request that a sample be returned after analysis is complete. Samples will be returned by common carrier or the client may pick them up. Samples that exhibit certain characteristics for which an appropriate disposal outlet is not available must be returned to the generator for disposal.

8.8.1.2 On-site Sample Disposal - Non-hazardous water samples which can be discharged to the POTW are poured down the drain. This includes small quantities of dilute (<10%) acidic, caustic and neutral water samples which contain insignificant non-hazardous levels of metals and/or organics. Used sample containers are emptied; labels are removed, rinsed and disposed in the trash. Rinsed glass containers may be saved for off-site recycling.

8.8.1.3 Off-Site Sample Disposal - All hazardous water samples and all oil and solid samples are segregated by hazard class and waste type. They are then bulked or stored in their original container for lab packing. An approved contractor is used to transport and dispose of the bulked or lab packed wastes. Documentation of off-site disposal consists of manifesting all sample and waste products and completion of any other disposal contractor requirements.

8.8.2 **Lab Waste Disposal:**
In addition to samples, several individual waste streams consisting of reagents, reference materials, contaminated materials and/or sample processing and spill cleanup waste have been identified and each is handled appropriately.

8.8.2.1 General sample processing waste - This category includes autosampler vials, disposable pipettes, weigh boats, spill cleanup materials, tongue blades, gloves, absorbents and any other disposal equipment which is contaminated with a hazardous sample or chemical. Each item is individually evaluated, segregated by hazard class, compatibility and waste type and is bulked or lab packed for disposal off-site.

8.8.2.2 Concentrated Acid/Caustic wastes - Sample processing and spill cleanup waste, samples, standards, reagents, and stock solutions containing concentrated acids or caustics (>10%) are segregated by hazard class, waste type and compatibility and are bulked or lab packed for disposal off-site. Where appropriate, they may also be neutralized to an appropriate pH with liquids disposed down the drain and solids in the trash.

8.8.2.3 Chlorinated solvent wastes - Sample processing and spill cleanup waste, samples, standards, reagents, reclaimed solvents and stock solutions consisting of chlorinated solvents or other solvents

contaminated with significant quantities of hazardous chemicals are segregated by hazard class, waste type and compatibility and are bulked or lab packed for disposal off-site.

8.8.2.4 Mercury wastes - Broken mercury thermometers, sample processing and spill cleanup waste, samples, standards, reagents and stock solutions containing or contaminated with mercury or elemental mercury at >260 ppm are segregated by hazard class, waste type and compatibility and are bulked or lab packed for disposal off-site or for reclamation.

8.8.2.5 PCB wastes - Samples, standards, reagents, stock solutions and sample processing and spill cleanup wastes containing or contaminated with PCB's are segregated by hazard class and compatibility and are bulked or lab packed for disposal off-site.

8.8.2.6 Lab trash and debris - Lab trash, including paper towels, weigh boats, disposal pipettes, tongue blades, gloves and other plastic, paper and glass disposal items which have not come into contact with and are not contaminated by hazardous chemicals or samples are disposed of in the trash.

8.8.3 Disposal of Expired Standards

Organic expired standards are disposed in the same manner and concurrent with the disposal of sample extracts (bulk drum disposal). Expired metals standards are added to the waste acid accumulated for disposal. General chemistry expired standards (typically very small volume of remaining standard) are disposed of by slowly pouring down the drain with copious amounts of water.

8.9. Modified Methods

All modifications to approved analytical methods are made only when an equivalent analytical procedure does not exist for samples of a particular matrix.

Table 8.1
Approved Methods and References for Analysis

INORGANIC CHEMISTRY							
Analyte Group	Reference Method	HES test code	matrix	HES SOP analysis	prep	clean-up	last update
Acidity	EPA 305.1	G606.2	W, GW, DW S/S/S	AM-126.0	NA	NA	11-26-02
Acidity (Leachate)	EPA 305.1	G606.9	S/S/S	AM-126.0	NA	NA	11-26-02
Alkalinity (Bicarbonate)	EPA 330.5	G609.0	W, GW, DW, S/S/S	AM-130.0	NA	NA	11-26-02
Alkalinity (Carbonate)	EPA 310.1	G611.2	W, GW, DW, S/S/S	AM-130.0	NA	NA	11-26-02
Alkalinity (Leachate)	EPA 310.1	G605.9	S/S/S	AM-130.0	NA	NA	11-26-02
Alkalinity (Phenolphthalein)	EPA 310.1	G612.2	W, GW, DW, S/S/S	AM-130.0	NA	NA	11-26-02
Alkalinity, Total	EPA 310.1	G604.7	W, GW, DW, S/S/S	AM-130.0	NA	NA	11-26-02
Alkalinity, Total (Automated)	EPA 310.2	G605.3	W, GW, DW, S/S/S	AM-130.0	NA	NA	11-26-02
Alkalinity, Total (Titration)	SM 2320B 18TH ED	G605.4	W, GW, DW	AM-130.0	NA	NA	11-26-02
Ion Chromatography	SW846-9056	G310.0	S/S/S	AM142.3	NA	NA	3-5-01
Asbestos (Polarized Light Microscopy)	NVLAP 18-A01	G616.0	S/S/S	*	*	*	*
Asbestos (Transmission Electron Microscope)	CLPOLM0183-043	G615.0	W, GW, DW, S/S/S	*	*	*	*
Biological Oxygen Demand (BOD)	EPA 405.1	G801.4	W, GW, S/S/S	AM 150.1	NA	NA	11-25-02
Biological Oxygen Demand, Nitrification Inhibited (CBOD)	SM 5210 18TH ED	G805.0	W, GW, DW	AM 150.1	NA	NA	11-25-02
Boiling Point, Initial	ASTMD-86	G519.0	W, OIL, S/S/S	**	**	**	**

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	matrix	HES SOP Analysis	[illegible]	[illegible]	[illegible]
Bromide by Ion Chromatography	EPA 300.0	G300.4	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Bromide by Ion Chromatography	SW846-9056	G310.4	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Bromide by Ion Chromatography	SM4110B 18TH ED	G320.4	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Carbon Dioxide	EPA 310.1	G620.0	W, GW, DW	**	**	**	**
Cation Exchange Capacity (CEC)	AOAC 57-3	G612.0	S/S/S	**	**	**	**
Cetane Index	ASTM D-976	G523.0	OIL	**	**	**	**
Chemical Oxygen Demand (Low-Level Colorimetric)	EPA 410.4	G301.1	W, GW, DW, S/S/S	AM 151.1	NA	see SOP	4-9-02
Chemical Oxygen Demand (High-Level Titrimetric)	EPA 410.3	G303.3	W, S/S/S	AM 151.1	NA	see SOP	4-9-02
Chloride , Colorimetric (Automated)	SW846-9251	G102.1	W, GW, DW, S/S/S	AM-129.0	NA	NA	1-17-02
Chloride by Ion Chromatography	EPA 300.0	G300.2	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Chloride by Ion Chromatography	SW846-9056	G310.2	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Chloride by Ion Chromatography	SM4110B 18TH ED	G320.2	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Chloride, Leachate (Automated)	EPA 325.1	G102.9	S/S/S	AM-129.0	NA	NA	1-17-02
Chloride, Colorimetric (Automated)	EPA 325.2***	G102.7	W, GW, DW, S/S/S	AM-129.0	NA	NA	1-17-02
Chlorine Demand (Starch-Iodine Titration)	SAS	G302.2	W, GW, DW, S/S/S	**	**	**	**
Chlorine, Residual	EPA 330.5	G103.6	W, GW, DW, S/S/S	GEN 14.0	NA	NA	10/10/95

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	Matrix	HES SOP Analysis	[illegible]	[illegible]	[illegible]
Chlorine, Residual DPD Method	SM 4500-CL G	G103.7	W, GW, DW	GEN 14.0	NA	NA	10/10/95
Chlorine, Total (Oil)	ASTM D-808 MOD	G516.0	OIL, S/S/S	**	**	**	**
Cloud Point	ASTM 2500	G524.0	OIL	**	**	**	**
Coating Density	ASTM 1475	G530.1	OIL, S/S/S	**	**	**	**
Coliform Bacteria (Fecal)	APHA 909C MOD	G803.0	W, GW, DW, S/S/S	*	*	*	*
Coliform Bacteria (Fecal)	SAS	G806.0	W, GW, DW	*	*	*	*
Coliform Bacteria (Total)	APHA 909A MOD	G802.0	W, GW, DW, S/S/S	*	*	*	*
Color (Colorimetric-Platinum-Cobalt)	EPA 110.2	G601.4	W, GW, DW	AM 107.1	NA	NA	11-27-02
Cyanide, Amenable Aqueous Extractable	SAS	G114.4	S/S/S	AM-128.4	P111.2	NA	3-19-03
Cyanide, Amenable to Chlorination (Manual)	EPA 335.1	G111.2	W, OIL, S/S/S	AM 128.4	NA	NA	3-19-03
Cyanide, Amenable to Chlorination (Automated)	EPA 335.1	G111.3	W, OIL, S/S/S	AM 128.4	P111.2	NA	3-19-03
Cyanide, Amenable to Chlorination (Automated)	SW846-9012	G111.4	W, GW, OIL, S/S/S	AM 128.4	P111.4	NA	3-19-03
Cyanide, Amenable to Chlorination (Automated)	SM 4500-CN-G	G111.5	W, GW, OIL, S/S/S	AM 128.4	P111.2/ P111.4	NA	3-19-03
Cyanide, Amenable to Chlorination (Manual)	SM 4500-CN-G	G111.6	W, GW, DW, OIL, S/S/S	AM 128.4	NA	NA	3-19-03
Cyanide, Total (Automated)	EPA 335.4	G101.0	W, GW,DW	AM 128.4	NA	NA	3-19-03
Cyanide, Total (Automated)	EPA 335.3	G101.3	W, GW, DW, OIL, S/S/S	AM 128.4	NA	NA	3-19-03

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	matrix	HES SOP analysis	prep	clean-up	last update
Cyanide, Total (Automated)	SW846-9012	G101.4	W, GW, DW, OIL, S/S/S	AM 128.4	NA	NA	3-19-03
Cyanide, Total (Automated) CLP	ILM03	G901.4	W, GW, DW, OIL, S/S/S	AM 128.4	NA	NA	3-19-03
Cyanide, Leachate (Automated)	SW846-9012A	G101.5	W, S/S/S	AM 128.4	NA	NA	3-19-03
Cyanide, Total Available	SW 7.3.3.2	G115.1/ G115.3	W, S/S/S	AM-140.1	NA	NA	2-11-94
Cyanide, Weak Acid Dissociable	SM-4500-CN.I	G118.1	W, GW, DW, OIL, S/S/S	AM 128.3	NA	NA	8/28/98
Density	ASTM D-70	G513.0	OIL, S/S/S	**	**	**	**
Dispersion	SAS	G526.0	W, OIL, S/S/S	**	**	**	**
Flash Point, Cleveland Open Cup	ASTM D-92	G515.9	W, OIL, S/S/S	**	**	**	**
Flash Point, Open Cup-solids	ASTM D-92	G515.1	OIL, S/S/S	**	**	**	**
Flash Point by Pensky-Martens Closed Tester	ASTM D-93	G509.9	W, OIL, S/S/S	AM-111.0	**	**	10-12-93
Fluoride by Ion Chromatography	EPA 300.0	G300.1	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Fluoride by Ion Chromatography	SW846-9056	G310.1	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Fluoride by Ion Chromatography	SM4110B 18TH ED	G320.1	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Fluoride (Ion Selective Electrode)	EPA 340.2	G104.4	W, GW, DW, S/S/S	AM-132.1	AM-131.1	NA	3-11-02
Fluoride, Leachate	EPA 340.2	G104.5	S/S/S	AM-132.1	AM-131.1	NA	3-11-02
Fluoride (Ion Selective Electrode)	SM 4500F-C 18TH ED	G104.6	W, GW, DW	AM-132.1	AM-131.1	NA	3-11-02

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES Method	Matrix	HES SOP Analyst	[illegible]	[illegible]	[illegible]
Formaldehyde	NIOSH P & CAM 125	G902.0	W, GW, DW, S/S/S	**	**	**	**
Groundwater Monitoring Well Data	SAS	G600.0	W, GW	**	**	**	**
Gravity, API 60 F	ASTM D-287	G511.0	OIL, S/S/S	**	**	**	**
Hardness	SM 2340B 18TH ED	G608.0	W, GW, DW, S/S/S	AM 227.0		NA	9-27-99
Hardness EDTA titrimetric	EPA 130.2	G621.0	W, GW, DW	IP	IP	IP	IP
Heat of Combustion (BTU)	ASTM D-240	G507.0	W, OIL, S/S/S	AM 180.0	NA	NA	2/12/96
Heterotrophic Plate Count	SM 9215 18TH ED	G921.5	W, DW, S/S/S	*	*	*	*
Hexavalent Chromium (Colorimetric)	SW846-7196A	M110.6	W, GW, OIL, S/S/S	AM 116.2	NA	NA	11-18-02
Hexavalent Chromium (Colorimetric)	SM 3500 CRD	M410.6	W, GW, DW, S/S/S	AM 116.2	NA	NA	11-18-02
Ignitability, Liquid	SW846-1010	G509.0	W, OIL, S/S/S	AM 111.0	NA	NA	10/12/93
Ignitability of Solids	SW846-1030	G515.2	S/S/S	AM 113.0	NA	NA	9/22/98
Ignitability (Solids Assessment)	SAS	G515.0	S/S/S	AM 112.1	NA	NA	2/14/94
Ignitability (Solids Assessment) Exposure to Flame	ASTM 4982A	G515.7	W, OIL, S/S/S	AM 112.1	NA	NA	2/14/94
Ignitability (Solids Assessment) Exposure to Spark	ASTM D-4982B	G515.5	OIL, S/S/S	AM 112.1	NA	NA	2/14/94
Iodide by Ion Chromatography	EPA 300.0	G300.8	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Iodide by Ion Chromatography	SW846-9056	G310.8	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	matrix	HES SOP analysis	prep	clean-up	last update
Iodide by Ion Chromatography	SM4110B 18TH ED	G320.8	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Ion Chromatography Scan	EPA 300.0	G300.0	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Ion Chromatography Scan	SW846-9056	G310.0	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Ion Chromatography Scan	SM4110B 18TH ED	G320.0	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
IR Scan	SAS	G517.0	W, DW, OIL, S/S/S	**	**	**	**
Langelier Saturation Index[1]	SM 203 16TH ED	G109.9	W, GW, DW	**	**	**	**
Langelier Saturation Index[1]	LANGELIER	G623.0	W, OIL, S/S/S	**	**	**	**
Membrane Filter Technique for coliform Bacteria	SM 9222D 18TH ED	G803.2	W, GW, DW, S/S/S	*	*	*	*
Mineral Acids by Ion Chromatography	SW846-9056	G311.0	W, GW, DW, OIL, S/S/S	AM 142.3	NA	NA	3-5-01
Moisture, Ash & Organic Matter of Peat & Other Organic Soils	ASTM D 2974-87	G407.0	S/S/S	**	**	**	**
Multiple Tube Fermentation for Coliform Bacteria	SM 9221 18TH ED	G803.8	W, GW, DW	*	*	*	*
Nitrate-Nitrite by Ion Chromatography	EPA 300.0	G300.9	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Nitrate-Nitrite by Ion Chromatography	SW846-9056	G310.9	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Nitrate-Nitrite by Ion Chromatography	SM4110B 18TH ED	G320.9	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Nitrate-Nitrogen by Ion Chromatography	EPA 300.0	G330.5	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Nitrate-Nitrogen by Ion Chromatography	SW846-9056	G310.5	W, GW, DW, S/S/S	AM 142.0	NA	NA	1/25/96

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	[illegible]	HES SOP [illegible]	[illegible]	[illegible]	[illegible]
Nitrate-Nitrogen by Ion Chromatography	SM4110B 18TH ED	G320.5	W, GW, DW, S/S/S	AM 142.0	NA	NA	1/25/96
Nitrogen, Ammonia	EPA 350.3	G203.4	W, GW, DW, OIL, S/S/S	AM-135.0	AM-133.0	NA	3-15-02
Nitrogen, Ammonia (Leachate)	EPA 350.3	G203.5	S/S/S	AM-135.0	AM-133.0	NA	3-15-02
Nitrogen, Nitrate (Colorimetric Automated)	EPA 353.1/ 353.2	G106.3/ G106.4	W, GW, DW, S/S/S	AM-136.1	NA	NA	11-7-01
Nitrogen, Nitrate-Nitrate	EPA 353.2	G113.3	W, GW, DW, S/S/S	AM-136.1	NA	NA	11-7-01
Nitrogen-Nitrite (Colorimetric Automated)	EPA 353.2	G107.3	W, GW, DW, OIL, S/S/S	AM-136.1	NA	NA	11-7-01
Nitrogen, Total Organic (Calculation)	EPA 351.3	G201.0	W, GW, DW, OIL, S/S/S	AM-134.0	NA	NA	10-3-01
Nitrogen, Total Kjeldahl (TKN), Ion Selective Electrode	EPA 351.4	G202.6	W, GW, DW, S/S/S	AM-134.0	NA	NA	10-3-01
Nitrite-Nitrogen by Ion Chromatography	EPA 300.0	G300.3	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Nitrite-Nitrogen by Ion Chromatography	SW846-9056	G310.3	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Nitrite-Nitrogen by Ion Chromatography	SM4110B 18TH ED	G320.3	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Nuisance Dust (Total)	NIOSH 500	G903.0	S/S/S	**	**	**	**
Odor	SM 2150b 18th ED	G140.2	W, GW, DW	**	**	**	**
Odor, Threshold	EPA 140.1	G140.1	W, GW, DW	**	**	**	**
Oil & Grease – Hexane Extractable Material (HEM)	EPA 1664A	G166.0, G166.1	W, GW	AM-162.1 (SPE only in-house)	NA	NA	9-17-01
Oil & Grease, Separatory Funnel Extraction (IR Analysis)	SM 5520C 18TH ED	G501.3	W, S/S/S	*	NA		

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	matrix	HES SOP analysis	prep	clean-up	last update
Oxidation-Reduction Potential	SM 2580B 18TH ED	G604.6	W, GW, DW	**	**	**	**
Paint Filter Test	SW846-9095	G103.1	S/S/S	AM 225.0	NA	NA	9/29/98
Particle Size (Hydrometer Method)	ASTM D-422-63	G540.0	S/S/S	**	**	**	**
Percent Ash (Residue)	ASTM D-482	G407.7	W, OIL, S/S/S	**	**	**	**
Percent Bottom Sediment and water	ASTM D-96	G510.0	W, OIL, S/S/S	**	**	**	**
Percent Hydrofluoric Acid	SAS	G527.0	W, S/S/S	AM-142.3	**	**	3-5-01
Percent Moisture	SAS (EPA 160.3)	G401.9	OIL, S/S/S	AM-104.0	NA	NA	2-10-94
Percent Nitric Acid	SAS	G528.0	S/S/S	AM-142.3	**	**	3-5-01
Percent Oil by Centrifuge	ASTM D-96	G502.0	W, OIL, S/S/S	**	**	**	**
Percent Solids by Centrifuge	ASTM D-96	G504.0	OIL, S/S/S	**	**	**	**
Percent Water by Centrifuge	ASTM D-96	G503.0	W, OIL, S/S/S	**	**	**	**
Percent Water Karl Fischer Titration	ASTM 1744	G906.0	W, OIL, S/S/S	**	**	**	**
Percent Water (Xylene Trap)	ASTM D-95	G503.5	W, OIL, S/S/S	AM 181.0	NA	NA	2/7/96
Petroleum Hydrocarbons (IR)	EPA 418.1	G518.0	W, GW, DW	*	NA	NA	*
pH (Aqueous)	EPA 150.1	G607.4	W, GW, DW, S/S/S	AM 206.1	NA	NA	4-19-97
pH (Aqueous)	SW846-9040A	G607.5	W, GW,D W, OIL, S/S/S	AM 206.1	NA	NA	4-19-97

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES Methods	Matrix	HES SOP analysis	[illegible]	[illegible]	[illegible]
pH, Electrometric Measurement in Calcareous Solids	SW846-9045B	G624.1	S/S/S	AM 206.1	NA	NA	4-19-97
pH (Leachate)	SW846-9040A	G624.9	S/S/S	AM 206.1	NA	NA	4-19-97
pH (Paper Method)	SW846-9041A	G607.6	W, OIL, S/S/S	AM 206.1	NA	NA	4-19-97
pH (S/S/S)	SW846-9045B	G624.0	OIL, S/S/S	AM 206.1	NA	NA	4-19-97
Phenol Analysis (Automated)	EPA 420.0	O405.9	W, GW, DW, OIL, S/S/S	AM-155.1	NA	NA	4-18-03
Phenol Analysis (Leachate)	SW846-9066	O405.8	S/S/S	AM-155.1	NA	NA	4-18-03
Phenol Analysis (Automated)	SW846-9066	O405.7	W, GW, DW, OIL, S/S/S	AM-155.1	NA	NA	4-18-03
Phosphorus, Ortho (Automated)	EPA 365.1	G207.3	W, GW, DW, S/S/S	AM-137.0	NA	see SOP	11-17-01
Phosphorus, Ortho by Ion Chromatography	EPA 300.0	G300.6	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Phosphorus, Ortho by Ion Chromatography	SW846-9056	G310.6	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Phosphorus, Ortho by Ion Chromatography	SM4110B 18TH ED	G320.6	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Phosphorus, Total (Automated)	EPA 365.1	G207.2	W, GW, DW, OIL, S/S/S	AM-138.0	NA	see SOP	4-17-02
Pour Point	ASTM D-97	G512.0	OIL, S/S/S	**	**	**	**
Reid Vapor Pressure	ASTMD-323	G514.0	OIL, S/S/S	**	**	**	**
Settleable Matter (IMHOFF CONE)	EPA 160.5	G406.0	W, GW, S/S/S	AM-109.0	NA	NA	1-18-02
Silica (Dissolved)	EPA 370.1	G618.0	W, GW, DW, S/S/S	**	IP	IP	IP

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	Matrix	HESSOP Reference	[illegible]	[illegible]	[illegible]
Solids, Dissolved	EPA 160.1	G402.7	W, GW,D W, S/S/S	AM 102.1	NA	NA	9-12-01
Solids, Dissolved (Leachate)	EPA 160.1	G402.8	S/S/S	AM 102.1	NA	NA	9-12-01
Solids, Percent	APHA 209A	G504.6	W, OIL, S/S/S	AM 104.1	NA	NA	9-13-01
Solids, Percent (insoluble in Trichloroethene)	ASTM D-2042	G504.5	W, OIL, S/S/S	**	**	**	**
Solids, Percent (Solubility)	ASTM D-2042	G504.9	OIL, S/S/S	**	**	**	**
Solids, Total	EPA 160.3	G401.7	W, GW, DW, OIL, S/S/S	AM 104.1	NA	NA	9-13-01
Solids, Total Dissolved	SM2540C 18th ED	G402.9	W, GW, DW	AM 102.1	NA	NA	9-12-01
Solids, Total Suspended	EPA 160.2	G403.7	W, GW, DW, S/S/S	AM 103.1	NA	NA	5-10-01
Solids, Total Suspended @pH 11	SAS	G403.6	W, S/S/S	AM 103.1	NA	NA	5-10-01
Solids, Total Volatile @550 C	EPA 160.4	G404.7	W, OIL, S/S/S	AM 108.1	NA	NA	1-22-02
Solids, Volatile Suspended @550 C	EPA 160.4	G405.7	W, GW, S/S/S	AM 108.1	NA	NA	1-22-02
Specific Conductance	EPA 120.1	G604.3	W, GW, DW	AM 101.1	NA	NA	11-27-02
Specific Conductance	SW846-9050	G604.4	W, GW, DW, S/S/S	AM 101.1	NA	NA	11-27-02
Specific Conductance	SM 2510B 18TH ED	G604.5	W, GW, DW	AM 101.	NA	NA	11-27-02
Specific Gravity	ASTM D-244	G506.0	W, GW, OIL, S/S/S	**	**	**	**
Specific Gravity, Solids	SM 2710F 18TH ED	G506.1	W, S/S/S	AM 106.0	NA	NA	3/28/95

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES Method	[illegible]	HES SOP analysis	[illegible]	[illegible]	[illegible]
Sulfate by Ion Chromatography	EPA 300.0	G300.7	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Sulfate by Ion Chromatography	SW846-9056	G310.7	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Sulfate by Ion Chromatography	SM4110B 18TH ED	G320.7	W, GW, DW, S/S/S	AM 142.3	NA	NA	3-5-01
Sulfate, Leachate	SW846-9038	G108.7	S/S/S	AM 139.1	NA	NA	11-25-02
Sulfate (Turbidimetric)	EPA 375.4	G108.5	W, GW, DW, S/S/S	AM 139.1	NA	NA	11-25-02
Sulfate (Turbidimetric)	SW846-9038	G108.6	W, GW, DW, S/S/S	AM 139.1	NA	NA	11-25-02
Sulfite (Titrimetric)	EPA 377.1	G109.2	W, GW, DW, S/S/S	**	**	**	**
Sulfide (Titrimetric Iodine)	EPA 376.1	G110.3	W, GW, DW, S/S/S	GEN 30.0	P116.2	NA	12/10/93
Sulfide	SW846-9030A	G110.4	W, GW, DW, OIL, S/S/S	GEN 30.0	P116.2	NA	12/10/93
Sulfide, Leachate	SW846-9030A	G110.5	W, GW, S/S/S	GEN 30.0	P116.2	NA	12/10/93
Sulfur	ASTM D 4294-98	G508.1	W, DW, OIL, S/S/S	**	**	**	**
Surfactants MBAS)	EPA 425.1	G208.5	W, GW, DW, S/S/S	AM-152.0	NA	see SOP	5-9-02
Temperature	EPA 170.1	G603.4	W, GW, DW	**	**	**	**
Total Carbon	SAS	G410.1	W, OIL, S/S/S	AM 158.0	NA	NA	1/26/95
Total Inorganic Carbon	SAS	G401.2	W, GW, DW, OIL, S/S/S	AM 158.3	NA	NA	11-19-02
Total Petroleum Hydrocarbons (TPH), Separatory Funnel Extraction	SM 5520F	G502.8	W, GW, DW, OIL, S/S/S	*	NA	NA	*

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	[illegible] matrix	HES SOP [illegible]	[illegible]	[illegible]	[illegible]
Turbidity (Nephelometric)	EPA 180.1	GG602.5	W, GW, DW	AM 105.2	NA	NA	DRAFT
Turbidity (Nephelometric) MOD	EPA 180.1	G602.6	W, GW, DW	AM 105.1	NA	NA	
Waste Compatibility	SAS	G999.0	S/S/S	**	**	**	**
Water Solubility	SAS	G535.0	W, S/S/S	**	**	**	**
Viscosity, Brookfield	ASTM D-2196	G505.2	OIL, S/S/S	**	**	**	**
Viscosity, Saybolt Universal @100 F	ASTM D-445	G505.0	W, OIL, S/S/S	**	**	**	**
Viscosity, Saybolt Furol @122 F	ASTM d-244	G505.1	OIL, S/S/S	**	**	**	**
Volatile Acids	SM 504B	G501.1	W, S/S/S	**	**	**	**
Volatile Solids	EPA 160.4	G404.7	W, GW, DW	AM-108.1	NA	NA	1-22-02
METALS							
Metals: **ICP**	EPA 200.7	M400's	W, GW, DW, OIL, S/S/S	AM 209.3	NA	see SOP	9-6-02
Metals: **ICP**	SW846-6010	M100's	W, GW, DW, OIL, S/S/S	AM 209.3	NA	see SOP	9-6-02
Metals: **GFAA**	EPA 200 Series	M300'S / M400'S	W, GW, DW, OIL, S/S/S	AM 221.0	NA	see SOP	4/14/94
Metals: **GFAA**	SW846-7000 Series	M100'S	W, GW, DW, OIL, S/S/S	AM 221.0	NA	see SOP	4/14/94
Metals: **ICP (200.7 CLP-M)**	CLP SOW	M500'S / M900'S	W, GW, DW, OIL, S/S/S	AM 209.3	NA	see SOP	9-6-02
Metals: **GFAA (CLP-M)**	CLP SOW	M500'S / M900'S	W, GW, DW, OIL, S/S/S	see SOW	see SOW	see SOW	see SOW
Mercury **Manual CVAA (245.1 CLP-M) (water)**	CLP SOW	M520.2 / M920.2	W, GW, DW	see SOW	see SOP	see SOW	see SOW

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	matrix	HES SOP analysis	[illegible]	[illegible]	[illegible]
Mercury **Manual CVAA (245.5 CLP-M) (solids)**	CLP SOW	M520.2 / M920.2	OIL, S/S/S	see SOW	see SOW	see SOW	see SOW
Mercury **CVAA Manual**	SW846-7470	M120.1	W, GW, DW, OIL, S/S/S	AM 215.1	AM 205.1	see SOP	4-3-03
Mercury **CVAA Manual**	EPA 245.1	M420.2	W, GW, DW	AM 215.1	AM 205.1	see SOP	4-3-03
Mercury **CVAA Manual**	SW846-7471	M420.2	OIL, S/S/S	AM 215.1	AM 205.1	see SOP	4-3-03
Mercury **CVAA Manual**	EPA 245.5	M420.1	OIL, S/S/S	AM 215.1	AM 205.1	see SOP	4-3-03
Mercury, **CVAFS (Low-Level)**	EPA 1631, Rev. E	M420.3	W, GW, DW	IP	P131.3 (prep code)	NA	IP
All Metals, (North Carolina Groundwater Only)	SM 3030C (PREP)	P129.1	GW	AM 222.1	NA	NA	2/17/95
Metals: **ICP/MS**	SW846-6020 EPA 200.8	V100's, V400's,V600's, V700's	W,GW,DW,S/S/S	AM 226.3	See SOP	See SOP	3-7-03
Metals: X-Ray Fluorescence (Non-Regulatory)	ASTM D-5839	M001.2	Oil, S/S/S	**	**	**	**
ORGANICS							
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD)	EPA 613	O525.3	W, S/S/S	*	*	*	*
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD)	EPA 613	O525.4	W, GW, S/S/S	*	*	*	*
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD)	CLP SOW 8/88	O525.5	W, S/S/S	*	*	*	*
2,3,7,8-TCDD by GC/HRMS (Isotope Dilution)	EPA 1613	O525.6	W, DW	*	*	*	*
Acrylamide by HPLC	SW846-8316	O616.1	W, S/S/S	AM 300.0	see SOP	see SOP	6/4/92
Alcohols by GC:FID	SW846-8015B	O490.0	W, GW, DW, OIL, S/S/S	AM 304.1	see SOP	see SOP	10/9/96
Alcohols by GC:FID	SW846-1311	O490.8	W, S/S/S	AM304.1	see SOP	see SOP	10/9/96

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	[illegible]	HES SOP [illegible]	[illegible]	[illegible]	[illegible]
Alcohols by GC:FID	SW846-8015B	O491.0	W, OIL, S/S/S	AM 304.1	see SOP	see SOP	10/9/96
Boiling Range Distribution of Petroleum Fractions by GC	ASTM D 2887-MOD	O409.7	W, GW, OIL, S/S/S	AM 23.1	see SOP	see SOP	10/9/96
Chlorinated Herbicide Acids	EPA 515.1	O250.1	W, GW, DW	AM 422.0	see SOP	see SOP	2/7/95
Chlorinated Herbicide Acids (2,4-D, Silvex/ 2,4,5-T)	SW846-8151A	O253.1	W, GW, DW, S/S/S	AM425.0	see SOP	see SOP	3-24-00
Chlorinated Hydrocarbons by GC:ECD	SW846-8121	O456.1	W, GW, DW, OIL, S/S/S	IP	IP	IP	IP
Chlorinated Hydrocarbons by GC:ECD	SW846-8181 MOD	O522.6	OIL, S/S/S	IP	IP	IP	IP
Diesel Range Organics (DRO) by GC/FID	SW846-8015B	O409.8	W, GW, DW, OIL, S/S/S	AM 308.1	see SOP	see SOP	7/27/98
Diesel Range Organics (Wisconsin DNR MOD)	DRO	O409.5	W, S/S/S	AM 308.1	see SOP	see SOP	7/27/98
Diquat in Drinking Water by Liquid/Solid Extraction by HPLC	EPA 549.2	O549.0	W, GW, DW	AM301.3	see SOP	see SOP	11-26-02
Endothall by GC/MS	EPA 548.2	O548.1	W, GW, DW	AM548.2	See SOP	See SOP	10-22-02
Chloral Hydrate by GC/ECD	EPA 551.1	O551.1	W,GW,DW	**	**	NA	**
Haloacetic Acids (HAA's) by GC/ECD	EPA 552.2	O552.0	W,GW,DW	AM-428.0	See SOP	NA	1-4-02
Ethylene Dibromide and Dibromochloropropane (EDB & DBCP)	EPA 504.1	O425.1	W, GW, DW	AM-426.1	NA	see SOP	3-5-01
Extractable Organic Halides (EOX)	SW846-9020B	O404.1	W, OIL, S/S/S	AM 157.1	see SOP	see SOP	3/26/98
Gasoline Range Organics (GRO) by P&T GC/FID	SW846-8015B	O409.9	W, GW, DW, OIL, S/S/S	AM 316.0	See SOP	See SOP	5/18/99
Gasoline Scan by GC/FID	SW846-8000B	O409.2	W, GW, S/S/S	AM 23.2	see SOP	see SOP	11/5/98

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES Method	[illegible]	HESSOP Manual	[illegible]	[illegible]	[illegible]
Gasoline Scan by GC/PID	SW846-8000B	O463.1	W, GW, S/S/S	AM 23.2	see SOP	see SOP	11/5/98
GC/FID Miscellaneous Analysis	SW846-8000B	O410.0	W, GW, OIL, S/S/S	AM 23.2	see SOP	see SOP	11/5/98
GC/FID Miscellaneous Analysis	SW846-8015B MOD	O410.2	W, GW, S/S/S	AM 23.2	see SOP	see SOP	11/5/98
GC/MS Miscellaneous	SAS	O510.4	W, GW, OIL, S/S/S	IP	IP	IP	IP
Glyphosate in Drinking Water by HPLC	EPA 547	O547.0	W, GW, DW	AM 305.2	see SOP	NA	11-26-02
Halogenated and Aromatic Volatile Organics by GC/PID ELCD	EPA 601 / EPA 602 MOD	O461.0	W, GW, DW, S/S/S	AM 319.0	see SOP	see SOP	
Halogenated and Aromatic Volatile Organics by GC/PID ELCD	SW846-8021B	O461.1	W, GW, DW, OIL, S/S/S	AM 22.1	see SOP	NA	1/19/00
Halogenated Volatile Organics by GC:ELCD	SW846-8010B	O459.2	W, GW, OIL, S/S/S	AM 22.1	see SOP	NA	1/19/00
Carbamates by HPLC	EPA 531.1	O605.0	W, GW, DW	AM 306.1	see SOP	NA	11-26-02
HPLC, N-Methylcarbamates by	SW846-8318	O605.0	W, GW, DW, OIL, S/S/S	AM 318.0	see SOP	NA	11-27-02
Hydrocarbon Scan by GC/FID	SW846-8000A	O409.0	W, GW, OIL, S/S/S	AM 23.2	see SOP	see SOP	3/14/94
Hydrocarbon Scan by GC/FID	SW846-8015A MOD	O409.1	W, GW, DW, OIL, S/S/S	AM 23.2	see SOP	see SOP	11/5/98
IDEM Semi-Volatile Organics Target Compound List	SW846-8270C	O531.1	W, GW, DW, OIL, S/S/S	AM 505.6	see SOP	see SOP	11-15-01
IDEM Volatile Organics Target Compound List	SW86-8240B	O530.1	W, GW, DW, OIL, S/S/S	AM 507.0	see SOP	see SOP	8-20-99
Nitroaromatics by GC:ECD	EPA 609.0	O609.0	W, GW	**	**	**	**
Nitrosamines	EPA 607	O479.0	W, GW	**	**	**	**

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	Matrix	HES SOP number	Prep	Clean-up	last update
Explosives (Nitroaromatics and Nitrosamines) by HPLC (rev1)	SW846-8330	O833.1	W, GW, S/S/S	AM 314.0	See SOP	See SOP	11/18/98
Nitrogen and Phosphorus containing Pesticides by GC:NPD	EPA 507	O428.1	W, GW, DW	AM 24.1	see SOP	see SOP	11/21/97
Organochlorine Pesticides by GC:ECD	EPA 508	O427.0	W, GW, DW	AM 424.0	see SOP	see SOP	1-28-00
Organochlorine Pesticides by GC:ECD	EPA 608	O164.9	W, GW, DW, S/S/S	AM 423.0	see SOP	see SOP	1-28-00
PCB Aroclors by Gas Chromatography/ECD	SW846-8082A	O301.7	W, GW, DW, S/S/S	AM 420.3	See SOP	See SOP	1/26/00
Organochlorine Pesticides by GC:ECD (4 Pesticides)	SW846-8081A	O164.2	W, GW, DW, S/S/S	AM 421.1	see SOP	see SOP	1/19/00
Organochlorine Pesticides by GC:ECD (7 Pesticides)	SW846-8081A	O164.3	W, GW, S/S/S	AM 421.1	see SOP	See SOP	1/19/00
Organochlorine Pesticides by GC:ECD	SW846-8081A	O164.4	W, GW, OIL, S/S/S	AM 421.1	see SOP	see SOP	1/19/00
Organochline Pesticides and PCBs in Water/Wastewater by GC:ECD	EPA 508	O427.1	W, GW, DW	AM 424.0	see SOP	see SOP	1-28-00
Organochlorine Pesticides and PCBs in Water/Wastewater	EPA 608	O305.0	W, GW, DW, S/S/S	AM 423.0	see SOP	see SOP	1-28-00
Organophosphorus Pesticides by GC/NPD (Capillary Column)	SW846-8141A	O480.1	W, GW, DW, OIL, S/S/S	AM 24.1	see SOP	see SOP	11/21/97
Pesticides/PCB Organics (CLP)	OLM01	O903.2	W, GW, S/S/S	AM 421.1	see SOP	see SOP	1/19/00
Pesticides/PCB Organics (CLP)	OLC01	O903.4	W, GW, S/S/S	AM 421.1	see SOP	see SOP	1/19/00
Petroleum Hydrocarbon Scan by GC/FID	SAS	O409.3	W, OIL, S/S/S	AM 23.1	see SOP	see SOP	11/12/96
PCB/Pesticide Scan GC:ECD	SW846-8081A	O305.1	W, GW, OIL, S/S/S	AM 421.1	see SOP	see SOP	1/19/00
PCB Analysis GC/ECD	Total Calculation	O301.3	W, GW, DW, OIL, S/S/S	AM 420.1	see SOP	see SOP	5/31/96

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HESS [illegible]	[illegible]	HESS SOP [illegible]	[illegible]	[illegible]	[illegible]
Polychlorinated Dibenzo-P-Dioxins and Dibenzofurans	SW846-8280A	O519.3	W, GW, S/S/S	*	*	*	*
Polychlorinated Biphenyls (PCSs)	EPA 608	O301.1	W, GW, DW, OIL, S/S/S	AM 423.0	see SOP	see SOP	1-28-00
Polychlorinated Biphenyls (PCSs)	SW846-8081A	O301.2	W, GW, DW, OIL, S/S/S	AM 421.1	see SOP	see SOP	1/19/00
Polynuclear Aromatic Hydrocarbons by HPLC (PAHs)	SW846-8310	O630.0	W, GW, OIL, S/S/S	AM 307.4	SOP 17.0/ SOP 14.0	see SOP	5-24-01
Polynuclear Aromatic Hydrocarbons by HPLC (PAHs)	EPA 610	O630.3	W, GW	AM 307.4	see SOP 14.0	see SOP	5-24-01
Purgeable Aromatics by GC/MS (BTEX)	SW846-8260B	O560.3	W, GW, DW, OIL, S/S/S	AM 507.0	See SOP		8/20/99
Purgeable Aromatics by GC/PID	SW8020A	O460.2	W, GW, OIL, S/S/S	AM 22.1	see SOP	see SOP	1/19/00
Purgeable Aromatics by GC/PID ELCD (BTEX)	EPA 602	O458.1	W, GW, DW, S/S/S	AM-319.0	see SOP	NA	DRAFT
Purgeable Halocarbons by GC:ELCD	EPA 601	O457.1	W, GW, DW, OIL, S/S/S	AM-319.0	See SOP	NA	DRAFT
RCRA F001-F005 Alcohols by GC:FID	SW846-8015B	O490.5	W, GW, OIL, S/S/S	AM 304.2	see SOP	See SOP	11-5-98
RCRA GC/FID (Non-Regulatory)	SW846-8000B	O412.0	W, OIL, S/S/S	AM 421.0	see SOP	See SOP	1/1/93
Semi-Volatile Organics (Appendix IX)	SW846-8270C	O508.3	W, GW, DW, OIL, S/S/S	AM 505.6	AM 508.1	See SOP	11-15-01
Semi-Volatile Organics (CLP)	OLM03	O901.2	W, GW, S/S/S	AM 505.6	See SOW	See SOW	11-15-01
Semi-Volatile Organics (CLP)	OLC01	O912.3	W, GW, S/S/S	See SOW	See SOW	See SOW	See SOW
Semi-Volatile Organics (Acid Fractions)	SW846-8270C	O518.3	W, GW, S/S/S	AM 505.6	AM 508.1	See SOP	11-15-01
Semi-Volatile Organics (Base/Neutral/Acid Fractions)	SW846-8270C	O505.3	W, GW, DW, OIL, S/S/S	AM 505.6	AM 508.1	See SOP	11-15-01

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	Matrix	HES SOP analytical	Prep	Clean-up	last update
Semi-Volatile Organics (Base/Neutral Fractions)	SW846-8270C	O517.3	W, GW, OIL, S/S/S	AM 505.6	AM 508.1	See SOP	11-15-01
SVOA Drinking Water by LSE and Capillary Column GC/MS	EPA 525.2	O512.3	W, GW, DW,	AM 506.0	See SOP	See SOP	8/1/96
Semi-Volatile Priority Pollutants (Acid Fraction)	EPA 625	O506.3	W, S/S/S	AM 504.1	AM 508.1	See SOP	9-24-02
Semi-Volatile Priority Pollutants	EPA 625	O507.3	W, S/S/S	AM 504.1	AM 508.1	See SOP	9-24-02
Semi-Volatile Priority Pollutants (Base/Neutral/Acid)	EPA 625	O501.3	W, GW, DW, S/S/S	AM 504.1	AM 508.1	See SOP	9-24-02
TCLP Alcohols by GC:FID	SW846-8015B	O490.7	W, S/S/S	AM 304.1	See SOP	See SOP	10/9/97
TCLP Organochlorine Pesticides by GC:ECD	SW846-8081	O164.7	W, S/S/S	AM 421.1	See SOP	See SOP	1/19/00
TCLP Organochlorine Pesticides by GC:ECD (Volume Weighted Average)	SW846-8081	O164.8	W, S/S/S	AM 421.1	See SOP	See SOP	1/19/00
TCLP Semi-Volatile Organics (Landban)	SW846-8270C	O523.3	W, GW, OIL, S/S/S	AM 505.6	AM 508.1	See SOP	11-15-01
TCLP Semi-Volatile Organics (Toxicity Characteristic)	SW846-8270C	O514.3	W, GW, OIL, S/S/S	AM 505.6	AM 508.1	See SOP	11-15-01
TCLP Semi-Volatile Organics (Toxicity Characteristic)	SW846-8270C	O514.7	W, S/S/S	AM 505.6	AM 508.1	see SOP	11-15-01
TCLP Volatile Organics (Landban)	SW846-8260B	O522.3	W, GW, DW, OIL, S/S/S	AM 507.0	see SOP	see SOP	8/20/99
TCLP Volatile Organics (Landban)	SW846-8260B	O522.7	W, S/S/S	AM 507.0	see SOP	see SOP	8/20/99
Zero Headspace Extraction	SW846-1311	O522.8	W, OIL, S/S/S	AM 501.0	see SOP	see SOP	2/14/95
TCLP Volatile Organics (Toxicity Characteristic)	SW846-8260B	O513.3	W, GW, DW, OIL, S/S/S	AM 507.0	see SOP	see SOP	8/20/99
TCLP Volatile Organics (Toxicity Characteristic)	SW846-8260B	O513.7	W, S/S/S	AM 507.0	see SOP	see SOP	8/20/99

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES method	[illegible]	HES SOP [illegible]	[illegible]	[illegible]	[illegible]
Total Halogen (TX)	ASTM D-5839	M001.1	W, OIL, S/S/S	*	NA	NA	*
Total Organic Carbon (TOC)	EPA 415.1	O401.1	W, GW, DW, S/S/S	AM 158.3	NA	NA	11-19-02
Total Organic Carbon (TOC)	SW846-9060	O401.0	W, GW,DW, S/S/S	AM 158.3	NA	NA	11-19-02
Total Organic Carbon (TOC) Leachate	SW846-9090	O401.2	S/S/S	AM 158.3	NA	NA	11-19-02
Total Organic Halides (TOX)	SW846-9020B	O404.0	W, GW, DW, S/S/S	AM 157.1	NA	NA	12/10/93
Total Trihalomethanes by GC/MS	EPA 524.2	O516.7	W, GW, DW	AN 8.2	see SOP	see SOP	9-4-02
Total Trihalomethane Potential by GC/MS (Maximum)	EPA 524.2	O516.8	W, GW, DW	AN 8.2	see SOP	see SOP	9-4-02
Volatile Organic Compounds (SDWA-Packed Column)	EPA 524.2	O516.5	W, GW, DW	AN 8.2	see SOP	see SOP	9-4-02
Volatile Organics (CLP)	OLM01	O902.2	W, GW, S/S/S	See SOW	See SOW	See SOW	See SOW
Endothall by GC/MS	EPA 548.1	O548.2	DW	AM-548.2	AM-548.2	NA	10-22-02
Volatile Organics (CLP)	OLC01	O916.5	W, GW, DW	See SOW	See SOW	See SOW	See SOW
Volatile Organics (Appendix IX)	SW846-8260B	O509.3	W, GW, DW, S/S/S	AM 507.0	see SOP	see SOP	8/20/99
Volatile Organics (Capillary Column)	SW846-8260B	O510.6	W, GW, DW, OIL, S/S/S	AM 507.0	see SOP	see SOP	8/20/99
Volatile Organics (RCRA Solvents Non-Reg)	SW846-8260B	O504.3	W, OIL, S/S/S	AM 507.0	see SOP	see SOP	8/20/99
Volatile Organics-GC/MS, Assessment Monitoring, 329IAC	SW846-8260B	O509.4	W, GW, DW, S/S/S	AM 507.0	see SOP	see SOP	8/20/99
Volatiles Soil Prep (Encore)	SW846-5035	P510.9, P510.3	S/S/S	AM 509.0	NA	NA	10-7-99

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Table 8.1
Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	matrix	HES SOP analysis	prep	clean-up	last update
Volatile Priority Pollutants	EPA 624	O502.3	W, GW, DW, OIL, S/S/S	AM 510.0	see SOP	see SOP	9-12-00
RADIOCHEMISTRY							
Americium 241 by Perals	AM 795	R195.0	W, S/S/S	*	*	*	*
Carbon-14 by Wet Oxidation	IDNS C.W.01	R712.0	W, S/S/S	*	*	*	*
Gamma Emitting Radionuclides (10PCI)	EPA 901.1	R901.1	W, GW, DW, S/S/S	*	*	*	*
Gamma Emitting Radionuclides (1 PCI)	EPA 901.1	R901.2	W, GW, DW, S/S/S	*	*	*	*
Gamma Emitting Radionuclides (0.1 PCI)	EPA 901.1	R901.3	W, GW, DW, S/S/S	*	*	*	*
Gamma Emitters in S/S/S	AM 704.1	R704.1	OIL, S/S/S	*	*	*	*
Gamma Emitters in S/S/S	AM704.1	R704.2	OIL, S/S/S	*	*	*	*
Gamma Emitters in S/S/S	AM 704.1	R704.3	OIL, S/S/S	*	*	*	*
Gross Alpha and Beta Activity Determination	DOE RP710	R700.0	OIL, S/S/S	*	*	*	*
Gross Alpha and Beta Activity Determination	EPA 900.0	R900.0	W, GW, DW, S/S/S	*	*	*	*
Gross Alpha Determination	DOE RP710	R700.1	W, OIL, S/S/S	*	*	*	*
Gross Alpha Determination	EPA 900.0	R702.0	W, GW, DW, S/S/S	*	*	*	*
Gross Beta Activity Determination	DOE RP710	R700.2	W, OIL, S/S/S	*	*	*	*
Gross Beta Activity Determination	EAP 900.0	R703.0	W, GW, DW, S/S/S	*	*	*	*
Analyte Group	Reference Method	HES test code	matrix	HES SOP analysis	prep	clean-up	last update

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Table 8.1
Approved Methods and References for Analysis

Gross Radium Alpha Screening Procedure	EPA 900.1	R701.1	W, GW, DW, S/S/S	*	*	*	*
Lead-210 by SR-Spec Resin Column Separation	R782.0	R782.0	W, S/S/S	*	*	*	*
Nickel-63	AM 728.0	R963.0	S/S/S	*	*	*	*
Nickel-63 by LCS	AM 763.1	R763.1	W, S/S/S	*	*	*	*
Plutonium by Perals	AM 794.0	R794.0	W, S/S/S	*	*	*	*
Polonium-210 by Perals	AM-784.0	R184.0	W, S/S/S	*	*	*	*
Radioactive Iron	ASTM 4922-89	R726.0	S, GW, DW, S/S/S	*	*	*	*
Radioactive Strontium	EPA 905.0	R905.0	W, GW, DW	*	*	*	*
Radium	EPA 900.1	R701.0	W, GW, DW, S/S/S	*	*	*	*
Radium 226 by Perals	AM 788.0	R188.0	W, GW, DW, OIL, S/S/S	*	*	*	*
Radium 226, Radium 228 (Indiana Method)	EPA 900.1 / EPA 904.0	R701.2	W, GW, DW	*	*	*	*
Radium 228	EPA 904.0	R904.0	W, DW	*	*	*	*
Radon	SAS	G704.0	W, GW, DW	*	*	*	*
Strontium 89/90	AM 738.0	R738.0	W, S/S/S	*	*	*	*
Technitium 99	AM 743.0	R343.0	W, GW, DW, OIL, S/S/S	*	*	*	*
Thorium by Perals	AM 790.0	R790.0	W, GW, DW, OIL, S/S/S	*	*	*	*

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Table 8.1

Approved Methods and References for Analysis

Analyte Group	Reference Method	HES test code	matrix	HES SOP	prep	clean up	last update
Total Radiostrontium	EPA 905.0	R905.1	W, GW, DW	*	*	*	*
Tritium	EPA 906.0	R706.1	W, GW, S/S/S	*	*	*	*
Tritium in Drinking Water	EPA 906.0	R706.0	W, GW, DW,	*	*	*	*
Tritium in Soil-Moisture	AM 706.0	R906.0	S/S/S	*	*	*	*
Uranium by Alpha Liquid Scintillation	AM 792.0	R192.0	W, GW, DW, S/S/S	*	*	*	*
Uranium-Radiochemical Method	EPA 908.0	G705.0	W, GW, DW	*	*	*	*

1	Requires Total Alkalinity, Calcium, pH, Temperature, and Total Dissolved Solids to calculate results.
*	Analysis is sub-contracted to certified laboratory
**	Given method is followed. A Heritage SOP is not written.
IP	Revision of current Standard Operating Procedure (SOP) is in process.
See SOP	See noted SOP for information
See SOW	See Statement of Work
NA	Not Applicable

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Table 8.2

EPA APPROVED ANALYTICAL METHODS AND REFERENCES FOR WATER ANALYSES

DRINKING WATER

1. 40 CFR Part 141, "National Primary Drinking Water Regulations", July 1, 1991 Edition, Code of Federal Regulations, Subpart C ("Monitoring and Analytical Requirements", section 141.21 to 141.30) and Subpart I - ("Control of Lead and Copper", section 141.89).

2. "Methods for the Determination of Organic Compounds in Drinking Water", EPA/600/4-88/039, December 1988.

3. "Methods for the Determination of Organic Compounds in Drinking Water", Supplement I, EPA-60014-901020, July 1990.

4. "Methods for the Determination of Organic Compounds in Drinking Water:, Supplement II, EPA-600/R-92/129, August 1992.

5. "Methods for the Determination of Organic Compounds in Drinking Water, " Supplement III, EPA/600/R-95/131, August 1995.

4. "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, Revised March 1983.

5. Standard Methods for the Examination of Water and Wastewater, 16th Edition, 1985.

6. Standard Methods for the Examination of Water and Wastewater, 17th Edition, APHA-AWWA-WPCF, 1989.

7. Standard Methods for the Examination of Water and Wastewater, 18th Edition, APHA-AWWA-WPCF, 1992.

8. Standard Methods for the Examination of Water and Wastewater, 19th Edition, APHA-AWWA-WPCF. 1995.

9. "Manual for Certification of Laboratories Analyzing Drinking Water", EPA 570/9-90/008, April 1990, as updated by Change I, October, 1991 and Change 2, September, 1992.

10. "Prescribed Procedures for Measurement of Radioactivity in Drinking Water", EPA-600/4-80/032, August 1980.

11. 40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act, July 1, 1991, Appendix A.

Note: "500" series methods shall be used for drinking water related analyses unless client requirements dictate low detection limits achieved by those methods and analyses require no dilutions. Regulatory approval may be required for use in other matrices. Application of drinking water QC procedures may be inappropriate for some sample matrices.

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Table 8.2

SURFACE WATER, GROUNDWATER AND WASTEWATER EFFLUENTS

1. 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act" Tables IA, IB, IC, ID, and IE, as published in the Federal Register, Vol. 65, No. 165, pp. 50758-50770, October 8, 1991.

2. Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, revised March 1983.

3. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition.

4. Methods listed in 40 CFR Part 261, Identification and Listing of Hazardous Waste, July 1, 1991, Appendix III (Chemical Analysis Test Methods).

NOTES:

1. Laboratories analyzing samples in support of NPDES Permits are limited to methods specified in Reference 1 above or those specifically approved for use by EPA.

2. Only those methods in Reference 2 that are specified in Reference 1 are approved.

3. Methods and protocols specified by References 3 and 4 above must be used when analyzing samples in support of RCRA related activities.

WATER SOURCES (SURFACE WATER AND GROUNDWATER) ANALYZED PURSUANT TO 40 CFR PART 261 (Resource Conservation and Recovery Act) and the DER Chapter 17-700 Series Rules

1. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition.

2. Methods listed in 40 CFR Part 261, Appendix III, July 1, 1991.

3. "USEPA Contract Laboratory Program Statement of Work for Inorganic Analyses", Multi-Media, Multi-Concentration EPA SOW 7/88, July 1988.

4. "USEPA Contract Laboratory Program Statement of Work for Organic Analyses", Multi-Media, Multi-Concentration EPA SOW 2/88, February 1988.

5. "Prescribed Procedures for Measurement of Radioactivity in Drinking Water", EPA-600/4-80/032, August 1980.

6. "USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration, Document Number ILM01" and its updates.

7. "USEPA Contract Laboratory Program Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, Document Number OLM01" and its updates.

8. "USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis", ILM02.0 (July 1990) and ILM02.1 (September 1991).

9. "USEPA Contract Laboratory Program Statement of Work for Organic Analysis", OLM02.0 (July 1990) and OLM02.1 (September 1991).

Table 8.3

EPA Approved Analytical Methods And References For Sediments, Soils, Residuals and Solid And Hazardous Wastes

1. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, 1986 as amended by Update I, Update II, Update IIA, Update IIB, Update III and Update IIIA, April 1998, Update IVA, January 1998.

2. "USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration document number ILM04" and subsequent updates.

3. "USEPA Contract Laboratory Program Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, document number OLM03.1" and subsequent updates.

4. Methods listed in 40 CFR, Part 261, Appendix III.

5. American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103.

BIOLOGICAL

Microbiological

1. "Drinking Water Analyses"- 40CFR Part 141, Subpart C (Monitoring and Analytical Requirements, Section 141.21).

2. "Water and Wastewater Analyses: - 40CFR Part 136, Table IA as published in the Federal Register.

3. "Microbiological Methods for Monitoring the Environment" EPA 600/8-78-17, 1978.

4. Standard Methods for the Examination of Water and Wastewater, APHA-AWWA-WPCF, 18th Ed., 1992 the 19th Ed., 1995 and the 20th Ed. 1999.

9.0 Calibration Procedures and Frequency

9.1 Laboratory Instrumentation

A list of laboratory instrumentation is found in Table 9.1, Instrument List. Field measurement equipment is listed in Table 9.2, Field Instruments.

9.2 Standards Receipt and Traceability

The Material Safety Data Sheet (MSDS) must be on file or sent with a substance before acceptance into the lab. MSDS's included with the shipping container should be in an external envelope so that it can be read and all precautions followed before opening the container.

All chemicals delivered to the lab will be accepted in the shipping and receiving area. Bulk reagents such as acids and solvents will be delivered in cases, which may be stored in the storeroom until use. The shipping and receiving department will label the date of receipt on the outside of the unopened case and of bulk reagents. All other reagents and analytical standards will be delivered (unopened) immediately to the appropriate Study Manager or Group Leader. The containers will be inspected to check for damage, leakage, etc. If the reagents, standards and bulk reagents taken from the storeroom are acceptable, they will be entered into a logbook with the following information:

1. Identification of compound (CAS number, if possible)
2. Source of Standard or reagent
3. Date of receipt
4. Date first opened
5. Purity
6. Batch or Lot number
7. Stability - expiration date
8. Approximate amount

For ease and/or confidentiality, chemicals or reagents can be assigned (and all bottles labeled with) a sequential laboratory compound (project specific) identification number based on the protocol or contract number. This information is logged in the project specific logbook. Solutions and dilutions of this compound will be tracked through this number.

Calibration certificates, when available, shall indicate the traceability to national standards of measurement and shall provide the measurement results and associated uncertainty of measurement and/or a statement of compliance with an identified metrological specification. All manufacturers' certification and traceability statements are maintained on file. The statements will be marked with the date received and the identification of the logbook where they are referenced. When logbooks are archived, the associated certification file documentation is archived with the logbook.

Where traceability to national standards of measurement is not applicable, the laboratory shall provide satisfactory evidence of correlation of results, for example by

participation in a suitable program of interlaboratory comparisons, proficiency testing or independent analysis.

Only standard sources approved by the QA Unit may be used. Standards will be traceable to NIST when possible.

9.3 Standard Sources and Preparation

Stock solutions are prepared for the purpose of making standards and performing analyses. There must be no handling of the reagents directly from the reagent bottles. Instead, minimal amounts are to be placed in interim holding containers. Unused stock solutions must not be poured back into original containers. The possible toxicity of the reagents must be noted and respected. Stock solutions are to be made using analytical reagent grade or other appropriate grade solvents. Storage precautions must be noted and observed with regard to heat and light sensitive compounds. Solutions must be kept in the proper container tightly sealed (amber glass where necessary) with Teflon lined lids in an appropriate refrigerator. No mouth pipetting is permitted.

When preparing stock solutions, at least 0.1000 grams or 1.00 ml of reagent is to be used, when possible or practical. Direct delivery into a volumetric flask is required. Stock solution preparation noting lot numbers of reagents and solvents in addition to date and initials of person preparing the solutions must be noted and recorded on the label and in the appropriate standards logs.

Stock solutions under proper storage (refrigerated if necessary) may be kept for a period not to exceed the maximum recommended storage time. Standard solutions are prepared from the stocks by the analyst on a daily, weekly, or monthly basis as necessary.

The details for preparation of standards are contained in each method Standard Operating Procedure. General standard sources and preparation protocols are listed in Table 9.3, STANDARD SOURCES AND PREPARATION. This table includes the following information:

1. Instrument group

2. Source and traceability of primary standards

3. Frequency of preparation

4. How primary and working standards are stored.

All stock and standard solutions are to be labeled with:

- Contents and level of concentration

- Discrete identifying ID

- Solvent

- Date of preparation
- Manufacturer's Lot number
- Initials of preparer
- Expiration date
- Other information which may be appropriate
- This information must also be entered into the group's standards logbook

9.4 Standardization of Titrating Solutions

The laboratory uses purchased pre-standardized reagents when possible for all those solutions and methods requiring standardization. Refer to Table 9.4, Standardization of Titrating Solutions for solutions that require standardization, the source of the primary standards used to standardize, and the frequency of standardization. Standardization must be documented in some manner (retained certificates from vendors as an example).

9.5 Calibration of Thermometers

All working thermometers are labeled and calibrated with a NIST certified thermometer. A logbook documents this calibration. Thermometers are calibrated every year. The laboratory tags each thermometer with a unique identifier, initials of the person calibrating and the correction factor to be applied. Refer to SOP # QA-4.2, Thermometer Calibration, and subsequent updates.

9.6 Calibration of Balances

All analytical balances will be checked daily (or each day of use) using "class S" certified weights in the expected use range. Logbooks or benchsheets will be used to document this calibration. US Army Corps of Engineers projects require weights bracketing the item to be weighed. A service contract is in effect on all analytical balances. The balances are serviced and calibrated annually by a qualified service representative. The laboratory retains a certificate supplied by the authorized service representative, which identifies traceability of the calibration to the NIST standards.

9.7 Calibration of Eppendorfs/Pipettors And Syringes

All mechanical volumetric dispensing devices (pipettors and dispensors except Class A glassware) in service required to deliver precise volumes are checked daily for any US Army Corps of Engineers projects, using a minimum one-point check for the volumes commonly used. Otherwise, pipettors and dispensers will be checked weekly and for initial use of new pipettes. Refer to Heritage SOP # QA-11.1, Calibration of Automatic Pipettes, effective 11/18/02 and subsequent updates. Pipettors must meet the manufacturer specifications. All calibrations are documented in a logbook or

benchsheet, which identifies the specific pipettor. Glass microliter syringes are considered in the same manner as Class A glassware, but must come with a certificate attesting to established accuracy or the accuracy must be initially demonstrated and documented by the laboratory.

9.8 Minimum Calibration Requirements For Field Instruments

This section discusses pre-inspection calibration, field calibration, office/lab calibration, and use of field instruments. Field instrument calibration will be followed in accordance with DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, Section 7.5 (all sections), revised 9-92.

9.9 Re-certification of Class S Weights and NIST Thermometers

Class S weights and NIST traceable thermometers will be re-certified every 5 years or upon the expiration of the certification as documented on the calibration certificates, whichever comes first.

9.10 Instrument Performance Parameters - Start-up QC

Performance parameters are checked at the beginning of each analytical run and are used as a check to determine acceptable instrument performance. The operating conditions are documented in a bound logbook.

9.10.1 Metals Analysis Instrument Performance Parameters

Performance parameters are checked at the beginning of each analytical run. The operating conditions are documented in a bound instrument logbook, one for each instrument. The following information is recorded:

GFAA: Date, element, analyst, standard concentration, standard absorbance, comments.

CVAA: Date, element, analyst, standard concentration, standard absorbance, blank absorbance, comments.

ICP: Date, analyst, emission "counts" for calibration standard and blank for Ag, Pb, Ca and Sb, Ar flow, Hg (or Cd or Mn) profile, comments.

ICP/MS: All performance test parameters are printed and included in each analytical run folder.

The following minimum criteria must be met before proceeding with the analytical run, unless approval is obtained from the appropriate supervisor.

ICP: Emission count criteria is in the performance logbook.

CVAA: The 1 µg/L calibration standard must be greater than or equal to 0.0050 absorbance. The blank must have less than 1/2 the absorption of the detection limit standard. The calibration correlation coefficient must be at least 0.995.

GFAA: A mid-range standard (designated in the logbook at the level of the analytical spike) must have an absorbance of at least the value in Table 9.5, GFAA Minimum Absorbance Criteria. The correlation coefficient must be at least 0.995.

ICP/MS: A 100 ppb test solution shall give the following minimum results:

9.10.1 Performance test
Resolution ≤ 0.85 AMU
Sensitivity ≥ 10000 c/s/ppm
Oxide (CeO/Ce) and double charged (Ba^{++}/Ba) ratios ≤ 8%
Background at 228 AMU ≤ 100 c/s

9.10.2 Mass Calibration
Mass calibration difference from last mass calibration ≤ .1 AMU.

Any standard must not deviate form the calibration curve by more than 20%. The linear correlation coefficient (r) must be ≥ 0.995

9.10.2 Mass Spectrometry Performance Parameters

Each system used for the analysis of volatile compounds must be tuned to meet the abundance criteria listed below for BFB.

	Method 624 / 8260A	Method 524
Mass	Target Value	Target Value
50	15%-40%	15%-40%
75	30%-60%	30%-80%
95	100%	100%
96	5%-9%	5%-9%
173	< 2% of 174	< 2% of 174
174	> 50%	> 50%
175	5%-9% of 174	5%-9% of 174
176	95%-101% of 174	95%-101% of 174
177	5%-9% of 176	5%-9% of 176

The mass spectrometers are considered to be in tuning compliance for 12 hours after the injection (and passing the criteria) of the tuning compound for SW846 methods and for 8 hours for EPA 524. EPA method 624 has no time limitation on the tune or continuing calibration check, but sequences are not run for greater than 24 hours. Any analytical run which lasts longer than the method allows must include a tune check at or before the time period expires. Background correction may only be used to eliminate column bleed or instrument background ions. A hardcopy report of each tune check (spectrum and mass listing) is kept in the run folder. Background correction technique must be recorded.

Each system used for the analysis of semi-volatile compounds must be tuned to meet the abundance criteria listed below for DFTPP or alternatives allowed by the method.

	Method 625 / 8270	Method 525
Mass	Target Value	Target Value
51	30%-60% of 198	10%-80% of 198
68	< 2% of 69	< 2% of 69
70	< 2% of 69	< 2% of 69
127	40%-60% of 198	10%-80% of 198
197	< 1% of 198	< 2% of 198
198	100%, Base Peak Relative Abund.	100% or > 50% of 442
199	5%-9% of 198	5%-9% of 198
275	10%-30% of 198	10%-60% of 198
365	> 1% of 198	> 1% of 198
441	Present and < 443	present and < 443
442	> 40% of 198	100% or > 50% of 442
443	17%-23% of 442	15%-24% of 442

The mass spectrometers are considered to be in tuning compliance for 12 hours after the injection (and passing the criteria) of the tuning compound. EPA method 625 has no time limitation on the tune or continuing calibration check, but sequences are not run for greater than 24 hours. Any analytical run, which lasts longer than the method allows from the injection of DFTPP, must include a tune check at or before the time expires. Background correction may only be used to eliminate column bleed or instrument background ions. A hardcopy report of each tune check (spectrum and mass listing) is kept in the run folder. Background correction technique must be recorded in the logbook.

9.10.3 Gas Chromatography and Liquid Chromatography (HPLC) Performance Parameters

Gas Chromatography (GC) and High Performance Liquid Chromatography (HPLC) techniques may require three basic checks used to evaluate the system upon start-up.

1. Column efficiency

2. Resolution (resolution and column efficiency)

3. Detector efficiency

9.10.3.1 Column efficiency is measured by an artificial concept called theoretical plates. In order to compare column efficiencies one must utilize identical conditions for the following:

1. Solvent
2. Solute
3. Temperature
4. Flow Rate
5. Sample size

Broadening of the peaks (under identical instrument and method conditions, see above) indicates a decrease in the number of theoretical plates and therefore less desirable chromatography. A representative compound for the method being utilized is chosen and a theoretical number of plates are calculated (with the exception of GC/MS methods) from the calibration standard(s) run at the beginning of a sequence. The number of theoretical plates may be documented in a logbook and can be used to assist in the determination of column acceptability.

Tangents are drawn to the peak at the points of inflection.
The number of theoretical plates n, is given by:

$$\frac{n}{cm} = \frac{5.545\ (RT/W_h)}{L}$$

Where: RT = distance from injection to peak maximum in centimeters
W_h = peak width at half height in centimeters
L = column length in centimeters

See Figure 9.1, Calculation of Theoretical Plates.

The peak gaussian factor (PGF) will be calculated in place of theoretical plates when required as per the method specified analyte and must meet the method specified criteria. The PGF

will be documented in a logbook. The PGF calculation is required by drinking water methods.

$$PGF = \frac{1.83(W_h)}{W_{1/10}}$$

Where: W_h = peak width at half height
$W_{1/10}$ = peak width at one-tenth height

9.10.3.2 Resolution is a measure of both the column and solvent efficiencies. It indicates both the separation of peak maxima (retention times) and the narrowness of peaks. Representative or method specified compounds will be utilized to calculate resolution (with the exception of GC/MS methods) at the beginning of the analytical run.

The formula for resolution (R) is:

$$R = \frac{2d}{W_1 + W_2}$$

Where: d = difference in elution times between two peaks
W_1 = peak width for analyte 1.
W_2 = peak width for analyte 2.

See Figure 9.2, Calculation of Resolution.

9.10.3.3 Retention time windows will be established for all conventional GC and HPLC methods each time a new column is installed. The concentration of each analyte will be such that the response is approximately half scale. The standard deviation (SD) from three injections shall be used to establish the retention time windows. For multi-response analytes, one major peak will be chosen for the calculation.

The performance criterion is:

$$RetentionTime: \pm 3(SD)$$

For multi-response analytes the analyst should utilize the retention time window, but will primarily rely on pattern recognition.

9.10.3.4 Detector efficiency will be monitored from the analysis of method specified and/or representative compounds chosen such that their response will indicate the optimum minimum acceptable response from the detector. Many methods (i.e.GC/MS) specify compounds called System Performance Check Compounds (SPCC's). SPCC's must meet the minimum Response Factor (RF) required by the method for both initial and continuing calibrations. Specifically, USEPA CLP lists minimum RF requirements for each analyte, which must be met for both initial and continuing calibrations. Refer to Sections 12.2.7 and 12.2.8 for a discussion of response factors.

Methods that do not list minimum RF's (detectors other than mass spectrometers) may monitor a chosen analyte and compare that response to a mean RF (RF)

Minimum RF : ± 20% Difference of the established mean

9.10.4 Prior to use on each working day, balances, ovens, refrigerators, freezers, incubators and water baths shall be checked with NIST traceable references (where possible) in the expected use range. Additional monitoring as prescribed by the test method shall be performed for any device that is used in a critical test (such as incubators or water baths). The acceptability for use or continued use shall be according to the needs of the analysis or application for which the equipment is being used. The laboratory identifies each piece of equipment in a way that establishes its use and distinguishes it from other pieces of equipment in the laboratory. Miscellaneous equipment and instrumentation performance requirements are listed below:

Ovens: ± 3°C of set point. Laboratory personnel will monitor each oven's temperature each day of use.

Furnaces: ± 20°C of set point

Refrigerators/Coolers: 0.1 to 4 Degrees C. Refer to SOP # FA-7.0, Sample Storage and Temperature Monitoring, and subsequent updates. Temperature is recorded twice daily, using dedicated thermometers graduated in increments no larger than 1^0 Degree C.

Freezers: ≤ - 12^0 Degrees C

Incubators: 35 ± 0.5°C or 44.5 ± 0.2°C

D.I. Water Systems: Conductivity ≤ 2.0 μmhos/cm at 25 ^{0}C. The status of the central DI/RO water system is checked twice daily using the in-line conductivity meter and weekly using a calibrated external meter. Refer to SOPs F-4.2 and FA-5.0, and subsequent updates.

Zero Headspace Extractors: Maintain 50 PSI for 1 hour

EP, TCLP Extractors: ± 2 RPMs of specified RPM

9.11 Instrument Calibration Criteria

Any item of the equipment which has been subjected to overloading or mishandling, or which gives suspect results, or has been shown by verification or otherwise to be defective, shall be taken out of service, clearly identified and wherever possible stored at a specified place until it has been repaired and shown by calibration, verification or test to perform satisfactorily. The laboratory shall examine the effect of this defect on previous calibrations or tests.

Each item of equipment including reference materials shall, when appropriate, be labeled, marked or otherwise identified to indicate its calibration status.

Instrument Calibration frequency and criteria are detailed in Table 9.6, Instrument Calibration. All linear calibration curves will be fitted by the least squares linear regression technique. This procedure will also be used for calibration curves that require log transforms or similar transforms (e.g., electrochemical measurements). The formula for calculation of the regression line is given in Section 12.0, Data Reduction, Validation and Reporting. All results calculated from a linear calibration curve must have a correlation coefficient ≥ 0.995, unless otherwise specified in an analytical method. Any other second order (quadratic) or higher regression fit will be detailed in the SOP for the method using such calibrations, including the formula, calculations and acceptance criteria. Linear curves are the predominant and the preferred calibration technique. The analyst should select the regression order that introduces the least calibration error into the quantitation (as allowed by the published analytical method).

9.12 Control of Devices

Each item of equipment shall, when appropriate, be labeled, marked or otherwise identified to indicate its calibration status, except for those items of equipment, which are calibrated more frequently than every 6 months.

Hot Plates:	± 3 ° C of set point
Sonic Probes:	Calibrate to manufacturer specifications.

Table 9.1
INSTRUMENT LIST

CODE	NAME	MANUFACTURER	MODEL	SERIAL_NO
174	ABSORBANCE/FLUORESCENCE DETECTOR	ISCO	UA-5	620940760-91220
272	ACCELERATED SOLVENT EXTRACTOR (ASE)	DIONEX	ASE200	95120333
254	ALPKEM AUTOMATED ANALYZER (7/94)	ALPKEM/PERSTORP	510	123/10703
291	ANALYTICAL BALANCE	AND	ER182	4701232
305	ANALYTICAL BALANCE	SARTORIUS	PT310	61003623
241	ANALYTICAL BALANCE (HRG)	METTLER AE2000	AE200	E84111
227	ANALYTICAL BALANCE (PREP LAB)	OHAUS	GT400	4075
276	ANALYTICAL BALANCE (TOP LOADING TO 0.01G) (MTO)	METTLER TOLEDO	PG802	1115181358
321	ANALYTICAL BALANCE - GENERAL LAB - OCT. 98	SARTORIUS	P1200	80602713
126	ANALYTICAL BALANCE 1 (TO 0.0001G) (ZHE)	SARTORIUS	1601 MP8	3304155
136	ANALYTICAL BALANCE 11 (TOP LOADING TO 0.01G) (ZHE)	FISHER	XL500	B028827
137	ANALYTICAL BALANCE 12 (MICRO BALANCE TO 0.00001G) (LINDA O)	METTLER	M3	H59496
127	ANALYTICAL BALANCE 2 (TO 0.0001G) (PREP LAB)	AMERICAN SCIENTIFIC	SP 180	2901111
130	ANALYTICAL BALANCE 5 (TOP LOADING TO 0.01G) (TCLP)	METTLER	PM 4000	K40509
131	ANALYTICAL BALANCE 6 (TOP LOADING TO 0.01G) (GEN)	OHAUS	300	3821
133	ANALYTICAL BALANCE 8 (TO 0.0001G) (GEN)	METTLER	AE200	G46324
255	AUTOMATED SOLID PHASE EXTRACTOR SYSTEM	HORIZON TECHNOLOGY	SPE-DEX(TM)4700	9301508
267	BALANCE (GEN)	METTLER TOLEDO	B3002	114162328
327	BALANCE (PURCHASED 11/99	DENVER INSTRUMENT CO.	TR-403	TO123716
333	GEN LAB ANALYTICAL BALANCE TO 0.0001G)	A&D WEIGHING	GR-200	14201498
354	GC BALANCE	DENVER INSTR. CO.	TR-403	T137426
185	BOD INCUBATOR (1989)	FISHER SCIENTIFIC	ISOTEMP LOW	?
369	GEN LAB BOD INCUBATOR (1997)	PRECISION SCIENTIFIC	815	10AY-6
286	BOMB CALORIMETER	PARR	1281	A900DDCLEA
245	CENTRIFUGE	MARATHON 10K	Z 510	17920041
228	COD REACTOR III	HACH	45600-00	921000008051

Table 9.1
INSTRUMENT LIST

360	GEN LAB COD REACTOR	HACH	45600	020200022790
361	GEN LAB COD REACTOR	HACH	45600	961200015266
362	GEN LAB COD REACTOR	HACH	45600	940500010945
359	GEN LAB SPE-DEX 3000XL OIL & GREASE EXTRACTOR 12/01/99	FISHER	2040 BD40	363390111
114	CONDUCTIVITY METER (1/90)	YELLOW SPRINGS INSTRUMENTS	35	H9007042
213	CONDUCTIVITY METER (DI SYSTEM)	THORNTON	TYPE 870	38185A
224	DIGITAL PROGRAMMABLE BLOCK HEATER	COLE PARMER	36200	0217
125	DISSOLVED OXYGEN METER (6/90)	YELLOW SPRINGS INSTRUMENTS	59	90K020793
368	GEN LAB DISSOLVED OXYGEN METER	YSI	50B-115V	94J23254
337	ENERGY-DISPERSIVE X-RAY FLUORESCENCE	KEVEX/SPECTRACE	QUANX/ECD	28619-001
194	FISHER SCIENTIFIC ISOTEMP OVEN	FISHER SCIENTIFIC	13-988-426	23325373
244	FLASH POINT TESTER (GEN)	PENSKY-MARTINS/FISHER TAG	ASTM D-93	20800016
336	STAT LAB SETAFLASH RAPID TESTER (2000)	PETROLAB	RT-00001	003115
124	FTIR	MATHESON INSTRUMENT	GALAXY 2020	910410G
355	UV/VIS SPECTROPHOTOMETER	PERKIN ELMER	LAMBDA 3B	618N2040210
24	GC C DUAL COLUMN ECD/ECD (1987)	HEWLETT PACKARD	5890	2728A13778
25	GC D DUAL COLUMN ECD/ECD (1990)	HEWLETT PACKARD	5890 SERIES II	2950A28410
163	GC E DUAL COLUMN ECD/ECD (1991)	HEWLETT PACKARD	5890 SERIES II	2650A0312
290	GC F DUAL COLUMN ECD/ECD (1996)	HEWLETT PACKARD	HP6890	US00003665
310	GC ISOTEMP REFRIGERATOR(RECV'D FROM CHARLOTTE 7/97)	FISHER SCIENTIFIC	426R	?
309	GC PREP LAB REFRIGERATOR(RECV'D FROM CHARLOTTE LAB 7/96)	GENERAL ELECTRIC	COMPACT	?
232	GC SAMPLE EXTRACT REFRIGERATOR (11/93)	TRUE	GDM-23	1080180
171	GC STANDARDS FREEZER	KENMORE	25154	S44137710
172	GC STANDARDS REFRIGERATOR	KENMORE	?	628610
326	GC/ECD/ECD Q CH19 AND CH20	HEWLETT PACKARD	6890 PLUS	US00030639
50	GC/ECD/ECD H	HEWLETT PACKARD	HP5890A	2643A09901
87	GC/ECD/ECD I	HEWLETT PACKARD	5890	2843A19384
324	GC/ECD/ECD P (MICRO ECD) 05-04-99	HEWLETT PACKARD	G1530A,6890	US0002754

Table 9.1
INSTRUMENT LIST

			PLUS	1
64	GC/FID 1 (1987)	HEWLETT PACKARD	5890	2643A10312
106	GC/FID 2 (DUAL CHANNEL) (1989)	HEWLETT PACKARD	5890 SERIES II	3033A30664
51	GC/FID/FID	HEWLETT PACKARD	HP5890A	2643A10689
259	GC/MS #11 (W/ PURGE & TRAP LSC2000 AND 2016)	HEWLETT-PACKARD	5890/5970MSD	2637A01825
328	GC/MS #18, ION TRAP	VARIAN	SATURN 2000	3668
102	GC/MS 14 SVOA	HEWLETT PACKARD	5970 W/5890 GC	2905A12055
122	GC/MS 15 (W/HEATED PURGE & TRAP)	HEWLETT PACKARD	5970 W/5890 GC	3034A12911
123	GC/MS 16 (SVOA)	HEWLETT PACKARD	5970 W/5890 GC	3034A12925
39	GC/MS 5 W/PURGE & TRAP (1989)	HEWLETT PACKARD	5970 W/5890 GC	2923A12066
160	GC/MS 8 (1991)	HEWLETT PACKARD	5971 W/5890 GC	3188A02844
176	GC/MS 9 W/ PURGE & TRAP (1992)	HEWLETT PACKARD	5971 W/5890 GC	3203A42102
346	GC/MS #17(V) VOLS 6890 W / AQUATEK 70 4/2001	AGILENT	G2578A	US10450463
347	GC/MS #3 (C) 5890 W / ARCHON	HEWLETT PACKARD	5970	2905A12050
343	GC/MS #6 (F) 6890 SEMIVOL 4/2001	AGILENT	G2578A	US10450449
344	GC/MS #2 (B) 6890 SEMIVOL 4/2001	AGILENT	G2578A	US10450450
345	GC/MS #4 (D) VOLS 6890 W/25 ML P/T 4/2001	AGILENT	G2578A	US10450436
257	GC/MS MEDIUM LEVEL SOILS REFRIGERATOR	TRUE MANUFACTURER CO.	GDM-23	1258463
258	GC/MS VOLATILE STANDARD FREEZER	MARVEL INDUSTRIES	6CAFM	080394023
335	GC/MS VOLATILES STANDARDS FREEZER 08/07/00	SEARS KENMORE	25329101990	WB91911783
41	GC/NPD/NPD (1989)	HEWLETT PACKARD	5890	LR47359C
19	GC/PID/ELCD W/PURGE & TRAP (1989)	HEWLETT PACKARD	5890 GC	2750A18677
271	GC/PID/ELCD/FID W/PURGE & TRAP	HEWLETT PACKARD	5890 GC	2843A21022
243	GC/PID/ELCD/FID TREMETRICS	TREMETRICS	9000 SERIES	920084
30	GFAA (PE5100-A) (1986)	PERKIN - ELMER	5100/ZEEMAN	6012
31	GFAA (PE5100-B) (1988)	PERKIN - ELMER	5100/ZEEMAN	6603
96	HPLC 1 W/PHOTODIODE ARRAY	WATERS	WATERS	600EPC066

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Table 9.1
INSTRUMENT LIST

	DETECTOR, FLUORESCENCE DETECTOR & PI	(COMPONENTS IN LOG)	600E	
100	HPLC 2 W / SCANNING FLUORESCENCE DETECTOR	WATERS	WATERS 600E	6PLEPD833
105	ICP, SEQUENTIAL (P40)	PERKIN ELMER	P40	131686
370	ICP SIMULTANEOUS (PURCHASED 10-1-2002)	VARIAN	VISTA AXIAL	EL02056633
334	ICP SIMULTANEOUS (PURCHASED 7-00)	VARIAN	VISTA AXIAL	EL00043816
320	ICP/MS (PURCHASED 7-98)	VARIAN	ULTRA MASS 700	EL98053615
268	ION CHROMATOGRAPH # 1	DIONEX	DX500	95050139
319	ION METER - GENERAL 8/3/98	ACCUMET	ACCUMET AB15	AB8120139 3
322	IR THERMOMETER	COLE PARMER	39650-02	2590120606 -0030
363	IR THERMOMETER	OAKTON	35629-00	2042240101 -0039
311	GEN LAB PH METER (AMMONIA, TKN, FLUORIDE) 6/10/97	ACCUMET	15A	C0022917
319	GEN LAB ION METER – 8-3-98	ACCUMET	ACCUMET AB15	AB8120139 3
323	LACHAT QUIKCHEM FIA+ 8000 SERIES (2/99)	LACHAT	QC8000	A85000-1324
234	LOW LEVEL VOLATILE COOLER	FISHER SCIENTIFIC	425D	?
198	MEDIUM LEVEL VOLATILE SOIL REFRIGERATOR	PRECISION SCIENTIFIC	812	12-AU-7
240	MUFFLE FURNACE (ASH)	BLUEM BOX TYPE	M25A-2A	MI88-10
214	NIST/NBS THERMOMETER	ERTCO	76MM (1MM)	M90347
236	PARR ADIABATIC OXYGEN BOMB CALORIMETER (HRG)	PARR	1241EA	5421
256	PERKIN ELMER FLOW INJECTION MERCURY SYSTEM	PERKIN ELMER	FIAS 400	4155
373	LEEMANS LABS AF GOLD FLOW INJECTION HG SYSTEM, PURCHASED 10/16/02	LEEMAN LABS	HYDRA AF GOLD	112-00066-1
226	PH METER	FISHER SCIENTIFIC	ACCUMET 15	C0009576
312	PH METER	ACCUMET	BASIC	07985
367	GEN LAB BASIC PH METER	DENVER INSTR. CO.	na	16066
375	GEN LAB ULTRA BASIC PH METER	DENVER INSTR. CO.	UB10	UB1002200 7
325	PH METER	FISHER SCIENTIFIC	ACCUMET AR15	AR8120359 6
374	GEN LAB BASIC PH METER	DENVER	Na	16991

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Table 9.1
INSTRUMENT LIST

339	TURBIDIMETER (MTO) 11/07/00	HACH	2100N	00006457
162	PORTABLE GC/PID/FID	HNU SYSTEMS	GC 321	A29022
199	SEALED STANDARDS REFRIGERATOR FOR GC/MS	MARVEL	SN3917	4570109
196	SEMIVOLATILE EXTRACT REFRIGERATOR	MARVEL INDUSTRIES	61AR	M/04049000 4
177	SOLIDS OVEN I (1990)	FISHER SCIENTIFIC	615F	90400057
178	SOLIDS OVEN II (1990)	FISHER SCIENTIFIC	615F	81000202
180	SOLIDS OVEN IV (1991)	GALLENKAMP	275-375	891041438
181	SOLIDS OVEN V	THERMOLYNE	1400	34806576
363	GEN LAB FISHER ISOTEMP OVEN - 03/2002	FISHER	M625G	202N0031
340	GEN LAB FISHER SCIENTIFIC ISOTEMP STANDARD OVEN 12/00	FISHER	625	011N0199
372	GENERAL LAB STANDARD OVEN 10/02	LINDBERG/BLUE M	G01305A-1	W19M-600156-WM
80	SOXHLET	LAB-LINE		123
329	SPE-DEX 3000XL OIL & GREASE EXTRACTOR 12/01/99	HORIZON TECHNOLOGY	3000XL	1009
223	SPECTROPHOTOMETER 401 (2/93)	MILTON ROY	401	3814178003
233	STANDARDS REFRIGERATOR (11/29/93)(GOG)	TRUE	GDM-23	1080173
278	TOC III (COMBUSTION IR) (5/96)	SHIMADZU	TOC-5000A	32214315
279	TOC SOLID SAMPLER (COMBUSTION IR) (5/96)	SHIMADZU	SSM-5000A	32704137
288	TOX IV (8/96)	MITSUBISHI	TOX-10E	75C10196
289	TOX PREP IV	MITSUBISHI	TXAO2	75A31675
253	TURBIDIMETER II (GEN)	HACH	2100AN	9405000002 49
292	TURBIDIMETER-FIELD	HACH	2100P	9606000109 24
293	TURBIDIMETER-FIELD	HF SCIENTIFIC	DRT-ISCE	029308
197	VOLATILE WATERS COOLER	KELVINATOR	UC76RG-1\1700	01472594
211	WALK-IN COOLER 1 (GEN LAB)	BOHN	ADT1040F	DKG5844
212	WALK-IN COOLER 2 (RECV)	BOHN	ADT1300F	TPJ5032

Table 9.2
Field Instruments

Division	Instr. Code	Name	Manufacturer	Model
Indianapolis Lab		pH Meter	Beckman	>P/N123132
		Conductivity Meter	Hanna	HI8633
		Digital Thermometer	Fisher Scientific	NIST Thermometer
		Wastewater Sampler	ISCO	1580
		Wastewater Sampler	ISCO	2710
		Water Level Meter	Solinst	10011
		Ultra Sonic Flow Meter	ISCO	3210
		Ultra Sonic Flow Meter	ISCO	3210
		Flow Meter	ISCO	2300
	S/N001083	pH Meter	Orion	250A
Lemont Office		pH Meter	Fisher	Accumet 1001 (2 units)
		pH Meter	Sentron	2001
		Conductivity Meter	Orion	120
		Conductivity Meter	Orion	135
		Turbidimeters	HF Scientific	DRT-15CE (2 units)
		Oxidation Reduction Potential	Orion	250A
		Water Level Meter	Solinst	101-150-P2

Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
GC/MS - Volatile						
Methods 624, 8260	AccuStandard or equivalent	200ppm	frozen	1:10 dilution in methanol[1]	Frozen	Weekly or as needed
Method 524	AccuStandard or equivalent	2000ppm	frozen	Stock solution 1:20 in methanol[1] Working solution 1:10 in methanol[1]	Frozen	Quarterly, Every 2 weeks or as needed
CLP OLMØ3	AccuStandard or equivalent	100ppm	frozen	1:5 dilution in methanol[1]	Frozen	Weekly or as needed
Appendix IX	AccuStandard or equivalent	Available 100-500 ppm	frozen	Dilute to 20ppm[1]	Frozen	As needed
GC/MS - Semi-Volatile						
Methods 625, 8270	Supelco, Restek or equivalent	2000ppm	frozen	1:20 for spiking soln. Make dilution to 160 ppm for Calibration[1]	Refrig.	As Needed
Method 525.2	AccuStandard or equivalent	100ppm	frozen	1:10 for spiking soln. Stock solution - 1:10 in methanol for Calibration[1]	Refrig.	As needed
CLP OLMØ3	Supelco or equivalent	Acid 2000ppm Base 1000	frozen	1:10 for spiking soln. Stock solution - 160ppm[1]	Refrig.	As needed
HPLC Polynuclear Aromatic	AccuStandard or	500-100 ug/mL	Refrigerate	Working Stocks prepared	Refrigerate	Semi-annual

[1]Daily calibration standards are made from stock solutions at method specified concentrations.

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Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source	Lab Stock Storage	Prep Frequency
Hydrocarbons (PNA's)	equivalent			from source stock.		
	AccuStandard or equivalent Mixture 610M	Solutions of 100 - 2000 ug/mL	Refrigerate	Working stocks prepared from source stock.	Refrigerate	Semi-annual
HPLC -Diquat Dibromide Paraquat Dichloride M-549.2	AccuStandard or equivalent	1.0 mg/ml	Refrigerate	Working stocks prepared from source stock.	Refrigerate	Semi-annual
HPLC Carbamates	Internal Standards AccuStandard or equivalent	0.1 mg/mL in ACN	Refrigerate	Working Stock Prepared from Source.	Refrigerate	Semi-annual
HPLC Carbamates	Perf. Check Solution AccuStandard or equivalent	Varied concentrations	Refrigerate	Working Stock prepared from source	Refrigerate	Semi-annual
HPLC Glyphosate	AccuStandard or equivalent	0.1 mg/mL in D.I. Water	Frozen	Working Stock prepared from source	Frozen	Semi-annual
HPLC 8330	AccuStandard or equivalent mix A & B	0.1 mg/mL	Refrigerate	Working standards prepared from source stocks in the range of 2.5 - 1000 ug/L	Refrig.	30 days
Ion Chromat. - Fluoride	Accu Standard or Equivalent	1000 mg/L	Room Temp	10mL/200mL 50 mg/L working Std.	Room Temp	1 month Combined Stock
Ion Chromat. - Chloride	Accu Standard or Equivalent	1000 mg/L	Room Temp	25 mL/200mL 125 mg/L working stock	Room Temp	1 month Combined Stock
Ion Chromat. - Nitrite	Accu Standard or Equivalent	1000 mg/L	Room Temp	10mL/200mL 50 mg/L working stock	Room Temp	1 month Combined Stock

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Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source	Lab Stock Storage	Prep Frequency
Ion Chromat. - Bromide	Accu Standard or equivalent	1000 mg/L	Room Temp	10mL/200mL 50 mg/L working stock	Room Temp	1 month combined stock
Ion Chromat. - Nitrate	Accu Standard or equivalent	1000 mg/L	Room Temp	10mL/200mL 50 mg/L working stock	Room Temp	1 month combined stock
Ion Chromat. - Phosphate	Accu Standard or equivalent	1000 mg/L	Room Temp	10mL/200mL 50 mg/L working stock	Room Temp	1 month combined stock
Ion Chromat. - Sulfate	Accu Standard or equivalent	1000 mg/L	Room Temp	50 mL/200mL 250 mg/L working stock	Room Temp	1 month combined stock
GC/PID/ELCD- Volatiles	AccuStandard or equivalent	Stock solution 200 - 2000 µg/mL	Freezer 0°C	Working solutions 20µg/mL	Freezer (with minimal headspace)	4 weeks Gaseous stds. 1 week unless validity proven
	Supelco or equivalent	Stock solution 200 - 2000 µg/mL	Freezer 0°C	Working solutions 20µg/mL	Freezer (with minimal headspace)	4 weeks Gaseous stds. 1 week unless validity proven
	Chem Service or equivalent	Neat compounds	Refrig.	Stock solutions~10,000 µg/mL Working solution~20 µg/mL	Freezer (minimal headspace	As needed for special analyte lists. 4 weeks unless validity proven.
FTIR	USEPA - API reference oil, #2 fuel oil	Neat compound	Refrig.	Stock solutions: Calibration Std.~7500 Spiking soln~20,000	Refrig.	6 month exp.
				Working calibration std. from stock soln.	NA	with every calibration

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Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source	Lab Stock Storage	Prep Frequency
				L-1~8 mg/l L-2~15 L-3~77 L-4~380 L-5~770 L-6~2300		
				Daily verification std. L-3~77	NA	Daily
ICP (LCS, ICV)	3 solutions R.E., EM Science multi-element or equivalent	50-10,000ppm multi-element mixes	Room temp.	Dil. 1:10 from source for LCS or as required	Room Temp.	Bi-weekly or as needed[2]
ICP (Cal. Std's)	3 solutions - Inorganic Ventures multi-element or equiv.	100-5,000ppm Multi-element mixes	Room temp.	Dil. 1:50 from source or as required	Room Temp.	Weekly or as needed[2]
ICP (DLS, CRDL, ICS)	Perkin Elmer, Inorganic Ventures or equiv.	5-5,000ppm	Room temp.	Intermediate solutions prepared from stock	Room Temp.	Weekly or as needed[2]
ICP (CCV)	Inorganic Ventures, EM Science or equiv.	100-5,000ppm	Room temp.	Working solution prepared from source	Room Temp.	As needed
CVAA (LCS, ICV)		1.52ppm	Room temp.		Room Temp.	Daily

[2]Stability must be verified for usage past recommended time.

Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
CVAA (Cal. Std's)	Fisher, RICCA or equiv.	1,000ppm	Room temp.	250ml → 25mL from source = 10ppm intermediate std. 1mL → 100mL = 0.1ppm working std.	Room Temp.	Daily
CVAA	EPA ref. materials	As provided	Room temp.	Working solution prepared from source	Room Temp.	As needed
CVAFS (LCS, ICV)	Inorganic Venture Custom-Grade Standard or equiv.	1,000 ppm	Room temp	100 uL into 100mL = 1 ppm intermediate std. 1mL into 100mL = 10ppb working standard	Room Temp.	Monthly or as needed
CVAFS (Calibration Standards)	Plasma Pure Hg Stock Solution (Leeman Labs) or equiv.	1.000 ppm	Room temp	1mL into 100mL = 10ppb working standard	Room Temp.	Monthly or as needed
GFAA (Cal. Stds.)	Fisher, RICCA, SPEX, Specpure or equiv.	1,000ppm	Room temp.	Working solution prepared from intermediate	Room Temp.	Weekly or as needed[3]
GFAA (ICV, LCS)	EPA ref. materials	1-5ppm, As provided	Room temp.	Working solution prepared from source	Room Temp.	As needed
GFAA (LCS)	PE pure Inorganic Ventures or equiv.	1,000ppm	Room temp.	Stock prepared from source	Room Temp.	Semi-annually or as needed[4]
ICP/MS (6020,	Inorganic Ventures	20ppm	Room Temp	0.1ml/1000ml	Room Temp	As Needed

[3]Stability must be verified for usage past recommended time.

[4]Stability must be verified for usage past recommended time.

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Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
200.8) (STD1)	2008CAL-1, WW-MSCAL-2 HERT-CAL-5					
ICP/MS (6020, 200.8) (STD2, CCV)	Inorganic Ventures 2008CAL-1, WW-MSCAL-2 HERT-CAL-5	20ppm	Room Temp	1.0ml/1000ml	Room Temp	As Needed
ICP/MS (6020, 200.8) (STD3)	Inorganic Ventures 2008CAL-1, WW-MSCAL-2 HERT-CAL-5	20ppm	Room Temp	10.0ml/1000ml	Room Temp	As Needed
ICP/MS (6020, 200.8) (ICV01)	Inorganic Ventures IV-19 (Second Source) IV-7 (Second Source) Sn, Sr, Th, U, Zr	100ppm 100ppm 10000ppm	Room Temp	1.0ml/1000ml 1.0ml/1000ml .1ml/10ml = 100ppm intermediate 1.0ml of intermediate/1000ml	Room Temp	As Needed
ICP/MS (6020, 200.8) (CDL01)	Inorganic Ventures HERT-CAL-6A	10ppb Sb, Cd, Mo, Tl, Th, U 20ppb Ba, Co, Pb, Sr 40ppb Be, Cu 50ppb Ag 100ppb Ni, V 200ppb As, Cr, Mn, Se, Sn, Ti, Zr 400ppb Zn 1000ppb B 2000ppb Al	Room Temp	10.0ml/1000ml	Room Temp	As Needed
ICP/MS (6020, 200.8) (QCS, SPI01)	Inorganic Ventures QCP-QCS-3 (Second Source)	10ppm all elements except: B, Sn, Sr, Ti, Zr	Room Temp	0.1ml stock/10ml working solution	Room Temp	As Needed

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Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source	Lab Stock Storage	Prep Frequency
ICP/MS (6020, 200.8) (ICSA)	Inorganic Ventures 6020ICS-0A	10000ppm Cl 2000ppm C 1000ppm Al, Ca, Fe, Mg, Na, P, S 2ppm Mo, Ti	Room Temp	1ml/10ml intermediate 2ml/10ml working solution	Room Temp	As Needed
ICP/MS (6020, 200.8) (ICSB)	Inorganic Ventures 6020ICS-0B	2ppm Ag, As, Cd, Cr, Co, Cu, Mn, Ni, Zn	Room Temp	0.1ml/10ml intermediate 2ml/10ml working solution	Room Temp	As Needed
ICP/MS (6020, 200.8) (LCS) Part A	Inorganic Ventures HERT-CAL 2A	20ppm Si 2ppm Sb, Mo, Sn, Ti, Zr	Room Temp	5ml stock/100ml working solution	Room Temp	As Needed
ICP/MS (6020, 200.8) (LCS) Part B	Inorganic Ventures HERT-CAL-2B	20ppm Al, Ca, Fe, K, Mg, Na 2ppm Ag, As, Ba, Be, B, Cd, Cr, Co, Cu, Pb, Mn, Ni, Se, Sr, Tl, Th, U, V, Zn	Room Temp	5ml stock/100ml working solution	Room Temp	As Needed
ICP/MS (6020, 200.8) (SPI02, DPS02) SPK1	Inorganic Ventures 6020SPKW	5ppm Ag, Be, Cd, Se, Tl 10ppm As, Pb 20ppm Cr, Co, Cu, Mn, Ni, Sb, V 50 Ba, Zn 100ppm Fe	Room Temp	1ml stock/100ml working solution	Room Temp	As Needed
ICP/MS (6020, 200.8) (SPI02, DPS02) SPK2	Inorganic Ventures HERT-CAL-4A	100ppm Si 10ppm Sn, Ti, Zr 5ppm Mo	Room Temp	1ml stock/100ml working solution	Room Temp	Room Temp
ICP/MS (6020, 200.8) (SPI02, DPS02) SPK3	Inorganic Ventures HERT-CAL-4B	100ppm Ca, K, Mg, Na	Room Temp	1ml stock/100ml working solution	Room Temp	Room Temp

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Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)		Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source	Lab Stock Storage	Prep Frequency
			50ppm Al, B 10ppm Sr 5ppm Th, U				
ICP/MS (6020, 200.8) (Internal Standards)		Inorganic Ventures Bi, Li6, In, Sc, Tb, Y	1000ppm Bi, Li6, In, Sc, Tb, Y	Room Temp	In, Sc, Tb, Y 4ml/1000ml, & Bi 10ml/1000ml, & Li6 20ml/1000ml for intermediate 60ml intermediate/6000ml working solution	Room Temp	Room Temp
ICP/MS (6020, 200.8) (Tuning Solution)		Inorganic Ventures VAR-TS-MS Li7 U	10ppm Ba, Be, Ce, Co, In, Mg, Th, Tl, Pb 1000ppm (Li7) 10000ppm(U)	Room Temp	10ml/1000ml .1ml/1000ml (Li7) .1ml U/10ml intermediate 1ml intermediate/1000ml working solution	Room Temp	Room Temp
Conductivity Meters	CAL	Fisher or equiv.	Potassium chloride granules	Room temp.	0.7456g/1000ml DI (1413µmhos)	Room Temp	6 mos. or as needed
	ICV	Analytical Products Group, Inc.	Potassium chloride granules	Room temp.	As received from Vendor	Refrig. 4°C	6 mos. or as needed
Chloride	CAL	Lab Chem or equiv.	1000 ppm Concentrate	Room temp.	Made from 1000 ppm stock	Room temp.	6 mos. or as needed, exp. date on bottle
	ICV	Mallinckrodt or equiv.	500 ppm Concentrate	Room temp.	Made from 500 ppm stock		

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Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)		Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source	Lab Stock Storage	Prep Frequency
	ICV	APG or equiv.	1-5 ppm (variable) (ICV)	Room temp.	10 ml/1000ml		
Ammonia	CAL	Lab Chem or equiv.	1000 ppm concentrate	Room temp.	Made from 1000 ppm concentrate	Room temp.	exp. date on bottle
Ammonia	ICV	APG or equiv.	0.5 – 10 ppm conc. (ICV)	Room temp.	2 ml/2000 ml		
Turbidity	ICV	Fisher or equiv.	400 NTU Formazin or Divinylbenzene polymer	Room temp.	Stock prepared from source	Room temp.	Every month
	CAL	HACH	4000 NTU	Room temp.	Pre-made from stock		Every Month
TOC - Method 415.1, 9060	CAL	Lab Chem APG or equiv.	1000 ppm 20-100 ppm (variable)	Refrig.	Pre-made 5 mL/500 ml	Refrig.	Exp. Date on bottle (CAL)
Micro-Coulometric (TOX)	CAL	Aldrich or equiv.	2,4,6-Trichlorophenol granules	Room temp.	0.465 g/25 mL MeOH (10,000 ppm)	Room temp.	3 mos. or as needed, exp. date on bottle
	ICV	APG	Concentrate	Refrigerate	1 ml/1 L	Refrigerate	3 mos. or as needed, exp. date on bottle
Spectrometers Phenols	CAL	Lab Chem, or equiv.	1000 ppm Phenol	Room temp.	Pre-made from stock	Room temp.	6 mos. or as needed, exp. date on bottle
	ICV	Mallinckrodt	Phenol 1000ppm (ICV)	Room temp.	Pre-made (ICV)		

Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)		Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source	Lab Stock Storage	Prep Frequency
Nitrite	CAL	Fisher or equiv.	KNO_2 granules (CAL)	Room temp.	3.351g/500mls w/2mls $CHCl_3$ (CAL)	Room temp.	3 mos. or as needed, exp. date on bottle
	ICV	Fisher or equiv.	Premade (ICV)	Room temp.	Pre-made (100ppm) (ICV)		
Nitrate	ICV	APG	Nitrate (ICV) 1-10 ppm concentrate	Room temp.	1 ml/1000ml	Room temp.	exp. date on bottle, semi-annual
	CAL	Lab Chem or equiv.	Nitrate 1000 ppm (CAL)	Room temp.	Pre-made from stock (CAL)		
Sulfate	ICV	Fisher or equiv.	$NaSO_4$ granules	Room temp.	1.479g/1c DI 100ppm (ICV)	Room temp.	6 mos. or as needed
	CAL	Lab Chem or equiv.	100 ppm SO_4	Room temp.	Pre-made 100 ppm (CAL)		
Micro-coulometric EOX	ICV	Mallinckrodt or equivalent	Chlorobenzene	Room Temp.	3.1748g/100ml Hexane (10,000 ppm)	Room temp.	6 mos. or as needed, exp. date on bottle
	CAL	Aldrich	2,4,6-Trichlorophenol	Refrigerate	1.8564g/100 ml methanol (10000 ppm)	Refrigerate	6 mos. or as needed, exp. date on bottle
Cyanide	ICV	Fisher or equiv.	KCN granules (ICV)	Room temp.	Made from stock (ICV)	Room temp.	6 mos. or as needed Exp. Date on bottle
	CAL	Lab Chem or equiv.	Cyanide 1000 ppm (CAL)	Room temp.	.Made from 1000 ppm stock(CAL)		

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Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)		Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
PO_4	ICV	Fisher or equiv.	Phosphorus 10000ppm (ICV)	Room temp.	Pre-made	Room temp.	6 mos. or as needed
	CAL	Lab Chem or equiv.	Phosphorus 1000 ppm (CAL)	Room temp.	Made from 1000 ppm stock		
COD Reactor	CAL	RICCA or equiv.	COD 1000 ppm	Refrig. 4°C	Made from 1000 ppm stock	Refrig. 4°C	Every3 months or as needed
	ICV	APG or equiv.	KHP conc. 50-100 ppm (variable)	Refrig. 4°C	5 ml/500ml DI		
Hexavalent Chromium	CAL	Lab Chem or equiv.	$K_2Cr_2O_7$ crystals 1000 ppm (CAL)	Room temp.	Made from 1000 ppm stock	Room temp.	exp. date on bottle
	ICV	Fisher or equiv.	premade (ICV)	Room temp.	Made from 1000 ppm		
Alkalinity	ICV	APG or equiv.	Sodium Bicarbonate conc. 20-100 ppm (variable)	Room temp.	20 ml/2000ml DI	.Refrig. 4°C	Exp. Date on bottle
TDS		APG or equiv.	KHP granules	Room temp.	0.3g/1000mls	.Refrig. 4°C	Exp. Date on bottle
Bomb Calorimeter	Soils	Fisher or equiv.	Ethylene glycol	Flammable cabinet premade	N.A. pre-made	Flammable cabinet (room temp.)	as needed
	Liquids	Parr	Benzoic Acid	premade	.25 (1 tablet)	Room temp.	purchased as new
TKN Digestor	ICV	APG	glycine p-toluenesulfonate 1-20 ppm (variable)	Room temp.	10 m./1000ml DI	Room temp.	Exp. Date on bottle

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Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)		Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[5]	Lab Stock Storage	Prep Frequency
Oxygen Meter	CAL	Fisher (CAL) or equiv.	glutamic acid and dextrose	Room temp.	.15g/L	Room temp.	Every Run
	ICV	APG (ICV)	KHP concentrate	Room temp.	2ml/200ml		
GC/ECD							
Method 504.1		Ultra Scientific or equivalent	Solutions of 1000 mg/L	Refrig. if seal is broken	Dilute to 10 or 1.0 mg/L	Refrig.	As needed
Methods 505, 508, 608 and 8081, 8082		Ultra Scientific or equivalent	Solutions of analytes at various conc. - from 5 to 1000 mg/L	Refrig. if seal is broken	Working solution prepared from source or dilution of source	Refrig.	As needed
Method 515.1 and 8151		Ultra Scientific or equivalent	Solutions of analytes at various conc. - from 5 to 1000 mg/L	Refrig. if seal is broken	Working solution prepared from source or dilution of source	Refrig.	As needed
GC/NPD - Method 8141							
GC/NPD - Method 507		Ultra Scientific or equivalent	Solution at 1000 mg/L	Refrig. if seal is broken	Working solution prepared from source or dilution of source	Refrig.	As needed
GC/FID							
8015B GRO/DRO		Ultra Scientific or Accu Standard	mg/mL	Refrig.	Working standards prepared from	Refrig.	6 months
8015B - Alcohols		Aldrich, Mallinckrodt, Fisher or equiv.	Neat	Refrig.	[5]	Refrig.	6 months

[5]Primary Stock ~1000 mg/L. Working standards in the range of 0.5→100 mg/L (analyte dependent)

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Table 9.3
STANDARD SOURCES AND PREPARATION

Method / Analyte(s)		Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
8015-MOD		Commercial Source of client provided	Neat	Refrig.	[6]	Refrig.	6 months
		D-2887 Supelco or equivalent	1% (w/v) each n-hexadecane and n-octadecane in n-octane	Refrig.	Primary stock ~ 7000 mg/L working solution 70 mg/L	Refrig.	6 months

1 Daily calibration standards are made from stock solutions at method specified concentrations. Exact dilutions and final concentrations may vary depending on the source available and the final concentrations required.

[6]Primary stock ~ 1000 mg/L working standards in the range of 5-500 mg/L

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Table 9.4
STANDARDIZATION OF TITRATING SOLUTIONS

Solution (N)	Source of Primary Standard	Frequency of Standardization	Methods Utilized
EDTA (0.2N)	$CaCO_3$ NIST	Daily	130.2
NaOH (0.02N)	$KHC_8H_4O_4$ NIST	As Needed (Each new soln.)	305.2
H_2SO_4 (0.1N)	Na_2CO_3 NIST	As Needed (Each new soln.)	375.4, 310.1, 350.2
HCl (0.1N)	Na_2CO_3 NIST	As Needed (Each new soln.)	310.1
Phenylarsine Oxide (0.0375N)	$KH(IO_3)_2$ Fisher	Daily	345.1, 320.1
$Na_2S_2O_3$ (0.75N)	$KH(IO_3)_2$ Fisher	Daily	320.1
$Hg(NO_3)_2$ (0.141N)	NaCl NIST	Daily	325.3
$Hg(NO_3)_2$ (0.025N)	NaCl NIST	Daily	325.3
$Hg(NO_3)_2$ (0.0141N)	NaCl NIST	Daily	325.3
Phenylarsine Oxide (0.00564N)	$KH(IO_3)_2$ Fisher	Daily	330.2
KI (0.1N)	PAO Red Bird Service	Daily	330.2
KI (0.0282N)	PAO Red Bird Service	Daily	330.2
$Fe(NH_4)_2(SO_4)_2$ (N)	$K_2Cr_2O_7$ NIST	Monthly	330.4
KCN (0.0192N)	$AgNO_3$ Red Bird Service	Monthly	335.2
$Na_2S_2O_3$ (0.0375N)	$KH(IO_3)_2$ Fisher	Daily	345.1
KI (0.0225N)	PAO, $Na_2S_2O_3$	Daily	376.1
Methylene Blue	KI	Daily	376.2
$Fe(NH_4)_2(SO_4)_2$(0.25N)	$K_2Cr_2O_7$ NIST	Daily	410.1, 440.3
$Fe(NH_4)_2(SO_4)_2$(0.025N)	$K_2Cr_2O_7$ NIST	Daily	410.2
I_2	$Na_2S_2O_3$	Bi-Weekly	
Karl Fischer Reagent	Methanol, Sodium Tartrate Dihydrate	Daily	D1744

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Table 9.5
GFAA MINIMUM ABSORBANCE CRITERIA

Element	Standard (ug/L)	Min. Abs.
As	10	0.035
Be	2.0	0.025
Cd	2.0	0.050
Cu	10	0.050
Cr	10	0.100
Pb	10	0.050
Ni	10	0.035
Sb	10	0.035
Ag	2.0	0.025
Se	10	0.025
Tl	10	0.040

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
FAA (Subcontract only)	**7000** Series SW-846	4	Correlation coefficient must be ≥ 0.995	At least daily, or as required	Every calibration	90-110% R	Beginning, End and every 10 analytical samples	90-110% R
	200 Series EPA600/4-79/020, March 1983 EPA/600/R-94/111, May 1994	4				90-110% R		90-110% R
	CLP / ILM04 & Updates	4				90-110% R		90-110% R
CVAA-FIMS	SW-846: **7470/7471**	4				90-110% R		80-120% R
	EPA 245.1, Rev.3.0, 5/94 (Drink. Water)	5				95-105% R		90-110% R
	EPA 245.1, 4/79 (CWA)	4				80-120% R		80-120% R
	CLP / ILM04 & Updates	4				80-120% R		80-120% R
ICP	**6010A/6010B** SW-846	1				90-110% R		90-110% R
	200.7 40 CFR 136 Appendix C				QCS (ICV) to verify new CAL Stds. Weekly	95-105% R		95-105% R
	200.7 Rev. 4.4 EPA/600/R-94/111, 5/94	1			QCS to verify new CAL Stds. Quarterly	90-110% R No ICV, req'd.		95-105% R first time, then 90-110% R continuing
	CLP / ILM04 & Updates	1			Every Calibration	90-110% R		90-110% R
ICP/MS	**6020** SW846	3				90-110% R		90-110% R
	200.8, Rev. 5.3 5/94	3				90-110% R		90-110% R

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
GFAA	**7000** Series SW-846 **2XX.2 Series** EPA600/4-79/020, March 1983 **200.9** EPA/600/R-94/111, May 1994 **CLP / ILM04**	4	Correlation coefficient must be ≥ 0.995	At least daily, or as required	Every calibration	90-110% R	Beginning, End and every 10 analytical samples	90-110% R
CVAFS	**EPA 1631, Rev. E**	5	RSD ≤ 15%. Lowest Std. 75-125% Recovery. System Blanks < 0.5 ng/L	Daily	Every Calibration	90-110% R	Called OPR; Beginning, End and at end of a 12-hour Shift	77 – 123% R
pH Meter	**EPA 150.1** EPA600/4-79/020, March 1983 **9040B/9045C** SW-846	2-3	±0.05 STD units of true value	Each use	Every Calibration	± 0.05 Std. units of true value	Every 10 samples	± 0.05 Std. units of true value
Analytical Balance	Not Applicable	1	± 0.5% of Class "S" True Value	Daily	Monthly - 5 Pt.	± 0.5% of Class "S" True Value	NA	NA

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
GC/MS-volatiles	**8260A/ 8260B** SW-846	5	%RSD of RF's should be <15% each compound. %RSD <30% (CCC's) If any compound RF-RSD >15%, use the average RF for quant. If RF-RSD for any compound > 15%, may use non-linear calibration. See Method 8000B. If the mean of all RSD values <15, then avg. RF may be used. **CCC (RSD <30%)** 1,1-dichloroethene; chloroform 1,2-dichloropropane; toluene ethyl benzene; vinyl chloride **Minimum RF (SPCC)** chloromethane 0.10 1,1-dichloroethane 0.10 bromoform 0.10 1,1,2,2-tetrachloroethane 0.30 chlorobenzene 0.30	As needed	As needed to verify new standards	80 - 120 % R	Daily, 12 hr.	CCC % D < 20% . Same SPCC criteria as initial calibration
	624 40 CFR 136	3 - 5	All compounds RSD <35%, or use calibration curve	As needed	As needed to verify new standards	80 - 120 % R	Daily, 24 hr.	Compare w/Table 9.5 "Q" (attached)

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
GC/MS Volatiles	**OLMO3** & Updates CLP SOW	5	min RF Bromoform 0.10 Vinyl Chloride 0.10 1,1-dichloroethene 0.10 1,1-dichloroethane 0.20 Chloroform 0.20 1,2-dichloroethane 0.10 1,1,1-trichloroethane 0.10 Carbon tetrachloride 0.10 Bromodichloromethane 0.20 cis-1,3-dichloropropene 0.20 Trichloroethene 0.30 Dibromochloromethane 0.10 1,1,2-trichloroethane 0.10 Benzene 0.50 trans-1,3-dichloropropene 0.10 Bromoform 0.10 Tetrachloroethene 0.20 1,1,2,2-tetrachloroethane 0.50 Toluene 0.40 Chlorobenzene 0.50 Ethylbenzene 0.10 Styrene 0.30 Xylene (total) 0.30 Bromofluorobenzene 0.20 **all % RSD <20.5** **Other target compounds must meet minimum RF of 0.10** **No %RSD criteria.** **Up to two analytes may exceed 20.5 %RSD but may not exceed 40 %RSD.**	As needed	As needed to verify new standards	80 - 120 % R	Daily every 12 hours	RF criteria same as initial cal. % D <25.0. Up to two analytes can exceed % D<25.0 but cannot exceed 40% D.
	EPA 524.2, Rev. 4.1 Drinking Water Volatiles	5 (or fewer as method specified)	% RSD <20% or use cal curve - all target compounds	As needed	As needed to verify new standards	80 - 120 % R	Daily, every 12 hours	All compounds RF % D <30% ISTD areas >30%, <150% of initial cal.

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
GC/MS - Semi-volatiles	**8270B/8270C** SW-846	5	%RSD of RF's should be <15% each compound. %RSD <30% (CCC's) If any compound RF-RSD > 15%, use the average RF for quant. If RF-RSD for any compound > 15%, may use non-linear calibration. See Method 8000B. If the mean of all RSD values <15, then avg. RF may be used. RRT +/- 0.06 **CCC (%RSD <30%)** acenaphthene 1,4-dichlorobenzene hexachlorobutadiene N-nitroso-diphenylamine di-octylphthalate fluoranthene benzo(a)pyrene 4-chloro-3-methylphenol 2,4-dichlorophenol 2-nitrophenol phenol pentachlorophenol 2,4,6-trichlorophenol **RF >0.05(SPCC)** N-nitrosodipropylamine hexachlorocyclopentadiene 2,4-dinitrophenol 4-nitrophenol	As needed	As needed to verify new standards	80 - 120 % R	Daily, every 12 hours	CCC % D < 20% . Same SPCC criteria as initial cal. Accept if avg. response for all analytes <20% D
	625 40 CFR 136	3-5	%RSD < 35% or cal. curve all compounds	As needed	As needed to verify new standards	80 - 120 % R	Daily every 24 hours	RF % D < 20%

Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
GC/MS - Semi-volatiles	**OLMO3** & Updates CLP SOW	5	min. RF phenol 0.80 bis(2-chloroethyl)ether 0.70 2-chlorophenol 0.80 1,3-dichlorobenzene 0.60 1,4-dichlorobenzene 0.50 1,2-dichlorobenzene 0.40 2-methylphenol 0.70 4-methylphenol 0.60 N-nitrosodipropylamine 0.50 hexachloroethane 0.30 nitrobenzene 0.20 isophorone 0.40 2-nitrophenol 0.10 2,4-dimethylphenol 0.20 bis(2-chloroethoxy)methane 0.30 2,4-dichlorophenol 0.20 1,2,4-trichlorobenzene 0.20 naphthalene 0.70 4-chloro-3-methylphenol 0.20 2-methylnaphthalene 0.50 2,4,6-trichlorophenol 0.20 2,4,5-trichlorophenol 0.20 2-chloronaphthalene 0.80 acenaphthylene 1.30 2,6-dinitrotoluene 0.20 acenaphthene 0.80 dibenzofuran 0.80 2,4-dinitrotoluene 0.20 4-chlorophenylphenylether 0.40 fluorene 0.90 4-bromophenylphenylether 0.10 hexachlorobenzene 0.80 pentachlorophenol 0.05 phenanthrene 0.70 anthracene 0.70 fluoranthene 0.60 pyrene 0.60	As needed	As needed to verify new standards	80 - 120 % R	Daily, every 12 hours	RF % D < 25 RF criteria same as initial calibration for listed compounds. Up to four analytes may exceed 25% D but cannot exceed 40% D.

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
GC/MS Semi-volatiles			benz(a)anthracene 0.80 chrysene 0.70 benzo(b)fluoranthene 0.70 benzo(k)fluoranthene 0.70 benzo(a)pyrene 0.70 indeno(1,2,3,cd)pyrene 0.50 dibenz(a,h)anthracene 0.40 benzo(ghi)perylene 0.50 nitrobenzene d5 0.20 2-fluorobiphenyl 0.70 terphenyl-d_{14} 0.50 phenol-d_5 0.80 2-fluorophenol 0.60 2-chlorophenol-d_4 0.80 1,2-dichlorobenzene-d_4 0.40 **%RSD < 20.5%. Other target compounds have no %RSD but must have RF > 0.01** **Up to 4 analytes may exceed 20.5 %RSD, but cannot exceed 40 %RSD.**					
	EPA **525.2**, Rev. 2.0 Drinking Water Semi-volatiles	6	%RSD < 30% all compounds. Chromatographic separation of isomers. 10% of compounds may exceed this criterion.	As needed	As needed to verify new std	80-120 % R	Daily, every 12 hours	RF % D < 30%. ISTD areas > 30% < 150% from initial calibration. 10% of analytes may exceed 30 % (RF) %D, but not more than three times in a row.
	Drinking Water EPA **548.1** Endothall EPA-600/R-92/129 August 1992 (Supplement II)	6	%RSD < 30% all compounds. Chromatographic separation of isomers. 10% of compounds may exceed this criterion.	As needed	As needed to verify new standards.	80-120% R	Daily, every 12 hours	RF % D < 30% . ISTD areas > 30% < 150% from initial calibration. 10% of analytes may exceed 30 % (RF) % D, but not more than three times in a row.
GC/MS High Resolution (Subcontract)	Dioxins **8280** PCDDs and PCDFS SW-846	5	%RSD ≤ 15%	As needed	As needed to verify new standards	80-120% R	Daily, every 12 hours	CCC % D <30% Relative Response for up to 2 Int. Std.'s may be >30%, but must be < 40%

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
								of mean RF.
GC/NPD	N-P Pesticides: EPA **507**, Rev. 2.1	3	RF < 20% RSD or linear calibration, r ≥ 0.995	As needed	As needed to verify new standards	80-120 % R	2 times daily, beginning and end of day	RF %D <20%
	Organophosphorus Pesticides: **8141A** SW-846	5	RF < 20% RSD (mean of all RSD values) or Cal. Curve	As needed	As needed to verify new standards	80-120% R	Beginning of each 12-hour shift & end of set.	Average of the response for all analytes ±15 %D. R.T. Window ± 3 SD.
GC/FID	SW-846 **8015B** Non-Halogenated Volatiles and Semi-Volatiles, including GRO, DRO, Alcohols, Glycols, ...	5	RF or CF < 20% RSD (mean of all RSD values) or Cal. Curve	As needed,	As needed to verify new standards	80-120% R	Beginning of each 12-hour shift & end of set.	Average of the response for all analytes ±15 % D With Azeotrophic Distillation use ±20 % D R.T. Window ±3 SD
	SW-846 **8040A** Phenols	5	RF or CF < 20% RSD (mean of all RSD values or cal. curve)	As needed	As needed to verify new standards	See method	See method	See method
HPLC	EPA **531.1**, Rev. 3.1 Drinking Water Carbamates	3-5	RF < 20% RSD or single point or calibration curve, r ≥ 0.995	As needed, when CCV > 20%D	Quarterly	80-120% R	Min. of 2 1 beg, 1 end	80 – 120% R
	SW-846 **8318** Carbamates	5	RF < 20% RSD or calibration curve, r ≥ 0.995	Daily or as needed	Each Calibration	85 – 115% R	Beginning, Every 10 analytical samples and Ending	80 – 120% R
	EPA **549.2** Drinking Water Diquat & Paraquat EPA-600/R-92/129 August 1992	3-5	RF < 20% RSD or calibration curve, r ≥ 0.995	As needed	As needed to verify new standards	80-120% R	2 levels, beginning and every 10 injections	80 – 120% R

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria – Continuing Calibration Verification
HPLC	EPA **550** Drinking Water PNA's EPA-600/4-90/020 July 1990	3-5	RF < 20% RSD or calibration curve, r ≥ 0.995	As needed	As needed to verify new standards	80-120% R	2 levels, beginning and every 10 injections	80 – 120% R
	EPA **547** Drinking Water Glyphosate EPA-600/4-90/020 July 1990	3-5	RF < 20% RSD or calibration curve, r ≥ 0.995	As needed	As needed to verify new standards	80-120% R	2 levels, beginning and every 10 injections	80 – 120% R
	SW-846 **8310** Polynuclear Aromatic Hydrocarbons	5	Calibration curve, r ≥ 0.995	As needed, when CCV > 15%D or every 6 months	As needed, with prep of new std.	80-120% R	Daily, 10%	85 – 115% R
	EPA **610** Polynuclear Aromatic Hydrocarbons	3	Calibration curve, r ≥ 0.995	When CCV > 15%D	As needed, with prep of new std.	80-120% R	Daily 10%	85 – 115% R
GC-PID/ ELCD	EPA **502.2, Rev. 2.1** Drinking Water	3-5	RF < 10% RSD or cal. curve or single point cal.	When CCV > 20%D	As needed, with prep of new std. or quarterly	80-120% R	Daily	20%D
	EPA **601** Halogenated Volatiles 40 CFR, Part 136	3	RF < 10% RSD or cal. curve	As needed, when ICV or CCV > Table 2 criteria	As needed, with prep of new std.	See method 601 Table 2 criteria ~ 30% D (Q Value)	Daily Note: ICV = CCV in this case (different source than calibration standards)	For % Rec. see method 601 Table 2 (Q Value)

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
GC-PID/ ELCD	EPA **602** Aromatic Volatiles 40 CFR, Part 136	3	RF < 10% RSD or cal. curve	As needed, when ICV or CCV > Table 2 criteria		See method 602 Table 2 Criteria ~ 25%D (Q Value)		For % Rec. see method Table 2 (Q Value)
	SW-846 **8021A / 8021B** Halogenated and Aromatic Volatiles	5	RF or CF < 20% RSD (mean of all RSD values) or use cal. curve	As needed,	As needed with prep of new std.	80-120% R	Bracket each set of 10 samples	Average of the response for all analytes ±15 % D With Azeotrophic Distillation use ±20 % D R.T. Window ± 3 SD
FTIR	**EPA 418.1** TPH EPA/600/4-79-020, March 1983 (Subcontract)	5	< 20%RSD Correlation Coeff. (r) ≥ 0.995	When CCV is > 20%D	As needed, with prep of new std.	80-120% R	Beg. And end of each sequence	20% D
	18th Ed. Standard Methods **5520F** Total Oil & Grease or TPH (subcontract)	5	20% D Correlation Coeff. (r) ≥ 0.995	When CCV is > 20%D	As needed, with prep of new std.	80-120% R	Beg. And end of each sequence	20% D
GC-ECD	EPA **508**, Rev. 3.1 Pesticides & Screening for PCB's	5	Linearity < 20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum.	80-120% R	Every tenth injection or as required by method	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20%
	EPA **508A** PCB's by Perchlorination EPA-600/4-88/039 December 1988 (Revised July 1991)	7	RF ± 3 S.D.	As needed	As needed to verify new standards	80-110% R	Every 8 hours and beginning and end of run.	20% D R.T. criteria is mean RT ± 3 S.D.

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria – Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
GC-ECD	EPA **504.1**, Rev. 1.1 Drinking Water EDB/DBCP	5	Linearity < 20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-120% R	Every tenth injection or as required by method	Primary column % D < 15. Conf. column % D < 15. R.T. Shift, Capp. Columns <0.3%. RT Shift Mega-Bore Columns < 1.5%
	SW-846 Pesticides/PCB: **8081 / 8081A** Herbicides: **8151 / 8151A**	5	RF or CF < 20% RSD (mean of all RSD values) or use cal. curve	As Needed	As needed to verify new standards	75-120% R or as control charted	Minimum every 20th (recommend 10th) injection. Beginning of each 12-hour shift & end of set.	Average of the response for all analytes 15 % D With Azeotrophic Distillation use 20 % D R.T. Window 3 SD RF or CF 15 % D of Initial Calib. RF or CF. R.T. Shift, Capp. Columns <0.3%. RT Shift Mega-Bore Columns < 1.5% Breakdown criteria: DDT < 15% Endrin < 15% Combined < 15%
	PCB's: **8082** SW-846	5	RF or CF < 20% RSD (mean of all RSD values) or use Cal. curve	As needed	As needed to verify new calibration standards	75 - 120 % R	Minimum every 20th (recommend 10th) injection and end of set.	RF or CF 15 % D of Initial Calib. RF or CF.
	Herbicides EPA **515.1**, Rev. 4.1	5	Linearity < 20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80 - 120% R	Every tenth injection and beginning and end of run, or as required by method	Primary column %D < 15. Conf. column %D < 15. R.T. Shift, Cap. Columns <0.3%. RT Shift Mega-Bore Columns <1.5%
	EPA **608** 40 CFR Part 136	5	Linearity < 10% RSD	Each Run	As needed to verify new standards	80 -120% R	Every tenth injection or as required by method	Primary column % D < 15. Conf. Column % D < 20. R.T. Shift, Cap. Columns < 0.3% RT Shift Mega-Bore Columns < 1.5% Breakdown Criteria:

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria – Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
								DDT < 20% Endrin < 20% Combined < 30%
GC-ECD	EPA **515.2** Drinking Water Pesticides EPA-600/R-92/129 August 1992 (Supplement II)	3-5	Linearity < 20 %D	As needed	As needed to verify new standards	80-120 % R	Every tenth injection and beginning and end of run, or as required by method	Primary column % D <15. Conf. Column % D <20. R.T. Shift, Capp. Columns <0.3%. RT Shift Mega-Bore Columns < 1.5%
	EPA **OLM03** & Updates Pesticides/PCB's (CLP SOW)	3+Instr. Blank Multi-Comp. Targets Calib. as single point	All peaks 100% resolved. Performance evaluation mixtures (PEMs) ≤ 25.0 RPD. 1 Chromatogram from each of 2 indiv. A&B must yield peak highs of 50-100% of full scale. Resolution of midpoint std. mixes A&B ≥ 90% Linearity ≤ 20% RSD except: Surrogates ≤ 30% Any 2 targets ≤ 30% Resolution check mix ≥ 60% Breakdown of DDT & Endrin ≤20%, Combined < 30%	Each Run	As needed. With each new std. Quarterly at a minimum	80-110% R	Every 12 hours (PEM or indiv. A&B)	PEMs and Indiv. A&B within RT windows of init. calibration. PEMs RPD ≤ 25.0. Resolution of PEM must be 100%. Resolution of indiv. A&B ≥ 90% Breakdown of DDT & Endrin ≤ 20% Combined ≤ 30%
	EPA 551.1 Chloral Hydrate	5	Linearity ≤ 10% RSD or use Linear Regression or Second Order curve.	Each Run (Daily)	As needed to verify new standards	80-120% R	Beginning, Every 10 analytical samples and Ending every 12 hours (2 diff. Levels)	75 – 125% R (90% of the analytes must recover at 80 – 120%)
	EPA 552.2 Haloacetic Acids	5	Linearity < 20% RSD or use Linear Regression, r ≥. 0.995 for all analytes	Each Run (Daily)	As needed to verify new standards	80-120% R	Beginning, Every 10 analytical samples and Ending every 12 hours	70 – 130% R

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
Ion Chromatography	Inorganic Anions EPA **300.0** Bromide, Chloride, Fluoride, Nitrate, Nitrite, Ortho-Phosphate-P, Sulfate Rev. 2.1, EPA-ORD Revised August 1993	3-5	r ≥. 0.995 for all analytes	As needed	As needed to verify new standards	90-110 % R	Each working day and after every 10 injections, beginning and end of run.	90-110% R
Ion Chromatography	Inorganic Anions SW-846 **9056** Bromide, Chloride, Fluoride, Nitrate, Nitrite, Ortho-Phosphate-P, Sulfate	5	r ≥ 0.995 for all analytes	As needed	Daily	90-110 % R	Beginning, End and every 10 injections	95-105% R
Ion Chromatography	Inorganic Anions Standard Methods 18th Ed. **SM 4110B** Bromide, Chloride, Fluoride, Nitrate, Nitrite, Ortho-Phosphate-P, Sulfate	3-5	r ≥ 0.995 for all analytes	As needed and when detector setting, eluent, or regenerant is changed.	As needed to verify new standards	90 - 110% R	Each working day and after every 10 injections, beginning and end of run.	90 - 110% R
Colorimeter (Alpkem - Automated)	SW-846 **9066** w Distill. by 9065 EPA **420.2** w/ Distill. by 420.1 **Phenols** EPA/600/4-79-020, March 1983 EPA/600/R-93/100 August 1993	7	Correlation Coeff. (r) ≥ 0.995.	At least daily, or as required when CCV fails.	Every calibration	90 -110% R	Every ten analytical samples	90 -110% R

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
Colorimeter (Lachat - Automated)	EPA **353.2** **Nitrate-Nitrite** EPA/600/4-79-020, March 1983 EPA/600/R-93/100 August 1993	7	Correlation Coeff. (r) ≥ 0.995.	At least daily, or as required when CCV fails.	Every calibration	90 -110% R	Every ten analytical samples	90 -110% R
Colorimeter (Lachat - Automated)	EPA **325.2** **Chloride** EPA/600/4-79-020, March 1983 EPA/600/R-93/100 August 1993	7	Corr. Coeff. ≥ 0.995.	At least daily, or as required when CCV fails.	Every calibration	90 -110% R	Every ten analytical samples	90 -110% R
Turbidimeter	EPA **375.4** **Sulfate** EPA/600/R-93/100 August 1993	8	Not Applicable to Pre-calibrated Instruments	Every 3 months or as needed.	Every Calibration	90 - 110% R	Every ten analytical samples	90 - 110% R
	SW-846 **9038** Sulfate	9	Not applicable to pre-calibrated instruments	Every 3 months or as needed	Every calibration	90-110 % R	Every 10 analytical samples	90-110% R
	EPA **180.1** Turbidity EPA/600/4-79-020, March 1983 EPA/600/R-93/100 August 1993	1	Not Applicable to Pre-Calibrated Instruments	1 month or as needed.				
Colorimetric Alpkem - Automated	SW-846 **9012A** EPA **335.3** **EPA 335.4** Total Cyanide EPA/600/4-79-020, March 1983 EPA/600/R-93/100 August 1993	8	Corr. Coeff. ≥ 0.995 ± 5% of NIST or other standard glass filters intensity when 6-month check performed.	At least daily, or as required when CCV fails. Wavelength accuracy and repeatability checks every 6 months	Every calibration	90 - 110% R	Every 10 analytical samples, beginning and end.	90-110% R

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria – Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
Colorimeter (Lachat-Automated)	EPA **365.1** Phosphorus, all forms EPA/600/4-79-020, March 1983 EPA/600/R-93/100 August 1993	8	Corr. Coeff. ≥ 0.995 ± 5% of NIST or other standard glass filters intensity when 6-month check performed.	At least daily, or as required when CCV fails. Wavelength accuracy and repeatability checks every 6 months	Every calibration	90 - 110% R	Every 10 analytical samples, beginning and end.	90-110% R
	EPA **365.2** o-Phosphorus EPA/600/4-79-020, March 1983							
Manual Spectrophoto meter	EPA **410.4** COD, low level EPA/600/4-79-020, March 1983	9		Every 3 months or as needed				
UV/VIS or Colorimeter	SW-846 **7196A** **SM 3500 CRD** Hexavalent Chromium		90-110%R		Every Calibration (as an LCS or LFB)		Every 15 analytical samples	90-110% R
Conductivity Meter	SM 2510B 18th SW-846 **9050** EPA **120.1** EPA/600/4-79-020, March 1983	1	Calculate Cell Constant ± 1% of mean value	Daily	Every Calibration	80-120% R	Every 10 analytical samples	80-120% R
Dissolved Oxygen Meter	EPA **405.1** (BOD SM **5210B**(BOD) Std. Methods 18th EPA/600/4-79-020, March 1983	1	90-100% R (Compare to Iodo-metric Method)	Daily	Every Calibration	80-120% R Advisory Only	Every 10 analytical samples	84.6 - 115.4 % R [GGA] (See Std. Methods)
	EPA **360.1** EPA/600/4-79-020, March 1983							

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria – Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria – Continuing Calibration Verification
TOC (Combustion-IR)	EPA **415.1** SW-846 **9060** EPA/600/4-79-020, March 1983	6	Correlation Coeff. (r) ≥ 0.995.	Every 3 months or as needed	Every Calibration	90-110% R	Every 10 Analytical Samples	90-110% R
TOX (Micro-coulometric)	SW-846 **9020B**	1	90-110% R	Weekly or as Needed		80 – 120% R	Every 10 Pyrolysis burns	
	SW-846 **9023** EOX	3	Mean of triplicate injections must be 2.2 – 2.8 ug Cl^- and RSD ≤ 5	Daily		80-120% R	Every 10 analytical samples	
Bomb Calorimeter	ASTM-**D240**	1	95-105% R	Daily		90-110% R	Every 10 analytical samples	
Ion Selective Electrode	**SM 4500 F-B** **SM 4500 F-C** Fluoride w/ Dist. 18th Ed. Standard Methods	5	Correlation Coeff. r ≥ 0.9980	Daily	Daily	90 - 110% R	Every 10 analytical samples and end of run	
	SW-846 9214							
	EPA 340.2 Fluoride w/ Dist. EPA/600/4-79-020 March 1983							
	EPA 350.3 Ammonia-N w/Dist. EPA/600/4-79-020 March 1983							
	EPA 351.4 TKN EPA/600/4-79-020							

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
	March 1983							
Proportional Counter	Gross Alpha, Beta EPA **900.0**	NS	No Criteria for Count Rate Efficiency	Monthly	N/A	N/A	Daily and Every 10 Analytical Samples	Control Chart (±3 Sigma)
Proportional Counter	Gross Radium EPA **900.1**			Every six months				
Gamma Spectr.	Cesium EPA **901.0**			Annually				
			No Criteria for System Energy Calibration	Daily or 2 times/week				
Gamma Spectr.	Gamma Emitters EPA **901.1**		No Criteria for Detection Efficiency	Annually				
			No Criteria for System Energy Calibration	Daily or 2 times/week				
Proportional Counter and Liquid Scintillation	Iodine EPA **902.0**		No Criteria for Detection Efficiency	Every 6 months				
Proportional Counter	Radium 223, 224, 226 EPA **903.0**							
Liquid Scintillation	Radium 226 EPA **903.1**							
Proportional Counter	Radium 228 EPA **904.0**							

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Table 9.6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Calibration	Calibration Acceptance Criteria	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Maximum Acceptance Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Maximum Acceptance Criteria - Continuing Calibration Verification
Proportional Counter	Strontium EPA **905.0**	NS						
Liquid Scintillation	Tritium EPA **906.0**							
Proportional Counter	Actinide Elements EPA **907.0**							

1 Number of Standards Run is 1, unless noted otherwise
2 Only when an unusually large analyte list requires analysis of more than one standard mix for injection by GC/NPD.
3 Not Specified by Method

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Table 9.6-Attachment
GC/MS – VOLATILE
CONTINUING CALIBRATION CHECK-EPA METHOD 624

	Range for "Q" in ug/L
Benzene	12.8-27.2
Bromoform	14.2-25.8
Carbon tetrachloride	14.6-25.4
Chlorobenzene	13.2-26.8
Chloroethane	7.6-32.4
2-Chloroethylvinyl-ether	D-44.8
Chloroform	13.5-26.5
Dibromochloromethane	13.5-26.5
Bromodichloromethane	13.1-26.9
1,4-Dichlorobenzene	12.6-27.4
1,1-Dichloroethane	14.5-25.5
1,2-Dichloroethane	13.6-26.4
1,1-Dichloroethene	10.1-29.9
1,2-Dichloropropane	6.8-33.2
trans-1,3-Dichloropropene	10.0-30.0
Ethylbenzene	11.8-28.2
Bromomethane	2.8-37.2
Chloromethane	D-40.8
Methylene Chloride	12.1-27.9
1,1,2,2-Tetrachloroethane	12.1-27.9
Tetrachloroethene	14.7-25.3
Toluene	14.9-25.1
trans-1,2-Dichloroethene	13.9-26.1
1,1,1-Trichloroethane	15.0-25.0
1,1,2-Trichloroethane	14.2-25.8
Trichloroethene	13.3-26.7
Trichlorofluoromethane	9.6-30.4
Vinyl Chloride	0.8-39.2

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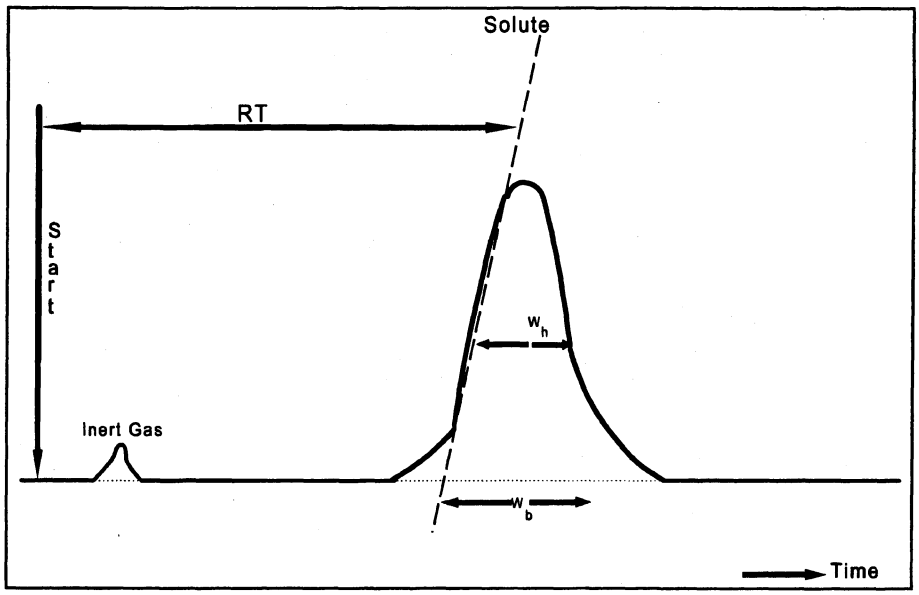
Figure 9.1

CALCULATION OF THEORETICAL PLATES



$$\frac{n}{cm} = \frac{5.545\left(\frac{RT}{Wh}\right)^2}{L}$$

n = # theoretical plates
RT = distance from injection to peak maximum (retention time in centimeters)
W_h = peak width at half height
L - column length in centimeters

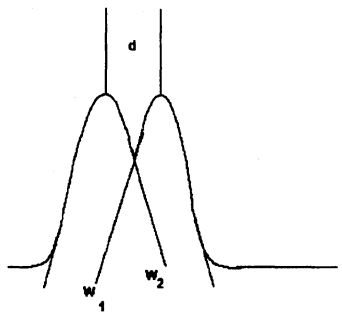
$$n = \frac{16\left(\frac{RT}{W_b}\right)^2}{L}$$

or;

Where: W_b = Width of peak at base

Figure 9.2

CALCULATION OF RESOLUTION



$$R = \frac{2d}{W_1 + W_2}$$

Where d = difference in elution times between two peaks.
W_1 = peak width for analyte 1.
W_2 = peak width for analyte 2.

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10.0 Preventive Maintenance

10.1 Where practical, maintenance agreements have been executed with instrument manufacturers. Such may be the case with the following major lab instrumentation:

GC Equipment

GC/MS Equipment

ICP/MS Equipment

HPLC Equipment

Atomic Emission (ICP) Spectroscopy Equipment

Lab Data Management Systems

For those instruments for which no maintenance agreements are available, an attempt has been made to maintain at least two functional instruments (e.g. TOX, pH Meters, EP Extractors, DO Meters, Conductivity Meters, Balances, etc.). If adequate in-house expertise exists and parts are stocked or easily available, maintenance agreements may be cancelled upon approval of the Lab Director.

10.2 A copy of the instrument manufacturer's instructions will be readily available in the work area (where available). The appropriate supervisor's and/or analyst's maintain a log for each instrument. Information kept in this log must include, but is not necessarily limited to:

1. Name of the item or equipment
2. Instrument manufacturer's name, type identification, and serial number or other unique identification.
3. Date instrument received and date placed in service.
4. Current location, where appropriate.
5. Condition when received (e.g., new, used, reconditioned).
6. A daily "response check" or "sensitivity check" (curve verification data).
7. A record of problems and their solutions.
8. A record of maintenance and preventive maintenance service calls noting what was done each time.
9. Initials of analyst and dates.
10. Acceptance range criteria, if applicable (balances, temp. monitoring, etc.)

10.3 Supervisors are required to maintain a supply of items critical to the performance of their instruments (e.g. electron multipliers for GC/MS, key circuit boards). Blanket purchase authority is given to supervisors for any item valued at less than $1,000.00

for each item to a maximum of $5,000.00 per group; the Lab Director must approve more costly items and/or higher maximums per group.

10.4 Logbooks are also maintained for all equipment/instrumentation monitoring activities, such as:

1. Balances - accuracy checks
2. Ovens - temperature monitoring (dedicated, calibrated thermometers)
3. Refrigerators - temperature monitoring (dedicated, calibrated thermometers)
4. Incubators - temperature monitoring
5. De-ionized Water Systems – resistivity/conductivity checks
6. Zero Headspace Extractors - leak tests
7. Hot Plates - surface temperature monitoring
8. Fume Hoods - Airflow
9. Extractors (EP, TCLP) - RPM checks
10. Gas Tanks - changes

10.5 Table 10.1, Routine Preventive Maintenance provides the following information:

1. Instrument/Equipment type
2. Specific activity
3. Frequency

All routine maintenance is documented in a logbook specific to the instrument or equipment. Service calls and all repairs will also be documented in this same logbook. Preventive maintenance procedures to be employed are described in detail in instrument manuals.

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Gas Chromatography/Mass Spectrometry (Volatiles)	Changing transfer lines	As needed
	Changing septa	Every 20-30 injections*
	Clean source	As needed
	Change trap (purge & trap)	As needed
	Change column	Every 3-4 months or as needed
	Flush sample lines with methanol* (P & Trap)	As needed
	Replace gas filters and traps	As needed or as indicated by traps
	Check cylinder gas pressures	Daily
	Measure the flows	As needed
	Replace vacuum pump oil	Annually
	Clean sparger	Weekly
	Bake Trap	As needed
	Check for leaks	Monthly

*or when criteria can't be met

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Gas Chromatography/Mass Spectrometry (Semi-Volatiles)	Check/Change injection liner	Daily or each day of use
	Change septum	Daily or each day of use
	Check/Trim head of column	Daily or each day of use
	Bake the source	When response to DFTPP initial standards decrease below acceptable levels
	Clean the source	When baking fails
	Replace gas filters and traps	As needed or as indicated by traps
	Check syringe/replace	Daily or each day of use
	Check cylinder gas pressures	Daily
	Bake out injector body	High Background
	Measure the flows	As needed
	Replace vacuum pump oil	Annually
Gas Chromatography/ECD	Change port liners	Twice per month
	Clean detectors	Twice annually
	Remove front 6" of column	As needed
	Check cylinder gas pressures	Daily
	Bake out injector body	High Background
	Measure the flows	As needed

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Gas Chromatography/ECD	Change septa	Daily
	Replace gas filters and traps	As needed or as indicated by trap
	Check syringe/replace	Daily (minimum) or each day of use
	ECD leak test (swipe)	Every 6 months
Gas Chromatography/PID, ELCD, NPD, FPD, FID	Change port liners	As needed
	Clean detectors	As needed
	Remove front 6" of column	As needed
	Change septa	As needed
	Replace gas filters and traps	As needed or as indicated by trap
	Check syringe/replace	As needed
	Change/Add Solvent, clean conduct, cell (ELCD)	As needed or as per Mfg'r Guidelines
	Clean lamp window (PID, FPD)	As needed
	Change resin (ELCD)	As needed or as per Mfg'rs Guidelines
	Change trap (purge and trap)	As needed
	Check cylinder gas pressure	Daily
	Bake out injector body	High background
	Replace flame tip (FID)	Annually or as needed
	Measure the flows	As needed

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
High Performance Liquid Chromatograph (HPLC)	Change injector rotor seals	As needed, recommended after 10,000 injections
	Change pump seals	As needed, recommended after 10,000,000 pump strokes
	Replace pre-column	As needed
	Change pump piston	When visibly scratched or when pump seals need replacement frequently
	Change lamps	As needed, recommended after 1,000 hours of use
	Check for leaks	Daily
	Clean mobile phase flow system w/HNO_3	Semi-annually
	Clean detector flow cells w/HNO_3	Semi-annually or as needed
	Clean injection valve	Annually
	Check solvent filters	Weekly
	Lubricate post column reagent pumps and check valve assembly oil felts	Monthly
Fourier Transform-Infra-Red (FTIR)	Purge System w/Nitrogen	Each use
	Clean instrument housing	Monthly
	Change desiccant and clean cells	Quarterly
	Re-align and Service (clean)	Annually
	Clean windows	Monthly

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Ion Chromatography	Check gas supply pressure	Daily or each day of use
	Empty drain container	Daily or as needed
	Inspect capillary tube	Daily or each day of use
	Clean burner heads (acid soak)	Daily or each day of use
	Aspirate DI water for 15 minutes to flush nebulizer and premix chamber	Daily or each day of use
	Check nebulizer uptake rate	Weekly
	Clean premix chamber	Weekly
	Inspect windows and clean if needed	Weekly
	Inspect glass bead	Monthly
	Inspect O-rings	Monthly
	Inspect nebulizer and clean if needed	Monthly
	Inspect frangible diaphragm (where applicable)	Monthly

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Inductively Coupled Plasma (ICP)	Check argon supply pressure	Daily or each day of use
	Clean nebulizer and spray chamber	As needed
	Change peristaltic pump tubing	As needed
	Clean entrance slit (simultaneous ICP)	Yearly
	Change torch	As needed
	Inspect focusing mirror (simultaneous ICP)	Yearly
	Drain and clean water cooler	Yearly
	Clean filters on instrument	Yearly
	Clean torch	As needed
	Clean cones	As needed
	Realign torch	Each use or daily
Total Organic Carbon (TOC)	Change catalyst	Bi-monthly or as needed
	Re-charge acid	Weekly
	Change injection needle, clean injector port	Monthly
	Inspect combustion tube	Semi-annually

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Total Organic Halogens (TOX)	Clean inlet tube	Weekly
	Clean titration cell and electrodes	Each use
	Recondition titration cell reference sidearm	Monthly
	Clean pyrolysis and quartz exit tubes	Each use
	Re-coat electrodes	As needed
Balances	Check with an external class "S" weight	Each use or daily
	Check with 2 class "S" weights, bracketing range	Minimum monthly (Each use for Army Corps)
	Change desiccants	Weekly
	Clean pans and compartments	Each use
	Check alignment (leveling)	Each use
	Service Engineer visit and calibration (retain traceability certificate for NIST)	Annual
Auto Analyzer	Change tubing	Quarterly
	Clean tubing w/10% HCl	Monthly
	Oil pump	Monthly
	Change Cadmium reduction column	Quarterly
	Clean optics	Quarterly
	Clean pump rollers, platens and colorimeter filters	Monthly

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Spectrophotometer	Check wavelength with standard filter	Quarterly
	Check lamp alignment	As needed
	Clean windows	Monthly
Turbidimeter	Clean optics	As needed
Conductivity Meter	Clean electrodes, re-platinize	As needed
Dissolved Oxygen Probe	Replace membrane, check filling solution	As needed
Recorders	Dust and clean	As needed
	Clean the carriage rod for smooth operation	As needed
	Lubricate the servomotor with two drops of light oil	Quarterly
De-ionized-Reverse Osmosis Water System	Conductivity Check, in-line meter	Daily
	Ion exchange beds replaced	As needed
	Change R. O. Membrane	As needed
	Conductivity check by lab S.C. meter	Weekly (Daily if no in-line meter)
Milli-Q DI Water System	Conductivity Check, in-line meter	Daily
	Replace cartridges	As needed
	Conductivity check with lab S.C. meter	Weekly
Oven	Check temperature	Each use
	Oil Motor	Quarterly

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Refrigerators/Coolers/Freezers	Check temperature	Daily
	Clean cooling coils	Annually
Vacuum pumps & air compressors	Lubricate	As needed
	Check belts, etc.	As needed
Zero Headspace Extractors	Leak test	Each use
Rotary Extractors (TCLP, EP)	RPM check	Daily or each day of use
Hot Plates	Surface temperature checks	Quarterly
Incubators	Temperature monitoring	Daily or each day of use
Fume Hoods	Check air flow	Monthly (or as specified in SOP)
	Replace charcoal filters if applicable	As needed
pH and Ion Selective Electrodes	Check probes for cracks and proper levels of filling solution	Daily
	Check reference junction	Daily
	Clean electrode	As needed
Data Systems	Clean computers, check battery back-up and check ventilation fans	Quarterly
Thermometers	Check for cracks and gaps in mercury	Daily or each use
	Calibrate and Tag with Correction Factor	Annually or quarterly or as needed
Auto samplers	Check needles and tubing	Daily

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
	Clean	Daily
Automatic Sample Collection Systems (ISCO, etc.)	Check sampler operations (forward, reverse, automatic through three cycles of the purge - pump-purge cycle)	Daily, prior to sampling event
	Check purge, pump, purge cycle each installation	Daily, in the field
	Check the flow pacer that activates the sampler to assure proper operation	Daily, prior to sampling event
	Check desiccant	Daily, prior to sampling event
	Check batteries	Daily, prior to sampling event
	Check pumping rate to manufacturer's specifications	Daily, prior to sampling event
ICP/MS	Check Argon Supply Pressure	As needed
	Clean Spray Chamber	As needed
	Inspect Torch	As needed
	Inspect Induction Coils	As needed
	Inspect Nebulizer	As needed
	Change Peristaltic Pump Tubing	As needed
	Change Torch	As needed
	Align Torch	As needed
	Clean Sampler and Skimmer Cones	As needed
	Align the SPS5 Sipper Probe	As needed

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
ICP/MS (continued)	Replace Teflon/Tygon® tubing from Spray Chamber to Torch	As needed
	Clean Nebulizer	As needed
	Clean Water Coolant Filters	Monthly
	Change Vacuum Pump oil	As needed
	Replace instrument air filter	Twice per year
	Inspect chiller water	Quarterly
	Change chiller water	As needed
	Mass Calibration	Daily or each use
	Performance test	Daily or each use

11.0 Quality Control Checks, Routines to Assess Precision and Accuracy and Calculation of Method Detection Limits

11.1 Quality Control Checks - Field QC

The laboratory has little to no control over what type of Field QC is collected and submitted for analysis by clients, unless the sampling is performed by Heritage and the client agrees to the increased costs associated with Field QC sample analysis. The laboratory encourages collection of field QC samples, but will analyze whatever samples are received.

The following types of QC checks and the stated frequency are the basic minimum requirements of this QAP. Deviations from these minimum requirements (i.e. less than 5 samples in a set, weekly or daily monitoring, etc.) are the responsibility and decision of the client and shall be proposed in a site specific QC plan (if required) with appropriate justification. See Appendix D for definition of all terms and QC types.

11.1.1 Sampling events with 10 or more samples of a similar matrix will require the following Field QC:

1. Equipment Blanks: At least one equipment blank on clean sampling equipment will be submitted and analyzed for every 20 samples in each analyte group for water matrices. This blank will be prepared in the field before sampling begins by filling or rinsing the pre-cleaned equipment with analyte free water, filling the appropriate container(s) and preserving and documenting the sample in the same manner as the other collected samples. Suitable blanks for analyte groups of interest will be collected and analyzed for each type of equipment set (i.e., bailer, filtration system; or cover, stainless steel pan and spatula, etc.) to be used in sampling.

   Heritage does not believe it is appropriate to use aqueous equipment blanks for non-aqueous (solid) matrices because different analytical procedures are utilized which have different detection levels at unnecessary expense to the client. The USEPA does not generally require collection of field blanks for solid matrices; however, if their collection is required the use of acid washed beach sand is a recommended blank matrix in place of the rinsing with analyte-free water cited above. The use of this solid matrix will be interference-free, will generally allow the use of identical methods and will provide similar if not lower detection limits.

   If equipment is cleaned on site, then additional equipment blanks will be collected and analyzed for each equipment group at a rate of one blank or 5% of the equipment sets that must be cleaned, whichever is greater. These blanks will be collected and analyzed as described in the preceding paragraph.

If no equipment is involved in sampling (i.e., grab samples using sample container) or passage of blank matrix through the sampling device is not possible (i.e., dedicated well pumps) then a Field Blank will be collected in place of an Equipment Blank.

2. Trip Blanks: At least one trip blank for each proposed volatile organic method (601, 624, 524.2, 8021, 8260, etc.) shall be prepared for each cooler to be used for storage and transport of volatile samples. This type of blank will require the submission of two or more 40mL vials per blank. Trip blanks will generally only be collected for water samples. Trip blanks are prepared in the laboratory, placed in the cooler before shipment to the field and are returned unopened to the lab.

3. Field Duplicate: During each independent sampling event, at least one sample or 10% of the samples, whichever is greater, shall be collected in duplicate for analysis. This requirement shall apply to each and all parameter groups and matrices that are sampled.

11.1.2 Sampling events involving 5 to 10 samples of a similar matrix will require the following Field QC:

1. Equipment Blanks: If equipment is cleaned in the field, one equipment blank for each parameter group shall be collected and analyzed on the field decontaminated equipment. If no equipment is cleaned, then one equipment blank that is prepared on-site on the pre-cleaned equipment shall be collected and analyzed for each parameter group. If no equipment is involved in sampling (i.e. grab sample using sample container) or passage of blank matrix through the sampling device is not possible (i.e., dedicated well pumps) then a Field Blank will be collected in place of an Equipment Blank.

2. Field Duplicates: One field duplicate shall be collected and analyzed for all parameter groups and matrices.

11.1.3 Sampling events involving less than five samples of a similar matrix will require the following field QC:

1. One equipment blank on either pre-cleaned or field decontaminated equipment (see above) will be collected and analyzed for each parameter group.

11.1.4 Additional QC types and/or submittal frequency of field quality control blanks may be required and are dependent on the methods of analysis and the Data Quality Objectives of a specific project and/or mandatory QC requirements. An example would be the collection and analysis of field blanks (see Appendix D for definition) in addition to the minimum requirements specified above.

11.1.5 QC checks on field measurements will require at least one duplicate sample analysis for every 10 field measurements. Field QC samples are treated as any other sample for analysis.

11.1.6 Low-Level Mercury analysis (by CVAFS) will require Project Managers to consult with each customer on the specifics of their project. If the customer is doing the sampling, they will need to send the lab any equipment (such as tubing) they will be using (or we or they supply the sampling equipment). The method requires generation of the equipment blank in the lab. In this way we will confirm that the equipment blank is acceptable (before going to the expense of shipping, sampling and analysis). Heritage will keep a logbook of the equipment blank results and report these blanks in a comment field on the LIMS Certificate (unless or until a new QC point is developed for Mercury Equipment Blanks).

More specifically the Equipment Blank for low-level mercury is defined as follows:

"An aliquot of reagent water that is subjected in the laboratory to all aspects of sample collection and analysis, including contact with all sampling devices and apparatus. The purpose of the equipment blank is to determine if the sampling devices and apparatus for sample collection have been adequately cleaned before they are shipped to the field site. An acceptable equipment blank must be achieved before the sampling devices and apparatus are used for sample collection."

Likewise, a Field blank for low-level mercury is:

"An aliquot of reagent water that is placed in a sample container in the laboratory, shipped to the field, and treated as a sample in all respects, including contact with the sampling devices and exposure to sampling site conditions, filtration, storage, preservation, and all analytical procedures..."

A trip blank does not meet the definition of a Field Blank; shipping the client reagent water to be used in preparation of the blank in the field meets this definition. Therefore, the method calls for generating a laboratory Equipment Blank that is identical to a Field Blank, except it's not in the field. The problem is that unless the lab or someone affiliated with the lab does the sampling, the lab may not have access to the equipment used (or even know how the sample was obtained) in the field in order to prepare an equipment blank in the lab.

All of this is different from "bottle blanks", see the low-level mercury EPA Method 1631E, Section 9.4.7. Bottle blanks are prepared by filling a representative bottle with reagent water, preserving them and letting them sit for the amount of time a sample would sit before analysis. Everything

in the procedure seems to say that we should be sending out carboys of reagent water to be used for blank preparation. In fact the sampling procedure specifically states:

"The lab or cleaning facility must prepare a large carboy or other appropriate clean container filled with reagent water for use with collection of Field Blanks."

The results of the Field Blanks are critical and the Field Blank is to be analyzed before any samples in the analytical run. In addition, the results of sample analysis cannot be used without meeting the following criteria:

- If Mercury levels in the Field blank ≥ ML (Report Limit or 0.5 ng/L, if the MDL is sufficient);
- If Mercury in the Field Blank ≥ 1/5 of the Sample result;

Then, Results cannot be reported or used for regulatory compliance.

11.1.7 When collecting samples for low-level mercury (Method 1631E) field duplicates should be collected at a frequency of one in ten samples per sample site. Since "sample site" is not defined, the regulatory permit should be consulted for the requirements of field duplicate collection.

11.2 Quality Control Checks - Laboratory QC

Heritage will follow the minimum quality control requirements specified by each method. Table 11.5, Analytical Run Requirement/Frequency lists the specific analytical run requirements. Those minimum requirements may be exceeded for specific methods. Please refer to Appendix D, Definitions and Acronyms for definitions and acronyms used by Heritage for QC types.

11.2.1 If quality control requirements are not listed in the method, the laboratory will follow the general guidelines listed below. The quality control is applied to samples that are prepared/extracted as a group. QC samples normally associated with the preparation batch are the method blank, laboratory control sample, matrix spike, etc. The analytical batch is defined as those samples that are analyzed as a group. QC samples normally associated with the analytical batch are the CCV, instrument blanks, interference check samples, etc.

Heritage defines most QC Types (see Definitions) with either a "01" or "02" suffix. The "01" suffix denotes that the procedure did not include a preparation step and/or a preparation step is not separate from the analytical procedures or that no "separate" LIMS test code exists for a prep. A "02" suffix denotes that the procedure was taken through the entire procedure, which includes a discrete or separate preparation (extraction, digestion, distillation, etc.) step.

1. Method Reagent Blank, or Prep Blank (BLA02) - Prepared and analyzed at a rate of one per sample prep batch (see definitions in Appendix D for batch and the definition for BLA02 under Quality Control, QCTS). BLA02 is matrix specific and must be run with

each matrix and each prep batch. A prep batch consists of only one analyst on 1 day, utilizing the same reagents and glassware. Prep batches are given discrete batch identification (run) numbers in the LIMS, which are linked to the analytical run.

2. Matrix Spike (SPI02) - Prepared and analyzed at a minimum of one sample in a sample prep batch (or 5%, whichever is more frequent) with similar matrices for a specified method. The matrix spike typically consists of spiking all target analytes of concern at the levels of concern into the matrix of concern. Exceptions to spiking all target analytes are made if doing so would cause overlapping (un-resolved) peaks or require multiple injections to quantify all target analytes. If a set contains samples of different matrices, matrix spikes should be prepared and analyzed for each matrix type by the specified method.

3. Reagent Water/Reagent Matrix Spikes or Laboratory Control Sample (LCS) - A control sample of known analyte concentration and source which has been processed through the entire method (digested/extracted, etc.); may be used as the QC check to evaluate the effectiveness of the method (not subject to matrix interferences). The LCS should be of the same interference free matrix as samples but must be spiked using a standard from a different source (for some methods) than the calibration standards (EPA or NIST traceable when possible). These must be analyzed at a frequency of one sample in a prep batch or analytical set, or 5%, whichever is greater, for a specified method.

4. Quality Control Check Standards or Performance Evaluation Standards (PE) - At a minimum these blind check samples shall be analyzed semi-annually. Results of all blind performance evaluation (PE) samples will be summarized in the QA report to management and forwarded to clients upon request. Heritage participates in multiple state certification programs requiring blind sample (PE) analysis and uses a commercial service providing double-blind samples. In addition, Heritage participates in other client PE programs at different times.

5. Quality Control Check Standards or Initial and Continuing Calibration Check Standards (ICV01, CCV) - An Initial Calibration Verification (ICV01) standard shall be analyzed to verify the standard curve (separate source from calibration standards, traceable to EPA or NIST if possible). A Continuing Calibration Verification (CCV) standard (same source as calibration standards) shall be analyzed at a continuing frequency of 10% of the analytical samples in the analytical set (i.e. one every 10 analytical samples in a run) for all analyses.

6. Duplicate Samples (DUP02) or Matrix Spike Duplicates (DPS02) - At least one or 5%, whichever is more frequent, of all samples in a prep batch with a similar matrix shall be selected and analyzed in duplicate. If a sample set contains samples from different matrices (e.g., effluent and drinking water), then duplicates or matrix spike duplicates should be analyzed for each matrix.

7. Microbiology QC Checks

   a. Blanks

      (1) Membrane Filter Analysis: For each set of samples, a control blank shall be run at the beginning (dilution water blank), every tenth sample (sample carry over blank), and at the end of the set.

      (2) MPN Analysis: A single tube of LTB broth media shall be inoculated with 10 milliliters of sterile phosphate buffered dilution water (dilution blank control).

   b. Duplicates - at least 10% of the known positive samples that have been processed shall be analyzed in duplicate or a minimum of one duplicate analysis per month for MF and MPN analyses.

   c. Positive/Negative Controls - Microorganisms obtained from the American Type Culture Collection (ATCC) or equivalent sources shall be used to confirm the morphological and biochemical responses to test media. Positive and negative controls shall be run with each new lot of media and monthly thereafter.

   d. Water Quality Indicators:

      (1) Water source shall be tested monthly for chlorine residual, conductivity and standard plate count.

      (2) The concentration of metals in the water source shall be determined annually.

      (3) Water Suitability Test shall be conducted annually

   e. 5% of all positive environmental samples analyzed by membrane filter shall be verified per method requirements.

   f. When using the MPN test, the MPN test shall be completed on 10% of all positive confirmed samples.

8. Additional QC Checks - may be included and will be used if specified by the approved method:

   a. Reagent purity checks

   b. Internal standards

   c. Surrogate spikes

   c. Method of Standard Additions (MSA, 3 Point or 1 Point)

   d. Detection limit standards

11.3 Determination of Frequency of QC Measurements

The required frequency of analysis of certain QC sample types stated in this QAP may be given as a percentage (i.e., 5%) or translated into a numerical ratio (i.e., 1 in 20). The term "analytical sample" is defined in Appendix D, Definitions and Acronyms. As the term is used, analytical sample includes all field samples, including Performance Evaluation samples, received from an external source. It also includes all required QA/QC samples (matrix spikes, analytical/post digestion spikes (1-point MSA), duplicates, serial dilutions, LCS, Interference Check Samples (ICS), CDL standards, preparation blanks (BLA02) and linear range analyses) except those directly related to instrument calibration or calibration verification. A "frequency of 10%" means once every 10 analytical samples. GFAA analytical spikes are not counted as an analytical sample except when EPA CLP methods are used. Heritage uses batch processing and required QC samples be performed per preparation batch if the sample requires a prep or by analytical batch if the samples do not require a separate prep.

The following Tables and Figures specify the QC Types and their frequency of analysis for different methods/regulatory programs.

Table or Figure #	Subject
Table 11.1	ICP Run Sequence
Table 11.2	GFAA Run Sequence
Table 11.3	CLP-GFAA Run Sequence
Table 11.4	Analytical Run Requirements/Frequency
Figure 11.1	Metals Analysis Scheme For Spiking (SPI 01)
Figure 11.2	CLP-GFAA Analysis Scheme

11.4 Routine Methods Used to Assess Precision and Accuracy

All sample prep and analysis runs and all QC data points are entered into the QCTS (Quality Control Tracking System). Certain of the QC types for a particular method are not applicable and/or not used to arrive at precision and accuracy statistics; those

types can be identified from Table 11.5, Analytical Run Requirements/Frequency for a particular method.

The criteria listed in Table 5.4 and Table 5.5, Section 5.0 are generic data quality goals. Control limits for Instrumental criteria (calibration) and method performances (LCS, LFB, and ICV02) are found in Section 9.0 of this document. Heritage defines most QC Types (see Definitions) with either an "01" or "02" suffix. The "01" suffix denotes that the procedure did not include a preparation step and/or a preparation step is not possibly separated from the analytical procedures or that no "separate" test code exists. An "02" suffix denotes that the procedure was taken through the entire procedure, which includes a discrete or separate preparation (extraction, digestion, distillation, etc.) step.

11.4.1 Accuracy

Acceptance limits are calculated as follows, where x_i represents the individual values, x is the mean, n is the number of values and S is the Standard Deviation:

$$\text{Upper Control Limit (UCL)} = \bar{x} + 3S$$

$$\text{Upper Warning Limit (UWL)} = \bar{x} + 2S$$

$$\text{Center Line } (\bar{x}) = \frac{\sum x_i}{n}$$

$$\text{Lower Warning Limit (LWL)} = \bar{x} - 2S$$

$$\text{Lower Control Limit (LCL)} = \bar{x} - 3S$$

11.4.2 Precision

Acceptance control limits are calculated as follows, where x_i represents the individual values, x is the mean, n is the number of values and S is the Standard Deviation:

$$\text{Upper Control Limit (UCL)} = \bar{x} + 3.268S$$

$$\text{Upper Warning Limit (UWL)} = \bar{x} + 2.456S$$

$$\text{Center Line } (\bar{x}) = \frac{\sum x_i}{n}$$

11.4.3 Identification of Outliers

Outliers are excluded from the data used to calculate acceptance (control) limits. The procedure is described in ASTM E178-80, Section 4.

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Outliers may be determined by any of the procedures referenced in ASTM E178-80 applicable, however, as a general rule the inorganic precision limits will be tested for outliers using the coefficient of kurtosis test at the 1 Percent Significance Levels (this is equivalent to a test for normality). The kurtosis formula is recommended for "two-sided" tests (changes in level to higher and lower values) and for changes in scale (variance). Outliers in the data sets for determining accuracy control limits in all tests and precision control limits in organic testing (from MS/MSD determinations) may use the simpler test criterion, T_n at the 1 percent significance level as follows:

$$T_n = (x_n - \bar{x})/S$$

Where:

x = arithmetic average of all n values, and
S = estimate of the population standard deviation based on the sample data
x_n = the doubtful value

11.5 Methods Used to Generate Precision and Accuracy Targets

The concentration levels used to make control limit determinations are as follows:

1. Low level - defined as concentrations from the minimum detection limit to a level 5 times the MDL or PQL.

2. Mid level - defined as the mean level between the minimum detection level and the upper end of the linear range.

3. High level - defined as the concentration at the upper end of the linear range.

Refer to Table 11.6, Methods Used to Generate Precision and Accuracy Targets, for further information.

11.5.1 The following procedures/equations are to be used to assess data:

1. Accuracy

$$\%Recovery\ of\ Standard = \frac{A}{B} x\ 100\%$$

Where: A = Value Measured (Observed)
B = True Value (Reference)

$$\%Recovery\ of\ Spike = \frac{(SSR - SR)}{SA} \times 100\%$$

Where: SSR = Spiked Sample Result
SR = Sample Result, 0.0 if < MDL
SA = Spike Added

2. Precision - Replicability expressed as Relative Percent Difference (RPD)

The following formula will be used when sample precision is evaluated utilizing matrix spikes (MS) and matrix spike duplicates (MSD):

$$RPD = \frac{2\,|\,MSR - MSDR\,|}{(MSR + MSDR)} \times 100$$

Where: MSR = Matrix Spike Recovery (%R)
MSDR = Matrix Spike Duplicate Recovery (%R)

The following formula will be used when sample precision is evaluated from duplicate (un-spiked) sample results:

$$RPD = \frac{2\,|\,S - D\,|}{(S + D)} \times 100$$

Where: S = Sample Original Measured Value
D = Duplicate Sample Measured Value
Note: If S or D is BDL (Below Detection Limit), use the detection limit to calculate

3. Standard Deviation (S)

The following formula will be used for calculations by computer programs:

$$S = \sqrt{\sum_{i=1}^{n} \frac{(C_i - \overline{C})^2}{n - 1}}$$

Where: C_i = Each individual data point
C = Average value for all readings

The following form may be used when S is calculated with a calculator:

$$S = \sqrt{\frac{\Sigma C_i^2 - \frac{(\Sigma C_i)^2}{n}}{n-1}}$$

4. Relative Standard Deviation (RSD)

Relative Standard Deviation is the ratio of the standard deviation S of a set of numbers to their mean expressed as percent. It relates standard deviation (or precision) of a set of data to the size of the numbers; sometimes referred to as the coefficient of variation (CV).

$$CV = RSD(percent) = \frac{S}{\bar{X}} \times 100\%$$

5. Percent Difference (%D)

Instrument calibration methods require this calculation to compare initial and continuing calibration response factors.

$$\%Difference = \frac{\overline{RRF_i} - RRF_c}{\overline{RRF_i}} \times 100$$

Where: $_i$ = Average relative response factor from initial calibration

RRF_c = Relative response factor from continuing calibration standard

11.6 Significant Figures

The following rule will be used for the number of significant figures to use in calculations: For all mathematical operations (addition, subtraction, multiplication, division and exponentiation) retain the equivalent of two more places of figures than

present in the single observed value. No rounding of calculated values or intermediate results should be done until the final values are obtained. No rule can be given for the number of significant places to be retained in final values, however, most tests will be reported with two significant figures. Single blind Performance Evaluation (PE) samples will be reported using three significant figures.

Percent recovery (%R) data will be rounded and reported to include the first decimal place. Relative percent difference (RPD) calculations will be performed using the above rounded %R result when hand calculated, or will use all digits carried by a computer when calculated by computer. The RPD result will be reported to two significant figures. The rules to be used for significant figure reporting of %R and RPD are as follows:

<u>% Recovery & RPD</u>

# Significant Figures Reported	Magnitude of Value (x)
4	$x \geq 100$
3	$100 > x \geq 10$
2	$10 > x \geq 1$
1	$x < 1$

11.6.1 The rounding procedure to be followed is:

1. If the figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. As an example, 11.444 is rounded off to 11.44.

2. If the figure following those to be retained is greater than 5, the figure is dropped and the last retained figure is raised by 1. As an example, 11.446 is rounded off to 11.45.

3. If the figure following those to be retained is 5, and if there are no figures other than zeroes beyond the five, the figure 5 is dropped, and the last-place figure retained is increased by one if it is an odd number or it is kept unchanged if an even number. As an example, 11.435 is rounded off to 11.44, while 11.425 is rounded off to 11.42.

11.6.2 Calculations using Percent Recovery (%R of spikes, etc.) or observed result from the RPD calculation will use the rounded (reported) value in the calculation, so that reported %R and final results used in calculations (vs. using un-rounded numbers not found on final reports) will arrive at the same result. Organic testing (GC, GC/MS, etc.) requires reporting of %RSD and Percent Difference (%D) to at least one decimal place.

11.7 Control Charts

In addition to the Quality Control Tracking System (QCTS) which establishes control limits quarterly for all QC types (regardless of matrix, and in a tabular format), certain QC types will be evaluated using graphical quality control charts at the bench.

Control charts are graphical process control tools for monitoring and improving analytical quality over time. They can be applied to instrument operating parameters, spiked samples or reference material recoveries (ICV01, LCS) or other QC test results. They can be used to document data quality, detect the existence of quality problems (special causes, reduce variation and improve the analytical process.

Control charts will be matrix and method specific. Resultant ranges generated from these charts for target analytes should be equivalent to or better than the ranges as or if specified in any of the specific methods. These charts will be produced at a level that would document the laboratory's performance capabilities for the target analytes of concern, at the levels of concern, in the matrix of concern for all method employed at the laboratory. For performance-based methods, the production of these charts will be mandatory. Control charts will be used for process control and improvement and will not be used to reject data for which specifications (acceptance limits) have been set by the method, regulatory agency or client specific DQO's. Those tests meeting the method or regulatory specifications but not meeting the in-lab control limits will not be rejected, but will require corrective actions to return the process to within laboratory generated control criteria.

At a minimum, the analytes charted will include problematic and/or diagnostic analytes. Control charts will be generated an evaluated periodically (semi-annually at a minimum) for the following QC types:

1. Control Samples, LCS or LFB
2. Prep Blanks, BLA01 or BLA02
3. Duplicate Control Samples, DLCS (or DPS02, DUP02)
4. Surrogate Recoveries
5. Spikes, SPI01 or SPI02

Recovery data for other QC types such as matrix spikes (segregated by matrix), surrogates, duplicates (or MSD's for RPD limits), ICV's, CCV's, and CDL's shall be maintained so that control limits can be developed as needed (either tabular or graphical). Some clients may require certain QC types are tracked using graphical control charts, i.e. matrix spikes and surrogates. This accumulated data can be used to generate control limits and plot daily points for clients with special requirements.

A more detailed treatment of the procedures to be used in generating control charts can be found in Heritage SOP QA-10.0, Control Chart Generation and Maintenance.

Refer to Section 11.4 and Appendix A, Selected References, for additional guidance.

11.8 Method Detection Limits (MDLs)

Method Detection Limits (MDLs) are a quantitative measure of capability. MDLs are determined annually as required by the states and drinking water programs for all applicable tests. Instrument Detection Limits (IDL's) are only done for metals analysis and only because it is a CLP requirement. IDL's are of very limited utility versus the time and effort required to generate them.

All operating instruments in the laboratory have documented MDLs. All newly acquired instruments will have MDLs determined and reported to the QA Unit for approval, before any samples are analyzed. Any significant manipulations/modification to any instrument will require a new determination of the MDLs, which shall be submitted to the QA Unit for approval, before any samples are analyzed. Computer generated spreadsheets (Microsoft EXCEL) containing equivalent information are preferred. MDL studies should be forwarded and stored in a designated folder on the network drive (i.e.; J:/labqaqc). Refer to Appendix D, Definitions, under Detection Limits, for the definition of an MDL. See Figure 11.3 for the IDL/MDL reporting form. In the absence of any major instrument manipulations/modifications, MDLs shall be determined annually. IDLs will be determined only when required by contract or regulation.

11.8.1 At a minimum, the MDLs will be determined in a reagent water matrix and will represent the best achievable detection limit. These reagent water MDLs will be determined by using the procedure outlined in 40 CFR Part 136, Appendix B. This procedure is designed for applicability to a variety of sample types ranging from reagent (blank) water containing analyte to wastewater containing analyte. Client or regulatory program specific requirements may call for the determination of client matrix specific MDLs, in which case the lab may opt to use the MDL procedure specified in the Third Edition of SW-846 for testing programs not requiring 40 CFR Part 136 or a procedure specified by the client and approved by the QA unit.

11.8.2 MDL Determination as Outlined in 40 CFR Part 136 App. B

Where Heritage opts to use the SW 846 procedure for determining the MDL, the same procedure as 40 CFR, Part 136, Appendix B will be used except for the following points:

- As few as three analyses may be utilized instead of seven analyses (see MDL in Definitions, Appendix D).
- The standard deviation from the triplicate analyses will be multiplied by 7 to obtain the MDL.

Heritage may opt to use more than seven replicate measurements in some cases and apply the appropriate value from the students' t values at the 99 Percent Confidence level (see Appendix B to Part 136).

11.8.3 Heritage will report a practical quantitation limit (PQL) in place of the actual Method Detection Limit (MDL) when allowed. The PQL is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The PQL is generally 3-5 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. The analytical error to be expected for concentrations at 3 times the MDL is +/- 25-30 percent.

Unqualified data can only be reported from within a valid calibration curve. Data can be reported above the high standard or below the low standard, but this data must be qualified (flagged) as estimated (J or E). Normally, the reporting limit (or PQL) would be directly linked to the low standard as used during the initial calibration. This low standard would typically be no lower than about 3 times the MDL and should typically be no lower than 5 to 10 times the MDL. Exceptions will be made to Practical Quantitation Limit (PQL) reporting where regulatory or client DQO's push the limits of reporting close to the MDL. In no case will Heritage report data lower than the PQL without the "estimated" qualifier on the result. Heritage will not report numerical results lower than the MDL.

The Method Detection Limit is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte. Numbers reported at the level of the MDL have an associated error of approximately +/- 80-100 percent. Several states require that detectable target analytes be estimated down to the value of their MDL. The laboratory is subject to penalties, fines, and revocation of certification from the state for failure to comply with this requirement. This requirement eliminates the censoring of data that can be imposed on a laboratory by their client from specifying a detection limit not to be lowered, regardless of lab or method capability.

Additionally, clients may ask for a method of analysis and not clearly specify an analyte list or they have not given an instruction to not include any additional findings related to that test. In that case, the standard analyte list and reporting protocol will be used. Unless specific, clear instructions are given prior to delivery or the reporting of sample results, Heritage will not amend or 'censor' reports to exclude information/results (routinely supplied) at the request of clients (See Section 12, Reporting); to do so would be unethical and could be perceived as the lab assisting the client in censoring data.

The PQL will be approximately 10 times the standard deviation (or S pooled if applicable) that is derived from the procedures used to determine the MDL. It will be calculated to two significant figures in most cases. Alternatives to the PQL calculated in this manner would be action levels or other criteria used as the reporting detection limit as long as the reported limit is equal to or greater than the actual MDL. The QA Officer will make the final determination for all reporting detection limits.

Heritage recognizes the definition of PQL as stated in John Taylor's book Principles of Quality Assurance of Chemical Measurements, 1987, p. 79-82.

11.8.3.1 Several estimates of the standard deviation may be pooled to obtain a better estimate based on an increased number of degrees of freedom. Given several estimates of the standard deviation obtained on several occasions with the corresponding number of measurements:

$$S_{pooled} = \frac{\sqrt{(S_1^2\, df_1) + (S_2^2\, df_2) + \ldots (S_n^2\, df_n)}}{df_1 + df_2 + df_n}$$

Where: S, S, S = variance for data set 1,2...n
df_1, df_2, df_n = degrees of freedom for data set 1,2...n

For example, one may have analyzed eight samples in quadruplicate (TOC, TOX) and wish to estimate the variance and standard deviation (eight sets of data with eight estimates of precision, but each only has three degrees of freedom).

Table 11.1
ICP RUN SEQUENCE

TYPE	DESCRIPTION/FREQUENCY
BLA00	Instrument Blank*
CAL01	Calibration Standards (Single Point Calibration)*
ICV01	Initial Calibration Verification (EPA QC or equivalent; Mid-Range Std.)*
BLA01	Calibration Blank (Beginning, Initial Calibration Blank)*
CDL01**	Detection Limit Standard (2x CRDL, beginning, 2 times/8 hrs.)
ICS	Interference Check Sample(s) (Beginning, 2 times/8 hrs.)
LRA	Linear Range Analysis (Upper limit of linear range - quarterly)
LCS	Laboratory Control Sample (ICV02 or EPA supplied LCS, 1 per 20 or prep batch)
BLA02	Preparation Blank (1 per 20 or prep batch, whichever is more frequent)
SAMPLES	6 samples, including required SPI02's, DPS02's, DUP02's and SPI01's (MSA)***
CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; mid-range std.)*
BLA01	Continuing Calibration Blank (10% frequency during run)*
SDA**	Serial Dilution Analysis (each matrix and/or each case)
SAMPLES	9 samples, including required SPI02's, DUP02's and SPI01's (MSA)***
CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
BLA01	Continuing Calibration Blank (end of run)*
	GO TO: SAMPLES OR CDL01
ICS	Interference Check Sample (End, 2 times/8 hrs)
CDL01**	Detection Limit Standard (2x CRDL, end, 2 times/8 hours)

* Does not count as an "analytical sample" for the 10% frequency requirement.

** Performed for SW846 methods.

*** Single addition post digestion spike (1 point MSA) analysis is counted as an "analytical sample" for ICP; required immediately following unspiked analysis of that sample.

NOTE: Each full (3 point) MSA counts as two "analytical samples". Prep blank (BLA02) and LCS can be in any sample order in the run after calibration.

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Table 11.2
GFAA RUN SEQUENCE

# INJECTIONS	TYPE	DESCRIPTION/FREQUENCY
1	BLA00	Instrument Blank*
5	CAL01	Calibration Standards (4+Blank Point Calibration)*
1	ICV01	Initial Calibration Verification (EPA QC or equiv.; Mid-range Std.)*
1	BLA01	Calibration Blank (Beginning, Initial Calibration Blank)*
1	CDL01***	Detection Limit Standard (2x CRDL, beginning, 2 times/8 hrs.)
1	LCS#	Laboratory Control Sample (ICV02 or EPA supplied LCS, 1 per 20 or prep (batch)
1	BLA02#	Preparation Blank (1 per 20 or prep batch, whichever is more frequent)
7	SAMPLES	7 samples, including required SPI02's, DPS02's, DUP02's, Serial Dilutions
7	SAMPLES-SP*	7 sample spikes (2x CRDL, post digestion spike, one per analytical sample except SPI02's, DPS02's)**
1	CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
1	BLA01	Continuing Calibration Blank (10% frequency during run)*
10	SAMPLES	10 samples, including required SPI02's, DPS02's, DUP02's
10	SAMPLES-SP*	10 sample spikes (2x CRDL, post digestion spike, one per analytical sample except SPI02's, DPS02's)**
1	CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
1	BLA01	Continuing Calibration Blank (end of run)*
		GO TO: SAMPLES OR CDL01
1	CDL01***	Detection Limit Standard (2x CRDL), end, 2 times/8 hrs.)

* Does not count as an "analytical sample" for the 10% frequency requirement.
** Single addition post digestion spike (1 point MSA) required immediately following unspiked analysis of that sample.
*** Performed only for specific projects as required (contracts, etc.).
NOTE: Duplicate injections (burns) not performed; maximum of 20 injections between CCVs. Each full MSA (3-point) count as 2 "analytical samples".
\# Prep Blank (BLA02) and LCS can be in any order in the run after calibration.

Table 11.3
CLP-GFAA RUN SEQUENCE

# INJECTIONS	TYPE	DESCRIPTION/FREQUENCY
1	BLA00	Instrument Blank*
5	CAL01	Calibration Standards (4+Blank Point Calibration)*
2	ICV01	Initial Calibration Verification (EPA QC or equiv.; Mid-range Std.)*
2	BLA01	Calibration Blank (Beginning, Initial Calibration Blank)*
2	CDL01	Detection Limit Standard (2x CRDL, beginning, 2 times/8 hrs.)
2	LCS	Laboratory Control Sample (ICV02 or EPA supplied LCS, 1 per 20 or prep batch)
2	LCS-SP	Laboratory Control Sample Spike (2x CRDL, post digestion spike, one per LCS)
2	BLA02	Preparation Blank (1 per 20 or prep batch, whichever is more frequent)
2	BLA02-SP	Preparation Blank (2x CRDL, post digestion spike, one per Prep Blank)
4	SAMPLES	2 samples, including required SPI02's, DPS02's, DUP02's
4	SAMPLES-SP	2 sample spikes (2x CRDL, post digestion spike, one per analytical sample except SPI02's, DPS02's)**
2	CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
2	BLA01	Continuing Calibration Blank (10% frequency during run)*
10	SAMPLES	5 samples, including required SPI02's, DPS02's, DUP02's
10	SAMPLES-SP*	5 sample spikes (2x CRDL, post digestion spike, one per analytical sample except SPI02's, DPS02's)**
2	CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
2	BLA01	Continuing Calibration Blank (end of run)*
	GO TO:	SAMPLES OR CDL01
2	CDL01	Detection Limit Standard (2x CRDL), end, 2 times/8 hrs.)

* Does not count as an "analytical sample" for the 10% frequency requirement.

** Single addition post digestion spike (1 point MSA) required immediately following unspiked analysis of that sample (counts as an analytical sample).

NOTE: Duplicate injections (burns) are performed; maximum of 20 injections between CCVs. Each full MSA (3 point) counts as 2 "analytical samples"; for analytical runs containing only MSAs, single injections can be used for QC samples during that run.

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Table 11.4
ANALYTICAL RUN REQUIREMENT / FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[1]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4] or LFB	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS/ DLFB
Acidity	EPA	R	NA	B,E 10%	-	-	R, 10%	-	NA	-	R	-	NA	NA	NA	-
Alkalinity	EPA	R	NA	B,E 10%	-	10%	R, 10%	10%	NA	-	R	5%	NA	NA	NA	-
Ammonia - N	EPA	C	B,E 10%	B,E 10%	B	R, 5%	R, 10%	R, 5%	P	-	P	-	P, 5%	P, 5%	P, 10%	-
Asbestos	NIOSH	R	R	NA	-	-	R, 10%	-	NA	NA	R, 10%	-	NA	NA	NA	-
BOD	EPA/SM	R	R	-	-	-	R, 10%	-	NA	-	R, 5%	-	NA	NA	-	-
COD	EPA/SM	C	R	R, 10%	B	R, 5%	R, 10%	R, 5%	NA	NA	R, 5%	-	NA	NA	NA	-
Chloride	EPA/SM	C	R, 5%	B,E 10%	B	R, 5%	R, 10%	R, 5%	NA	NA	R, 5%	-	NA	NA	NA	-
Chlorine, Total	ASTM	R	R	NA	B	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Chlorine, Residual	EPA	R	B,E 10%	B,E 10%	B	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Coliform, Fecal	SM	NA	10%	NA	-	-	R, 10%	-	NA	NA	-	-	NA	NA	NA	-
Coliform, Total	SM	NA	10% (P*)	NA	-	-	R, 10%	-	NA	NA	-	-	NA	NA	NA	-
Color	EPA	N	NA	B,E 10%	NA	-	R, 10%	NA	NA	NA	NA	-	NA	NA	NA	-
Cyanide, Amen.	EPA/SW	C	B,E 10%	B,E 10%	B	-	-	-	P, 5%	-	P, 5%	-	P, 10%	P, 10%	P, 10%	-
Cyanide, Total	EPA/SW	C	B,E 10%	B,E 10%	B	-	-	-	P, 5%	-	P, 5%	-	P, 10%	P, 10%	P, 10%	-
Inorganic Anions Ion Chrom.	EPA/SW/SM	D	B,E, 10%	B,E, 10%	B	R, 10%	_	R, 10%	NA	_	R, 5%	_	NA	NA	NA	Q
Cyanide, Total	CLP	C	B,E 10%	B,E 10%	B,E	-	-	-, N	P, 5%	-	P, 5%	-	R, 10%	-	R, 10%	-

* Colilert only requires 1 blank

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Table 11.4
ANALYTICAL RUN REQUIREMENT / FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[5]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4] or LFB	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS/ DLFB
Cyanide, T. Avail.	SW	C	B,E 10%	B,E 10%	B,E	P, 10%	P, 10%	P, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Dissolved Oxygen	EPA	NA	B	B,E 10%	-	NA	P, 10%	NA	NA	NA	R, 5%	-	NA	NA	NA	-
Dissolved Solids	EPA	R, 10%	R, 5%	NA	NA	R, 5%	R, 10%	R, 5%	NA	NA	R, 5%	NA	NA	NA	NA	-
ISE Fluoride	EPA	C	B,E 10%	B,E 10%	B	P, 5%	P, 10%	P, 5%	P, 5%	-	P, 5%	-	P, 5%	P, 5%	P, 5%	-
Formaldehyde	AOAC		B,E 10%	B,E 10%	R	P, 5%	R, 10%	P, 5%	NA	-	, 5%	-	NA	NA	NA	N
Titrimetric Hardness	EPA	R	B,E 10%	NA	-	R, 5%	R, 10%	R, 5%	NA	NA	R, 5%	-	NA	NA	NA	-
Hexavalent Chromium	SM/SW	R	B,E 10%	B,E 10%	B	R, 10%	R, 10%	R, 10%	P, 10%	-	R, 5%	-	P, 5%	P, 5%	R, 10 %	-
TKN	EPA	C	B,E 10%	B,E 10%	B	R, 5%	R, 10%	R, 5%	NA	NA	R, 5%	-	NA	NA	NA	-
Nitrate-N (Colorimetric)	EPA	C	B,E 10%	B,E 10%	B	R, 5%	R, 10%	R, 5%	NA	NA	R, 5%	-	NA	NA	NA	-
Nitrite-N	EPA	C	B,E 10%	B,E 10%	B	R, 5%	R, 10%	R, 5%	NA	NA	R, 5%	-	NA	NA	NA	-
Nitrate-Nitrite-N	EPA	C	B,E 10%	B,E 10%	B	R, 5%	R, 10%	R, 5%	NA	NA	R, 5%	-	NA	NA	NA	-
Oil & Grease	EPA 1664A	R	R	R	_	R, 5%	NA	R, 5%	NA	NA	R, 5%	_	NA	NA	NA	NA
Paint Filter	SW	NA	NA	NA	NA	NA	R, 10%	NA	NA	NA	-	NA	NA	NA	NA	-
Percent Solids	SM		R	NR%	NA	NA	R, 10%	NA	NA	NA		NA	NA	NA	NA	-
Percent Solids	ASTM	R	R	NA	NA	NA	R, 10%	NA	NA	NA	R, 5%	NA	NA	NA	NA	-
pH	EPA/SW	C	NA	B,E 10%	NA	NA	R, 10%	NA	-	-	R, 5%	-	NA	NA	NA	-
Phenols	EPA/SW	C	B,E 10%	B,E 10%	B	R, 10%	R, 10%	R, 10%	P	-	P, 5%	-	P, 10%	P, 10%	P, 10%	-
Phosphorus	EPA	C	B,E	B,E	B	R, 5%	R, 10%	R, 5%	P	-	P, 5%	-	P, 5%	P, 5%	P, 10%	-

Table 11.4
ANALYTICAL RUN REQUIREMENT / FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[5]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4] or LFB	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS/ DLFB
(Total & Ortho)			10%	10%												
% Water (K. Fischer)	ASTM	-	NA	R, 10%	R, 10%		R, 10%	R, 10%	NA	-	R, 10%	-	NA	NA	NA	NA
% Water Xylene Trap	ASTM	-	-	-	-	-	R, 10%	-	NA	NA	R, 10%	NA	NA	NA	NA	-
BTUs	ASTM	R	-	-	-	-	R, 10%	-	NA	NA	-	NA	NA	NA	NA	-
Flash Point	ASTM SW-846	NA	NA	B	-	NA	R, 10%	NA	NA	-	-	-	NA	NA	-	-
Radon	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N
Gross Alpha, Beta	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N
Gross Radium	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N
Radium 223, 224, 226	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N
Radium 226	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N
Ignitability of Solids	SW 1030	NA	NA	NA	NA	NA	Tr	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium 228	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N
Strontium 89, 90	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N
Tritium	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N
Actinide Elements	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N
Total Uranium	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N
Gamma Emitters	EPA	-	R	B,E 10%	-	N	R, 10%	N	NA	NA	N	NA	NA	NA	NA	N

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Table 11.4
ANALYTICAL RUN REQUIREMENT / FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)*	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4] or LFB	(CLP) LCS/ SPI01	SPI02[5]	DPS02[5]	DUP02[5]	DLCS/ DLFB
Settleable Matter	EPA	-	NA	NA	-	NA	R, 10%	NA	NA	-	N	-	NA	NA	NA	-
Silica, Total	EPA	R	R	10%	-	R, 5%	R, 10%	R, 5%	NA	-	R, 5%	-	NA	NA	NA	-
S. Conductance	EPA/SW	R	R	B,E 10%	-	NA	R, 10%	-	NA	NA	R, 5%	NA	NA	NA	NA	-
Sulfate	EPA/SW	R	R	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Sulfide Titrimetric	EPA/SW	-	R	NA	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Sulfur	ASTM	R	R	10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Surfactants	EPA	R	R	10%	-	NA	R, 10%	NA	NA	NA	R, 5%	-	NA	NA	NA	-
Temperature	EPA	N	-	-	NA	NA	R, 10%	NA	NA	NA	-	NA	NA	NA	NA	-
Thiocyanate	EPA	R	R	B,E	-	R, 10%	R, 10%	R, 10%			R, 5%	-				-
Sulfide, T. Available	SW	R	R	B,E 10%	-	P, 10%	P, 10%	-	P, 10%	-	P, 5%	-	P, 10%	P, 10%	P, 10%	-
Sulfite	EPA	R	R	10%	-	R, 5%	R, 10%	R, 5%	NA	NA	R, 5%	-	NA	NA	NA	-
Total Halogen	ASTM	R	B,E 10%	NA	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
TOC	EPA/SW	R	B,E 10%	B,E 10%	B	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
T. Volatile Residue	EPA/SM /ASTM	-	R	-	-	NA	R, 10%	NA	NA	NA	R, 5%	-	NA	NA	NA	-
TOX	SW	R	B,E 10%	B,E 10%	B	-	Each Sample	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
EOX	9023 SW	R	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Tot. Recoverable Oil & Grease	SW	R	R	NA	-	-	R, 10%	-	NA	NA	R, 5%	-	NA	NA	NA	-
Total Solids	EPA	R	R, 5%*	NA	-	-	R, 10%	-	NA	NA	R, 5%	-	NA	NA	NA	-

*** Serial Dilution Analysis once per batch with 1 Pt.MSA (Post Digestion Spike) on sample Spiked (SPI02, if performed).

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Table 11.4
ANALYTICAL RUN REQUIREMENT / FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)*	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4] or LFB	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS/ DLFB
Total Suspended Solids	EPA	R	R, 5%	NA	-	R, 5%	R, 10%	R, 5%	NA	NA	R, 5%		NA	NA	NA	
Turbidity	EPA	R	R	B,E 10%	-	NA	R, 10%	NA	NA	NA	R, 5%	-	NA	NA	NA	-
Volatile Susp. Solids	EPA		R, 5%		-	NA	R, 10%	NA	NA	NA	R, 5%	-	NA	NA	NA	-
Metals-ICP	EPA	R	B,E 10%	B,E 10%	B,E,T	10%*	10%	10%	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-ICP	SW	R	B,E 10%	B,E 10%	B,E,T	NA	NA	***	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-ICP	CLP	R	B,E 10%	B,E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 10%	-	P, 10%	-
Metals-ICP/MS	EPA	R	B,E, 10%	B,E, 10%	B,E,T	NA	NA	10%	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-ICP/MS	SW	R	B,E 10%	B,E, 10%	B,E,T	NA	NA	***	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-GFAA	EPA	R	B,E 10%	B,E 10%	B,E,T	NA	NA	100%**	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-GFAA	SW	R	B,E 10%	B,E 10%	B,E,T	NA	NA	100%** or ***	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-GFAA	CLP	R	B,E 10%	B,E 10%	B,E,T	NA	NA	100%**	P, 10%	P, 5%	P, 10%	P, 5%	P, 5%	-	P, 5%	-
Mercury, CVAA	EPA	R	B,E 10%	B,E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Mercury, CVAA	SW	R	B,E 10%	B,E 10%	B,E,T	NA	NA	***	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Mercury, CVAA	CLP	R	B,E 10%	B,E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	-	P, 5%	-

** Single Point MSA. *** Serial Dilution Analysis, 1 typical sample for each analytical batch (sample spiked , SPI02).

Table 11.4
ANALYTICAL RUN REQUIREMENT / FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[5]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4] or LFB	(CLP) LCS/ SPI01	SPI02[5]	DPS02[3]	DUP02[3]	DLCS/ DLFB
Mercury, CVAFS	EPA 1631	R (QCS)	B (must run 3)	B,E 12	-	NA	NA	NA	B (must run 3)	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
2,3,7,8-TCDD	613 EPA	C	-	R,D	-	NA	NA	NA	P, 5%	-	10%	-	P, 10%	-	-	-
2,3,7,8-TCDD	CLP	N	-	12	-	NA	NA	NA	P, 5%	-	10%	-	P, 10%	P, 10%	-	-
PCDD's & PCDF's	8280 SW	C	-	12	-	NA	NA	NA	P, 5%	-	10%	-	P, 5%	P, 5%	-	-
Organochlorine Pests/PCBs	OLM	N	12	12	-	NA	NA	NA	P, 5%	-	P, 5%	-	SDG, 5%	SDG, 5%	-	-
Organochlorine Pests/PCBs	8081	C	-	10%, 12	-	NA	NA	NA	P, 5%	-	P, 10%	-	P, 5%	P, 5%	-	-
Semi-volatiles GC/MS	OLM01 CLP	N	-	12	-	NA	NA	NA	P, 5%	-	-	-	SDG, 5%	SDG, 5%	-	-
Semi-volatiles	625 EPA	C	-	R,D	-	NA	NA	-	P, 5%	-	N	-	P, 5%	P, 5%	-	N
Semi-volatiles	8270 SW	C	-	12	-	NA	NA	NA	P, 5%	-	N	-	P, 5%	P, 5%	-	N
Volatiles	OLM	N	12	12	-	SDG, 5%	-	SDG, 5%	NA	NA	-	-	NA	NA	NA	-
Volatiles	624 EPA	C	R,D	R,D	-	R, 5%	-	R, 5%	NA	NA	N	-	NA	NA	NA	-
Volatiles	8260 SW	C	R, 12	12	-	R, 5%	-	R, 5%	NA	NA	N	-	NA	NA	NA	-
Organochlorine Pests/PCBS	608 EPA	C	-	R,D	-	NA	NA	NA	P, 5%	-	P, 10%	-	P, 10%	P, 10%	-	-
Purgeable Halocarbons	601 EPA	C	R,D	NA	-	R, 10%	-	R, 10%	NA	NA	R, 10%	-	NA	NA	NA	-
Purgeable Halocarbons (Halogenated Volatiles)	8010SW	C	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-
Purgeable Aromatics	602 EPA	C	R,D	NA	-	R, 10%	-	R, 10%	NA	NA	R, 10%	-	NA	NA	NA	-
Purgeable Aromatics	8020 SW	C	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-

Table 11.4
ANALYTICAL RUN REQUIREMENT / FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[4]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4] or LFB	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS/ DLFB
Halogenated & Aromatic Volatile Organics	601/602 EPA	C	R,D	NA	-	R, 10%	-	R, 10%	NA	NA	R, 10%	-	NA	NA	NA	-
Halogenated & Aromatic Volatile Organics	8021 SW	C	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R,10%	-	NA	NA	NA	-
Hydrocarbon Scan (FID)	8000B SW 8015B	C	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-
RCRA Listed Solvents (FID)	8000 B SW	N	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-
Alcohols (FID)	8015B SW	C	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-
PCBs (ECD)	8082 SW	C	-	10% 12	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-
Chlorinated Hydrocarbons	8120 SW	C	-	10% R,D	-	NA	NA	NA	P, 10%	-	10%	-	P, 5%	P, 5%	-	-
Organophos-phorus Pesticides	8141 SW	C	-	10% R,D	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-
Chlorinated Herbicides	8151 SW	C	-	10% R,D	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-
PNAs (HPLC)	8310 SW	C	-	10% R,D	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-
Carbamates (HPLC)	8318 SW	C														
T. Petroleum Hydrocarbons	418.1 EPA 503E SM	N	D	B,E 5%	-	R, 10%	-	R, 10%	NA	-	P, 10%	-	NA	NA	-	-
EDB, DBCP	504.1 EPA	C	R,D	NA	Weekly	R, 5%	R, 5%	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	Q
N & P Pesticides	507 EPA	C	R,D	10% R,D	D	NA	NA	NA	P, 10%	-	P, 5%	-	P, 5%	P, 5%	-	Q
Volatiles (GC/MS)	524.2 EPA	C	R, D	D, 8	-	-	-	-	NA	NA	R, 10%	-	NA	NA	NA	Q
PNAs (HPLC)	610 EPA	C	-	10% R,D	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-

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Table 11.4
ANALYTICAL RUN REQUIREMENT / FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[3]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4] or LFB	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS/ DLFB
Carbamates (HPLC)	531.1 EPA	C	R,D	D,B,E	-	10%	-	10%	NA	NA	10%	-	NA	NA	NA	Q
Herbicides (ECD)	515.1 EPA	C	-	D,B,E 10%	N	NA	NA	NA	P, 10%	-	P, 10%	-	P, 10%	P, 10%	-	-
Chloral Hydrate	551.1 EPA	C	R, D	D,B,E 10%	N	10%	-	10%	P, 10%	-	P, 10%	-	P, 10%	P, 10%	-	Q
Haloacetic Acids	552.2 EPA	C	R, D	D,B,E 10%	N	10%	-	10%	P,10%	-	P, 10%	-	P, 10%	P, 10%	-	Q
TCLP Regulated Analytes	1311 SW	N	R,D	10% R,D	N	10%	10%	N	P, 10%	-	10%	-	10%	10%	10%	-
Semi-Volatiles GC/MS	525.2 EPA	Q, N	NA	D, 12	NA	NA	NA	NA	P, 5%	-	P, 5%	-	P, 5%	P, 5%	-	Q
Endothall	548.1 EPA	Q, N	NA	D,B,E 10%	-	NA	NA	NA	P, 5%	-	P, 5%	-	P, 5%	P, 5%	-	Q
Diquat	549.2 EPA	Q, N	NA	D,B,E 10%	-	NA	NA	NA	P, 5%	-	P, 5%	-	P, 5%	P, 5%	-	Q

Table Abbreviations:

B	=	Beginning of run	T	=	Twice per 8 hour shift	NA	=	Not applicable
C	=	Each calibration curve (ICV01)	SW	=	SW-846	-	=	Not routinely performed
D	=	Daily	N	=	As needed	SM	=	Standard Methods
E	=	End of run	SDG	=	Each sample delivery group	EPA	=	Methods for Chemical Analysis of Water and Wastes
P	=	Each prep batch	12	=	Once per 12 hours	AOAC	=	Association of Official Analytical Chemists
Q	=	Quarterly	8	=	Once per 8 hours	ASTM	=	American Society for Testing Materials
R	=	Each run	Tr	=	Triplicate Bum rate/positive result	SDA	=	Serial Dilution Analysis, Once per matrix or batch
S	=	2 times per 8 hour shift						

1. Number of Standards Run is 1, unless noted otherwise.
2. CCV may be the same as ICV.
3. Where preps are optional and not performed then "01" QC is used. Either MS/MSD or Spike and Dup used, not both. "01" QC will be used only when "02" QC is not applicable.
4. LCS or LFB can be "01" or "02".

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Table 11.5
METHODS USED TO GENERATE PRECISION AND ACCURACY TARGETS

QC Type (Method)			
Laboratory Control Sample (LCS) and Laboratory Fortified Blank (LFB, primarily used for drinking water methods)	Accuracy To determine method performance in the absence of matrix interference.	Low Level	All EPA "500" series (Drinking Water) organic methods EPA "600" series organic methods: 601, 602, 624 EPA: 340.2, 350.1, 350.3, 351.2, 351.3, 375.4, 410.2, 415.1, 418.1 All Furnace metals methods SW-846: 9020B, 9038, 9060; SM: 407A
		Mid Level	EPA "600" series organic methods: 607, 608, 625 All SW-846 organic methods ("8000B" series) All EPA SOW (CLP) organic methods EPA: 325.1, 325.2, 335.1, 335.2, 365.2, 376.1, 376.2, 410.4, 420.1, 420.2 All ICP & FAA metals methods SW-846: 7196A, 9010A, 9012, 9034, 9065, 9066; SM: 3128, 503E
Duplicate Laboratory Control Sample (DLCS) and Duplicate Laboratory Fortified Blank (DLFB) (DLFB, primarily used for drinking water methods)	Precision and Accuracy. To determine method performance in the absence of matrix interference.	Low Level	All EPA "500" series (Drinking Water) organic methods EPA "600" series organic methods: 601, 602, 624 EPA: 340.2, 350.1, 350.3, 351.2, 351.3, 375.4, 410.2, 415.1, 418.1 All Furnace metals methods SW-846: 9020B, 9038, 9060; SM: 407A
		Mid Level	EPA "600" series organic methods: 607, 608, 625 All SW-846 organic methods ("8000B" series) All EPA SOW (CLP) organic methods EPA: 325.1, 325.2, 335.1, 335.2, 365.2, 376.1, 376.2, 410.4, 420.1, 420.2 All ICP & FAA metals methods SW-846: 7196A, 9010A, 9012, 9034, 9065, 9066; SM: 3128, 503E
Duplicate Matrix Spikes (DPS01, DPS02)	Precision and Accuracy	Low Level	All EPA "500"series (Drinking Water) organic methods EPA "600" series organic methods: 601, 602, 624 EPA: 340.2, 350.1, 350.3, 351.2, 351.3, 375.4, 410.2, 415.1, 418.1 All Furnace metals methods SW-846: 9020B, 9038, 9060; SM: 407A
		Mid Level	EPA "600" series organic methods: 607, 608, 625 All SW-846 organic methods ("8000B" series) All EPA SOW (CLP) organic methods EPA: 325.1, 325.2, 335.1, 335.2, 365.2, 376.1, 376.2, 410.4, 420.1, 420.2 All ICP & FAA metals methods SW-846: 7196A, 9010A, 9012, 9034, 9065, 9066; SM: 3128, 503E

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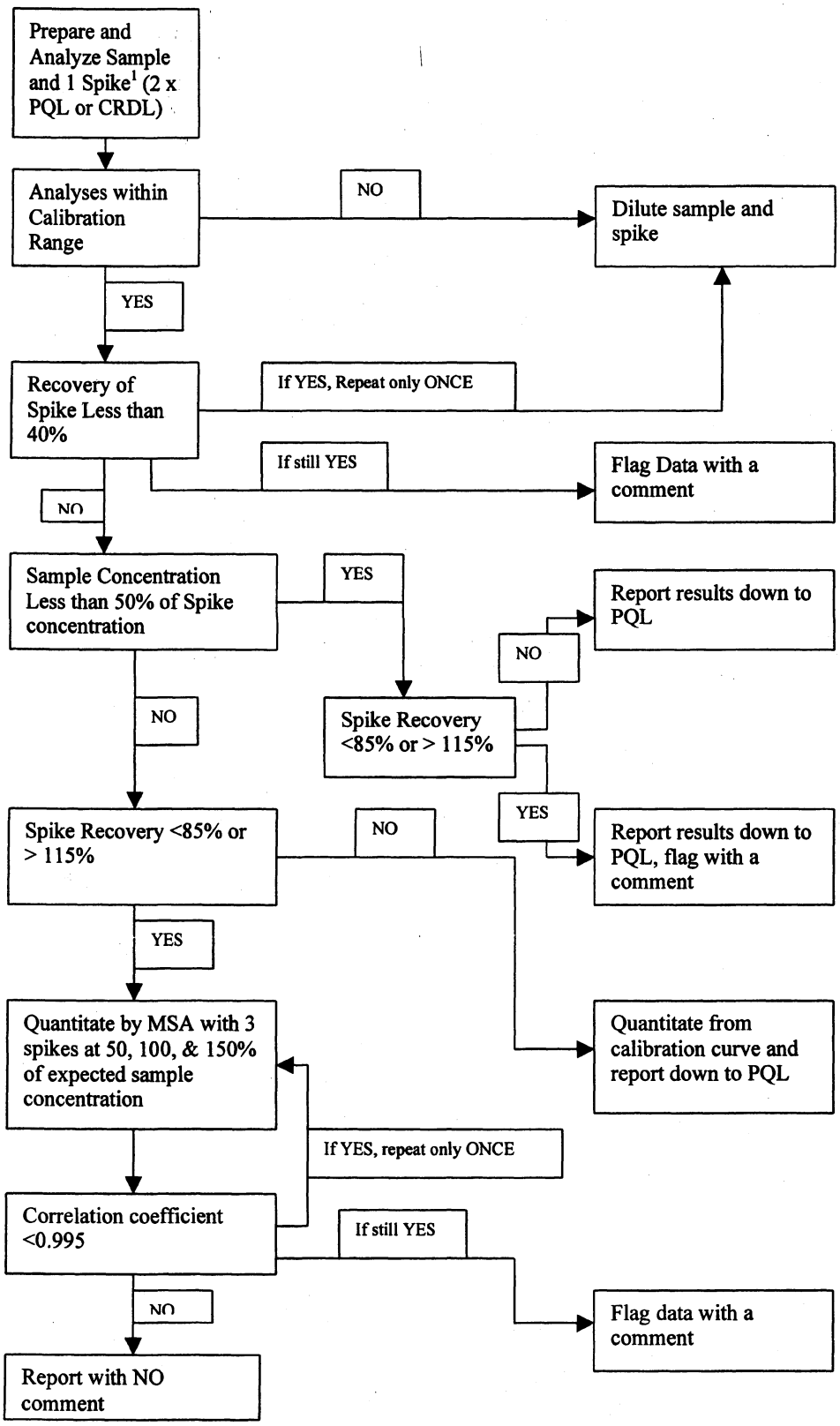
Table 11.5
METHODS USED TO GENERATE PRECISION AND ACCURACY TARGETS

QC Type (Method)	Parameter	Concentration Level	Method Reference
Matrix Spikes (SPI01, SPI02, DPS01, DPS02)	Accuracy	Low Level	All EPA "500" series (Drinking Water) organic methods EPA "600" series organic methods: 601, 602, 624 EPA: 340.2, 350.1, 350.3, 351.2, 351.3, 375.4, 410.2, 415.1, 418.1 All Furnace metals methods SW-846: 9020B, 9038, 9060; SM: 407A
		Mid Level	EPA "600" series organic methods: 607, 608, 625 All SW-846 organic methods ("8000B" series) All EPA SOW (CLP) organic methods EPA: 325.1, 325.2, 335.1, 335.2, 365.2, 376.1, 376.2, 410.4, 420.1, 420.2 All ICP and FAA metals methods SW-846: 7196A, 9010A, 9012, 9034, 9065, 9066; SM: 312B, 503E
Sample Duplicates (DUP01, DUP02)	Precision	Mid Level	All Methods
		Low Level	All Methods (Maximum RPD=20)
Sample Duplicates (DPS01, DPS02)	Precision	Mid Level	See "Duplicate Matrix Spikes"
		Low Level	See "Duplicate Matrix Spikes"

* See Table 11.4



[1]Spike or the Dilution Test (SDA) required for all GFAA. Spike optional, Dilution Test required for ICP, CVAA analyses.

Fig11.1

Figure 11.2
CLP-GFAA ANALYSIS SCHEME

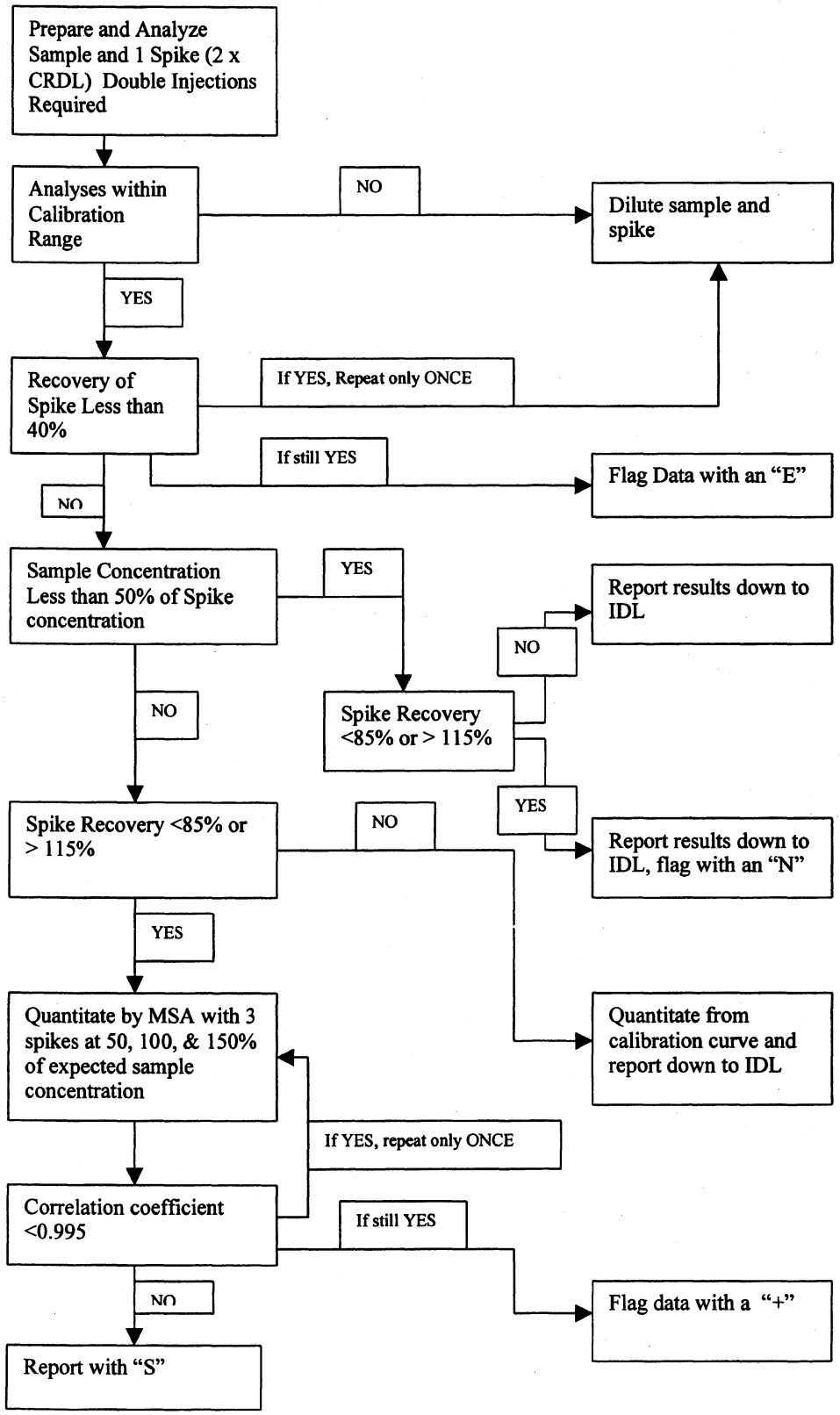


Figure 11.3

DETECTION LIMIT STUDY

DATE_____:

INSTRUMENT:_____ ANALYST:_____

ANALYTE:_____ Std. Conc. Used:_____

METHOD:_____

PREP METHOD:_____

SAMPLE MATRIX:_____

CURVE DEVELOPMENT

	Conc.	Units
1.		
2.		
3.		
4.		
5.		

6. ICV01_____TV=_____Obsv.=_____%R=_____

MEASURED CONCENTRATION

	Conc.	Units
8.		
9.		
10.		
11.		
12.		
13.		
14.		

15. ICV01_____TV=_____Obsv.=_____%R=_____

16. BLA01_____

Mean (%) of #'s 8 through 14 values =_____

Standard Deviation (SD) =_____ x 3.143 = _____

IDL/MDL =_____

95% LCL = IDL/MDL_____x 0.64 =_____

95% UCL = IDL/MDL_____x 2.20 =_____

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12.0 Data Reduction, Validation and Reporting

12.1 Introduction

The laboratory analyst holds the key to the successful completion of valid and documentable analytical testing. Analysts must be provided with proper training, equipment and supervision so that they know and follow proper analytical procedures. This QA Plan will be made available at the bench level and it is the analysts' responsibility to know and to follow its' requirements. In addition to the QA Plan, pertinent Heritage SOPs and published (EPA, etc.) methods, the analysts must be provided any specific contract requirements and data quality objectives. Data will not pass validation if the proper QC types are not analyzed as dictated by the specific method, project or contract.

12.2 Data Reduction

This section outlines how the raw data are reduced into reportable values. Refer to Appendix E, Job Descriptions, for the responsibilities and specific duties of the analyst.

12.2.1 All lab analysts share some portion of the responsibility for maintaining documentation of the testing being performed. In addition to the various bound notebooks which are maintained documenting standard preparations, instrument maintenance, instrument performance, logbook of logbooks, etc., analysts must maintain some combination of bound notebooks and/or original raw data printouts with bench sheets indicating the analytical run contents, sequence and results. Some documentation requirements under various testing programs may make the use of loose bench sheets an unacceptable procedure, in which case bound notebooks will be utilized exclusively. Exclusive use of bound notebooks may necessitate the use of loose sheets for data entry of results and associated information into the LIMS system.

The initial data reduction is the responsibility of the analyst or field technician who operates the analytical instrument.

12.2.2 All analytical run notebooks must contain the following information at a minimum:

1. Analyst identification
2. Date and time of analysis
3. Instrument identification
4. Analytical method (Edition or Version) used and any deviations
5. Date or identification of initial calibration
6. Computer file name if applicable
7. Concentration and source identification of all standards and spikes (QC samples)
8. Lab sample I.D. number

9. Reference to prep performed (test code)
10. Any comments pertinent to the analysis or sample conditions (homogeneity)
11. Any dilutions, concentrations, sample manipulations (initial and final weights/volumes, etc.)

Calculation of results from raw data if not contained in the bound lab notebook, will be maintained and filed along with the original hard copy of instrument printouts.

12.2.3 When data entry into LIMS is required (direct data file transfer not available), it will be necessary to summarize the final results and all information needed for data entry. A combination of the analytical run notebook, the instrument printouts/chromatograms, calculation work sheets, prep bench sheets/notebooks and summary of final results will be sufficient to re-construct the sample analysis. This simple final result summary will include at a minimum:

1. Analyst identification
2. Date and time of analysis
3. Instrument identification
4. Analytical method used
5. Computer file names
6. Lab sample I.D. number
7. Comment to appear on the final report
8. Any dilutions or concentrations involved
9. Final results with proper units and detection limits
10. Concentration and source identification of all standards and spikes (QC samples)
11. Reviewer initials and date of review
12. Data entry operator and date of data entry

If raw data is entered into a computer program or spreadsheet for data reduction, the lab will have on file a record of the mathematical formulae that are being used by the computer. If such information is not available, the lab will verify the formula by manual calculations and maintain a record of the verification process. Any change to the software must undergo a re-verification and documentation of computer calculations.

12.2.4 All instrument printouts/chromatograms must contain the following at a minimum:

1. Analysts' initials and date of review of hard copy
2. Sample or standard identification (and conc.)
3. Computer file numbers
4. Dilutions or concentrations
5. Date and time of injection or analysis
6. Units (µg/L, mg/L, mg/kg, etc.)

7. Identification of samples that are spiked or duplicated (in addition to computer assigned "Q" numbers).
8. Peaks chosen for quantitation and their identification.
9. Instrument Operating conditions
10. Detector and column types

12.2.5 Some testing will generate only bench sheets when no instrument printout is possible or practical and no bound notebook is maintained. The following tests are directly read from instruments:

1. pH and ISE methods
2. Manual spectrophotometric methods
3. Gravimetric methods
4. Coliform bacteria
5. Heat of combustion
6. Total organic halides, extractable organic halides
7. Temperature tests (i.e. Flash Point, Boiling Point)
8. Titrations
9. Turbidity
10. Biochemical oxygen demand (BOD)
11. Specific conductance

In those cases this bench sheet must contain all information required in the analytical run notebook previously discussed and the following at a minimum:

1. Reviewer initials and date of review
2. Data entry operator initials and date of entry
3. Page numbers
4. Calculated final results, %R of spikes, RPD of duplicates, etc.
5. Any raw data used to arrive at the final result
6. Results of the calibration curve (linear regression, log transform)

12.2.6 All calibration curves conforming to a linear equation will be fitted by the least squares linear regression technique. This procedure will also be used for calibration curves that require log transforms or similar transforms. The formula for calculation of the regression line is as follows:

$$Y = mX + b$$

Curves should not be forced through zero (don't set b = 0)

Where: Y = Point on the y axis (instrument response)
m = Slope of line
X =
b = y intercept

The least squares estimate of b and m uses the following equations:

$$m = \frac{\sum XY - \frac{\sum X \sum Y}{n}}{\sum X^2 - \frac{(\sum X)^2}{n}}$$

$$b = Y - mX$$

The linear calibration correlation coefficient (r) must be at least 0.995.

Other scientifically sound procedures/data reduction techniques may be used as permitted by regulatory agencies, analytical methods and the QA Officer. These include second (quadratic) and higher order equations. One disadvantage of second and higher order equations are that it may take more reference standards to accurately capture the region of curvature. In addition the analysis for uncertainty is difficult (may require approximation by interpolation). Any use of a non-linear equation must be included in the applicable method SOP as well as the acceptance criteria for use.

The equation for a quadratic fit is as follows:

$$Y = Ax^2 + Bx + C$$

Where: Y = Point on the y axis (instrument response, > 0)
x = Point on the x axis (known concentration, >0)
A, B & C = Coefficients to be determined

12.2.7 When using the <u>external standard</u> calibration technique the average calibration factor (CF) can be used in place of a calibration curve (non-linear) when the %RSD is less than the method criteria over the working range and linearity through the origin can be assumed. The calibration factor (CF) is calculated as follows:

$$CF = \frac{\textit{Total Area of Peak *}}{\textit{Mass Injected (in nanograms)}}$$

or

$$RF(\textit{Response Factor}) = \frac{\textit{Mass injected (in nanograms)}}{\textit{Total Area of Peak *}}$$

*For multi-response pesticides/PCBs, gasoline, diesel, etc., use the total area of all peaks

The concentration of each analyte in the sample may be determined by calculating the amount of standard purged or injected, from the peak response, using the calibration curve or the calibration factor (CF) above. The concentration of a specific analyte is calculated as follows:

Aqueous samples:

$$\text{Concentration } (\mu g/L) = \frac{(A_x)(A)(V_t)(D)}{(A_s)(V_i)(V_s)}$$

where:

- A_x = Response for the analyte in the sample, units may be in area counts or peak height.
- A = Amount of standard injected or purged, ng.
- A_s = Response for the external standard, units same as for A_x.
- V_i = Volume of extract injected, µL. For purge-and-trap analysis, V_i is not applicable and therefore = 1.
- D = Dilution factor, if dilution was made on the sample prior to analysis. If no dilution was made, D = 1, dimensionless.
- V_t = Volume of total extract, µL. For purge-and-trap analysis, V_t is not applicable and therefore = 1.
- V_s = Volume of sample extracted or purged, mL.

By inspection of the above formula one observes that the concentration in the extract is:

$$(A_x)(RF)$$

where:

$$RF(ResponseFactor)^* = \frac{A}{A_s}$$

*RF is the inverse of CF.

Non-aqueous samples:

$$\text{Concentration } (ng/g) = \frac{(A_x)(A)(V_t)(D)}{(A_s)(V_i)(W)}$$

where:

- W = Weight of sample extracted or purged, g. The wet weight or dry weight may be used, depending upon the specific applications of the data.

A_x, A_s, A, V_t, D, and V_i have the same definition as for aqueous samples.

12.2.8 When using the internal standard technique (used for all GC/MS analyses) the average response factor (RF) can be used in place of a calibration curve

(non-linear) when the %RSD is less than the method criteria over the working range and linearity through the origin can be assumed. The response factor (RF)* is calculated as follows:

$$RF = \frac{(A_S C_{IS})}{(A_{IS} C_S)}$$

where: A_s = Response for the analyte to be measured.
A_{is} = Response for the internal standard.
C_{is} = Concentration of the internal standard, µg/L.
C_s = Concentration of the analyte to be measured, µg/L.

*Also known as "Relative Response Factor" or RRF

The concentration of a specific analyte is calculated as follows:

Aqueous samples:

$$\text{Concentration } (\mu g/L) = \frac{(A_x)(C_{is})(D)}{(A_{is})(RF)(V_s)}$$

where:

A_x = Response of the analyte being measured, units may be in area counts or peak height.
C_{is} = Amount of internal standard added to extract or volume purged, ng.
D = Dilution factor, if a dilution was made on the sample prior to analysis. If no dilution was made, D = 1, dimensionless.
A_{is} = Response of the internal standard, units same as A_x.
RF = Response factor for analyte.
V_s = Volume of water extracted or purged, mL.

Nonaqueous samples:

$$\text{Concentration } (\mu g/kg) = \frac{(A_s)(C_{is})(D)}{(A_{is})(RF)(W_s)}$$

where: W_s = Weight of sample extracted, g. Either a dry weight or wet weight may be used, depending upon the specific application of the data.

A_s, C_{is}, D, A_{is}, and RF have the same definition as for aqueous samples.

The RF from the calibration curve is used to calculate the concentration in the sample unless specific methods (e.g., CLP) dictate otherwise.

12.2.9 Temperature variations for pH are negated by simply allowing solutions to warm-up to room temperature or by using an automatic temperature compensation probe. When testing for specific conductance, the operator may use the standard solution and the table to check accuracy of the cell's constant or to determine an unknown constant. The formula is:

$$K = \frac{k_1 + k_2}{\frac{1}{R}}$$

where,
K = cell constant in c.g.s. Metric units (cm^{-1})
k_1 = conductivity from Table 12.7 (1380.8 @ 24 °C)
k_2 = blank conductivity
1/R = measured conductance of KCl standard on meter

1/R, k_1 and k_2 must either be determined at the same temperature, or corrected to the same temperature to make the equation valid.

To calculate sample value, use the following equation:

$$\frac{\textit{Conductivity of Sample x Cell Constant}}{1 + 0.0191(t - 25)}$$

Table 12.8 lists denominator values (1 + 0.0191[t-25]) for temperatures ranging from 17°C to 28°C.

12.2.10 Manual data entry is the responsibility of the Data Entry Supervisor who will assure that data entry staff has knowledge of the system in order that complete analytical information is entered accurately, in the correct format and labeled consistently. Data entry staff will not perform any calculations; all data entry items will be summarized and submitted on standard forms that have been reviewed by the responsible group supervisor for acceptability, accuracy and completeness. All analyses in the data system are based on the "analytical run" concept. All data (prep or analytical) is grouped in the computer, exactly in the order analyzed (as it also appears on a bench sheet). All QC is included in the analytical sequence. Sub-contractor QC data is not entered into the LIMS database; a copy of the sub-contract report is provided to the client.

Automated data transfer is the responsibility of each respective Group Supervisor.

12.3 Data Validation - During Collection

The principal criteria to be used to validate data integrity during collection will be the following:

1. Calibration Criteria (Linearity, RF etc.)

2. Internal Standard Areas (organics)
3. Calibration Blank Value (CAL01)
4. Method Prep Blank Value (BLA02)
5. Reagent Blank Value (BLA01)
6. Result of calibration verification standard used to verify calibration (ICV01, ICV02).
7. Results of (matrix) spiked non-QC samples (DPS01, SPI01, SPI02, DPS02).
8. Results of surrogate recoveries (organics)
9. Results of replicate measurements (DUP01, DUP02, DPS02).
10. Results of Continuing Calibration Verification standard or Ongoing Precision & Accuracy standards (CCV)
11. Results of Laboratory Fortified Blanks and Laboratory Control Samples or QC Check Samples (LCS, DLCS, LFB, DLFB)

12.3.1 These measurements are to be made by the analyst who, using specific acceptance criteria, will either proceed with analyses or take corrective action. The analyst will review the data and report the final result(s). This process is called the First Level Review. All QC data must be reviewed by the Group Supervisor to insure that all QC types have been completed and meet acceptance criteria. Group Supervisors must also:

1. Check raw data entries and calculations.
2. Check extraction logs and bench sheets.
3. Check Calibration integrity.
4. Check Instrument/analytical logbooks.
5. Check chromatograms, AAS recorder outputs, burn records to verify adequacy of documentation, confirm peak shape and resolution, and to assure that the instrument system is sufficiently sensitive and responsive

The Group Supervisors are responsible for assuring that all bench sheets submitted for data entry are accurate and facilitate the rapid and error free recording of data into LIMS. The review by the Group Supervisor or their designee is called the Second Level of Review.

12.3.2 Group Supervisors and the Sample Custodian are also responsible for checking and assuring that all internal chain of custody requirements and documentation of such are met.

12.3.3 In summary, Group Supervisors will review all bench sheets or release computer files to LIMS after review. In addition, 20% of all raw data will be reviewed by the Group Supervisors to insure that the method was in-control during the analytical run. Group Supervisors are responsible for initialing and submitting data for data entry upon completion of their review. This Second Level Review completes the second step in review of the data integrity and data validity.

12.3.4 All software formulas and algorithms shall be tested periodically to ensure calculations are accurate and appropriate; these tests will be documented and

filed. Any modifications to software will require a re-validation before use. Group Supervisors are responsible for this validation of non-LIMS (i.e. instrument specific) software. Results of validations will be documented to the QA Unit.

12.4 Data Validation - Post Completion

Refer to Figure 12.1, Data Review Protocol for the procedures used at Heritage for data review and validation. The QA Officer and/or the QA Unit must also:

1. Confirm that the goals for precision and accuracy on duplicate and spiked compounds are sufficient to achieve the goal of 95% completeness.
2. Confirm that all analytical QC precision and accuracy (the measurement system, not matrix related) is 100% acceptable or that the run has been rejected and corrective action taken.
3. Confirm that all client specific or contract specific QC requirements have been met.
4. Examine at least 5% of the raw data (e.g. chromatograms, AAS recorder outputs, burn records) on a periodic basis to verify adequacy of documentation, confirm peak shape and resolution, and to assure that the instrument system is sufficiently sensitive and responsive.

12.4.1 Internal and External Assessments

External assessment of the adherence to the QA/QC policy and procedures is the responsibility of the Quality Assurance Officer. Audit forms have been developed in the QAP and may be used to evaluate their adherence to QA/QC Procedures. External assessments are also accomplished via third party audits.

Internal assessment of compliance to company Quality policies and procedures is conducted by the Laboratory Director and the Quality Assurance Unit or their designee. Review of documentation, use of blind duplicates and standards and reference materials and analysis of previously analyzed samples by the same and/or different techniques shall be used to evaluate the performance of each laboratory. Refer to Section 14.0, Performance and Systems Audits for the details of internal and external assessments.

12.4.2 Quality Control Policy and Procedures

The Heritage QAP is mandatory for all samples submitted for a regulatory purpose (not research or information only purposes). Specific procedures are required and regular quality control audits are performed to assure compliance to company policy. The overall quality of analysis shall be compiled and summarized by the Senior QA Officer, who will report this summary to the Senior Vice-President of Heritage. Acceptable levels of performance are presented and monitored by the QA Officer. Refer to Section 15.0, Quality Assurance Reports for further details.

Customer inquiries or complaints regarding Quality Control/Quality Assurance issues or questions regarding the precision and accuracy of data reported should be referred to the Quality Assurance Unit (or the QA Officer) of the lab generating the data. Complaints of a technical nature will trigger an audit of the area of responsibility. If the questions or issues are simple or easily corrected, the QA Unit need only be informed of the complaint and its resolution. Documentation of simple corrections may be maintained in phone logs or other written logs.

It is important that data quality complaints are investigated as soon after notification as possible. It should not be assumed that a lab generated analytical result is correct until the QA Unit has fully investigated (audited) the issue. Clients will be notified promptly, in writing, of any event (such as identification of defective measuring or instrumentation) that indicates that the laboratory's test results given in any sample data and sample result reports or amendment to a sample data and sample result reports are invalid.

Minor changes to a report include such things as correction of client sample descriptions and other changes not directly related to the final numerical results of analysis. Minor changes do not need to be referred to the QA Unit unless the problems are of a systematic nature requiring corrective actions. Changes made to the Certificate of Analysis will be documented as an "**Amended Report**" on the Certificate of Analysis in the comments to appear on the final report section and should *identify the changes* made to the report if not overly complicated. Also, included is the *date and initials* of the person making or authorizing the changes. The QA Unit or their designated representative will review and sign off on all amended Certificates of Analysis reports.

Client requests to provide a partial report or multiple versions of a report (containing different groupings of tests) will not be honored except in cases where the laboratory failed to follow the clients' clear instruction prior to or upon sample delivery.

The respective Project Manager or Laboratory Manager should handle problems and questions of a project management nature unless the problem is of a Quality Control/Quality Assurance technical nature. All customer complaints/inquiries, responses and corrective actions should be documented in either the general client files or the QA Unit files. Customer complaints/inquiries and the results of triggered audits will be reported and summarized to management in the semi-annual report to management.

12.5 Laboratory Quality Control Checks

The types and frequency of laboratory QC Checks are presented in Table 11.4, Analytical Run Requirement/Frequency. This table presents three categories of QC:

1. Instrument Initial and Continuing Calibration Verification QC
2. Instrumental Method QC (tests w/no prep. or analyzed w/o prep)
3. Analytical samples QC - processed through all steps (prepped QC).

Instrument Calibration criteria must be met before any analyses are allowed to proceed; those criteria are given in Table 9.5, Instrument Calibration. Internal QC checks not related to calibration are discussed below.

12.5.1 Preparation or Method Blanks

The requirements as stated in Chapter One, SW846 state that for method blanks, "guidelines should be in place for accepting or rejecting data based on the level of contamination in the blank." Blanks are identified at Heritage as either BLA01 or BLA02 (calibration blanks are treated as a calibration data point, CAL01). Those methods that do not differentiate a prep from the analysis, i.e. purge and trap volatile analyses, are labeled as BLA01, which is equivalent to a BLA02 for tests that do have a separate prep and analysis.

SW846, Method 8000B (the generic Organic guidance) states that *"the results of the method blank should be:*

8.2.6.5.1 *Less than the laboratory's MDL for the analyte or less than the level of acceptable blank contamination specified in the approved quality assurance project plan.*

8.2.6.5.2 *Less than 5% of the regulatory limit associated with an analyte.*

8.2.6.5.3 *Or less than 5% of the sample result for the same analyte, whichever is greater.*

8.2.6.5.4 *If the method blank results do not meet the acceptance criteria above, then the laboratory should take corrective action to locate and reduce the source of the contamination and to re-extract and reanalyze any samples associated with the contaminated method blank.*

8.2.6.5.5 *The laboratory should not subtract the results of the method blank from those of any associated samples unless directed to do so by the method. Such "blank subtraction" is inappropriate for the GC and HPLC method addressed here, and often leads to negative sample results. If the method blank results do not meet the acceptance criteria in 8.2.6.5 and reanalysis is not practical, then the data user should be provided with the sample results, the method blank results, and a discussion of the corrective actions undertaken by the laboratory."*

The National Environmental Laboratory Accreditation Conference (NELAC Quality Systems, June 29, 2000, Page 5D-1) has adopted a criterion of 10% of the regulatory limit or of the sample result for blanks, which conflicts with the less than 5% given above in SW846-8000B. The U.S. Army Corps of Engineers Shell Document (23-NOV-1998) mandates a criterion of less than 5% of the regulatory limit or of the sample result. This comprehensive QAP is not a project specific plan, and as such cannot meet every criteria needed for individual projects.

Regulatory limits for RCRA projects are not universally constant except for the Characteristics (TCLP, etc.) and even those can be forced lower by individual state agency requirements. A lab method blank criterion of ≤ PQL would meet the requirement of 'blank value less than 5% of the regulatory level' for most routine TCLP matrices. Specific projects with specific regulatory requirements will have to be specified to the laboratory in order to allow us to set the appropriate limits based on client data quality objectives (or the lab should simply follow the client's QAPjP).

In the absence of project specific blank criteria, this Comprehensive QAP will set the following reasonable approach to method blank criteria. The following control limits apply for all method blanks (BLA02) and reagent blanks (BLA01):

If sample results are greater than 10 times the method blank value or the sample results are below the detectable level, the analysis is acceptable. **Any blank result greater than the PQL (reporting level) may not be reported without corrective action, with the exceptions noted below.** Otherwise, the following criteria will apply for **reporting blanks unqualified**:

1. Organic Analytes: Blank result less than one-half the Reporting Detection level (PQL)

   Exceptions to the rule will be for common lab solvents not to exceed 5 times the PQL, including but not limited to the following:

   1. Acetone
   2. Methylene Chloride
   3. Toluene
   4. Methyl Ethyl Ketone (MEK)
   5. Methyl Isobutyl Ketone (MIBK)
   6. Freon(s)
   7. Phthalates

   Note: Drinking Water analysis does not allow the presence of any common lab solvents (or any other targets) in the method blank above the reported limit.

2. Inorganic Analytes: Blank result less than one-half the Reporting Detection Level (PQL)

Exceptions to the rule will be for the following metals by ICP -not to exceed 0.050 mg/L:

1. Iron
2. Zinc
3. Copper

12.5.2 Blank Reporting

Any target compounds in the blank greater than one-half of the PQL will be qualified at a minimum. **Any blank result greater than one-half of the reporting level (PQL) but less than the reporting level will be reported with a "B" flag (detected in the blank) on the analyte for all associated samples in the batch if re-analysis is not practical.** As always, Heritage will take all corrective actions necessary to minimize laboratory contamination to the extent reasonable.

Target compounds not detected in the blank at ≥ ½ the PQL will be reported as BDL (Below Detection Limit) and will be entered into the database as BDL at the PQL. **Target hits found in the blank ≥ ½ the PQL will be entered into the database at the concentration found (only for the common lab contaminants specified above).** This assumes that the limit reported meets the definition of PQL, which means the limit is 3-5 times the actual (not calculated) MDL. See definitions of MDL and PQL. Target analytes present in a blank greater than the reporting detection limit (PQL) are not acceptable except as listed above for the common lab contaminants. Common lab contaminants found in samples above the reporting detection limit must be reported with a "B" data flag.

12.5.3 Matrix Spikes

Matrix spikes are included as a routine protocol according to the frequency given Table 11.5, Analytical Run Requirements/Frequency. Matrix spikes serve only to show that an individual sample does or does not exhibit matrix interference using the prescribed method; they do not definitively demonstrate that a given analytical method is in or out of control. Other QC types will be utilized to demonstrate that an analytical method is in control (QC check sample, LCS, LFB, etc.).

If the mandated or requested test method does not specify the spiking components, the laboratory shall spike all reportable components to be reported in the Laboratory Control Sample and Matrix Spike. Except, in cases where the components interfere with accurate assessment (such as simultaneously spiking chlordane, toxaphene and PCBs in Method 608), the test method has an extremely long list of components or components are incompatible, a representative number (at a minimum 10%) of the listed

components may be used to control the test method. The selected components of each spiking mix shall represent all chemistries, elution patterns and masses, permit specified analytes and other client requested components. However, the laboratory shall ensure that all reported components are used in the spike mixture within a two-year time period.

12.5.3.1 There are basically two types of spikes utilized:

1. Pre-digestion/extraction/purge spikes
2. Post digestion spikes

Pre-digestion/extraction spikes are performed for all applicable analyses at the required (Table 11.4) frequency. The frequency of the matrix spikes meets or exceeds the method criteria. The generic goals for accuracy are listed in Section 5.0. Internally generated control limits are determined from actual data entered into the LIMS and are used only if a sufficient number of observations (minimum of 7, prefer 20) are available to determine meaningful statistical limits. Where permissible, data collected outside those control limits will not be rejected as long as method or project specifications are met, but the process will be evaluated and any corrective actions necessary will be taken to return the system to normal operating conditions.

Accuracy will be a function of the spiking level chosen. Many methods and testing programs specify the spiking levels to be used; Heritage will use those spiking levels where specified. Generally, spiking will be performed at approximately 10 to 20 times the PQL unless other factors (method, regulatory action levels, etc.) preclude that choice.

Several methods contain established multi-laboratory performance based control limits for spike recovery of specific matrices (water and soil). The control limits used will be those specified by the method (assumes similar spiking levels used), unless project data quality objectives are more restrictive. Surrogate matrix spikes will be treated in the same manner for organic analyses. Refer to the specific methods for further explanation.

12.5.3.2 The spike (%R) recovery QC Acceptance Criteria for those organic methods (EPA 600 Series) providing specific limits are as found in Table 12.1, Organic Spike Recovery Criteria. SW846 Organic methods generally require the use of laboratory generated acceptance criteria.

12.5.3.3 The spike recovery (%R) QC Acceptance Criteria for those inorganic CLP methods providing specific limits are given in Table 12.2, Inorganic Spiking Levels and Control Limits. Inorganic analytes not listed in Table 12.2 will utilize the control limits established in the method or in Section 5.0, Table 5.5 (or the most current control charts) where a sufficient number of observations exist. In most cases, the control limit criterion is 75-125% recovery for metals and inorganic methods.

12.5.3.4 Post-digestion spikes (SPI01) are only used in metals analyses and may be referred to as the Method of Standard Additions (MSA). Two versions of this MSA are referenced in SW846, Third Edition. The full method of standard additions (3-Point MSA) generates a 4-point curve from which a final result can be calculated. Another version of MSA is the Single-Point, which essentially is a sample and matrix specific spike recovery. Section 11.0, Figures 11.1, Metals Analysis Scheme For Spiking and 11.2, CLP-GFAA Analysis Scheme define the criteria used to determine the application of those techniques.

TCLP extract analysis requires 3-Point MSA when the analytical result is within 20% of the regulatory threshold or when the matrix bias spike recovery is less than 50%.

The spike recovery criteria for a post-digestion spike is as follows:

SPI01 Criteria : 85 - 115% Recovery

Those analytical samples not meeting the above criteria will follow the procedures outlined in either Figure 11.1 and/or Figure 11.2, with the exception of TCLP analysis.

12.5.4 Duplicate Matrix Spikes (DPS01, DPS02)
Duplicate matrix spikes determine both accuracy (see previous section for matrix spikes) and precision. As with matrix spikes, USEPA has established control limits for precision for waters and soils in some methods. Those control limits are given as Relative Percent Difference (RPD) and will be used as control limits by Heritage when applicable. When the methods do not specify RPD control limits, the most current control charts will be utilized when a sufficient number of observations allow for usable statistical limits.

Any method not falling into the above two categories will use the criteria given in Table 5.6, Matrix Precision (RPD) Control Criteria. RPDs exceeding these limits may be considered as out-of-control for Duplicate Matrix Spike analyses.

12.5.4.1 The Precision Control Limits for the CLP organic methods are given in Table 12.3, Organic Precision Control Limits.

12.5.5 Reagent Water or Reagent Matrix Spikes (LCS, DLCS, LFB, DLFB)
Reagent water or reagent matrix spikes will be used as additional QC checks to monitor the performance of the method. These QC types will utilize either reagent water spiked with analyte (known as Laboratory Fortified Blank and/or QC Check Sample) or a blank matrix (water, soil, sand, and oil), which is known to exhibit minimal, or no matrix interferences (known as Laboratory Control Sample [LCS]). Heritage uses the acronyms of LCS, DLCS (Duplicate Laboratory Control Sample) ICV02 (Initial Calibration Verification - Prepped Standard) LFB (Laboratory Fortified Blank) and DLFB (Duplicate Laboratory Fortified Blank) to identify the variations of these check samples.

Analysis of these QC types will demonstrate that the method is in control when the Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries are outside acceptance criteria. One of these QC types must be extracted/digested (if applicable) in the same preparation batch as the samples failing to meet QC criteria. Analysis may be optional for some organic tests when QC criteria for MS/MSD samples are met. Control limits generated will be examined to verify that each individual limit is reasonable. Any unreasonable limits identified will be investigated for possible corrective actions.

12.5.5.1 Reagent water or reagent matrix spikes (LFB, LCS) are entered into LIMS as are all QC types. In addition, these QC samples are kept on control charts at the bench level. The minimum QC criteria to be utilized for these QC types will be the same criteria as found in Table 5.5 and Table 5.6 for matrix specific accuracy and precision. Criteria that are more stringent will be utilized where appropriate.

Generally, the following criteria will apply for the Laboratory Control sample:

(LCS, DLCS, LFB, DLFB, ICV02) : 80 - 120% Recovery (Accuracy)

DLFB, DLCS : 20% RPD (Precision)

Some tests, particularly extractable organic analyses cannot meet these criteria, see Table 5.5.

12.5.6 Quality Control Check Samples - Performance Evaluation Samples (PE Samples)

Acceptance criteria for PE samples are set by the organization running the study (EPA, commercial vendors). All results of PE samples are summarized to management and the lab will evaluate the PE results with respect to the theoretical true values if given, in addition to the statistical analysis based on the mean of the reporting labs. Heritage is interested in our method bias in addition to the bias of the other labs reporting.

12.5.7 Quality Control Check Standards or Initial and Continuing Calibration Check Standards (ICV01, CCV)

Refer to Section 9.0, Table 9.6, Instrument Calibration for the acceptance criteria of the ICV01 and the CCV.

Refer to Table 12.4, Acceptance Criteria and Corrective Actions for Quality Control Checks for non-instrumental QC criteria.

12.5.8 Duplicate Samples (DUP01, DUP02)

Control limits for duplicate samples are identical to those for duplicate matrix spike samples (see section 12.6.4, and Table 12.3) with one exception. Since duplicate precision is measured from analyte already present in the sample (no spike added) the level may not be detectable or may be very close to the detection limit. Concentrations of analyte less than ten times the detection limit reported (MDL, PQL, etc.) present in non-spiked (duplicate) samples will not be considered as out-of-control based on the Control Limit data, but will be acceptable with duplicate values of plus or minus the reporting detection limit (without dilution).

12.5.9 Methods Utilizing Internal Standards

The criteria that must be met for internal standard areas (when used) are found in Table 12.5, Internal Standard Area Criteria.

This table defines the minimum method criteria unless otherwise noted. All sample internal standard areas will be monitored and a professional judgment will be made regarding corrective action (if any) needed. Non-matrix related problems require reanalysis.

12.5.10 Surrogate Recovery Criteria

Some methods (SW846) require the use of internally generated surrogate recovery limits. Methods that do not require internal limits will use method specified limits for acceptance / rejection criteria. Control limit criteria for methods not specifying control limits will be developed from in-house data. "Advisory" criteria will not require corrective action. Refer to Table 12.6, Surrogate Recovery Criteria for method specific control criteria. Poor surrogate recovery may indicate a problem with the sample composition and shall be reported to the client whose sample produced the poor recovery.

Poor surrogate recovery in blanks will be handled in the same manner as samples.

12.4.11 Serial Dilution Analysis

A serial dilution is used to determine whether interferences are present. The concentration of the analyte must be at least 25 times the estimated detection limit (reporting limit) for atomic absorption methods or 10 times the Instrument Detection Limit for ICP method before this technique is required. The sample is diluted by a minimum of five-fold (1+4) and reanalyzed. If all samples in the analytical batch are below 10 times the detection limits, a 1-Point MSA is performed (Post Digestion Spike).

Agreement within 10% between the concentrations for the undiluted sample and five times the concentration for the diluted sample indicates the absence of interferences and such sample may be analyzed without using the method of standard additions. This test is also known as the 'Dilution Test' in SW846-7000A, see Section 8.6. If the recovery is less than 85% or greater than 115% for any atomic absorption method, the method of standard additions shall be used for all samples of that same matrix in the batch.

12.6 Review of Project Data

Project Managers are responsible for review of the overall project data (project data is defined as analytical results reported with a raw data package, forms, etc.; known as a data package) before submission to the client. Laboratory "Certificates of Analysis" (analytical results only) and QA Summaries are routinely reviewed and approved (exceptions are permitted) by the QA Unit (see Reporting) prior to delivery to the Project Manager. The point being that the QA Unit may not have the complete picture or understanding of the Project than does the Project Manager.

Project Managers are responsible for the following review prior to releasing the data report package to clients:

1. Review of supporting documentation including, but not limited to:
    a. Chain of Custody.
    b. Laboratory Analysis Request or Task Order Forms.
2. Review of all contract or project deliverables for completeness and accuracy including but not limited to:
    a. Reporting forms.
    b. Selected Raw data including chromatograms/ printouts.
    c. Adherence to specific DQO's.
    d. Analysis of all required QC Types at the required frequency.
3. Review of data for any obvious anomalous values, specifically those areas requiring knowledge of special project conditions possibly unknown to the QA Unit during review. Review large sets of data for comparability from one analytical batch or case to another in the

project (QA Unit does not generally review an entire project case at one time, but reviews reports as completed).

4. Adherence to reporting deadlines and shipment/delivery of report packages by the best means available to meet those deadlines.

12.7 Data Reporting: Laboratory Report Format and Contents

The Data Entry Supervisor is responsible for supervision of all data entry operators. The Data Entry Supervisor (or designee other than the original data entry operator) will verify all data manually entered into LIMS. The data entered into LIMS is complete information describing the analytical run results as included on submitted bench sheets, including all quality assurance data and the run order.

Heritage Environmental Services, LLC, Commercial Laboratory Operations, Standard Operating Procedures (and any subsequent updates) cover the aspects of data reporting:

SOP D-4.1, Data Results Entry
SOP DD-11.0, GC/MS QC Package
SOP DD-10.0, General QC Package
SOP DD-1.0, Mailing of the Certificate of Analysis
SOP LO-4.3, Sample Receiving Data Entry Operator Responsibilities

Heritage defines the "test report" (as named in NELAC standards) to consist of only the final signed Certificate of Analysis. The term "test report" does not include additional supporting documentation and raw data packages or forms. These supporting documents are frequently supplied, but are not routinely supplied and do not require consecutive pagination as defined in NELAC for the "test report". The NELAC requirements for the content of a test report (Certificate of Analysis) are adopted by reference, but are given as follows:

The results of each test, or series of tests carried out by the laboratory shall be reported accurately, clearly, unambiguously and objectively. The results shall normally be reported in a test report and shall include all the information necessary for the interpretation of the test results and all information required by the method used. Some regulatory reporting requirements or formats such as monthly operating reports, may not require all items listed below, however, the laboratory shall provide all the required information to their client for use in preparing such regulatory reports.

When the laboratory provides information to another individual within Heritage Environmental Services, LLC for preparation of regulatory reports, management must ensure that the appropriate report items are in the report to the regulatory authority (if such information is required). Heritage assures that the appropriate report items are reported by employing trained professionals under the supervision of trained professionals. Laboratory reports are retained as an official record and are available for regulatory inspection. In addition, Heritage is accredited to the ISO-14001 Environmental Management Standard, which is our system for compliance with laws, preventing pollution and continuous improvement of the environmental management system. All processes and procedures are fully documented.

Indication of the NELAC accreditation status will be included on the LIMS generated Certificate of Analysis. The method/test code database will contain the NELAC accreditation status as a YES/NO option, which will be output on the final Certificate of Analysis (test report). This NELAC accreditation status procedure will also be utilized for sub-contract data reported.

Heritage meets the following requirements for a test report from the NELAC Quality System standard. The LIMS system is programmed to produce a Certificate of Analysis meeting these requirements.

a) Except as discussed in b (see below), each report to an outside client shall include at least the following information (those prefaced with "where relevant" are not mandatory):

1) a title, e.g., "Test Report", or "Test Certificate", "Certificate of Results" or "Laboratory Results";
2) name and address of laboratory, and location where the test was carried out if different from the address of the laboratory and phone number with name of contact person for questions;
3) unique identification of the certificate or report (such as serial number) and of each page, and the total number of pages;

This requirement may be presented in several ways:

i. The total number of pages may be listed on the first page of the report as long as the subsequent pages are identified by the unique report identification and consecutive numbers, or
ii. Each page is identified with the unique report identification, the pages are identified as a number of the total report pages (example: 3 of 10, or 1 of 20).

Other methods of identifying the pages in the report may be acceptable as long as it is clear to the reader that discrete pages are associated with a specific report, and that the report contains a specified number of pages. [NOTE: Heritage Certificate of analysis lists the page number of the report, each containing the client ID and laboratory ID and states "continued on next page" and "last page" as applicable]

4) name and address of client, where appropriate and project name if applicable;
5) description and unambiguous identification of the tested sample including the client identification code;
6) identification of test results derived from any sample that did not meet NELAC sample acceptance requirements such as improper container, holding time, or temperature;
7) date of receipt of sample, date and time of sample collection, date(s) of performance test, and time of sample preparation and/or analysis if the required holding time for either activity is less than or equal to 48 hours;
8) identification of the test method used, or unambiguous description of any non-standard method used;
9) if the laboratory collected the sample, reference to sampling procedure;
10) any deviations from (such as failed quality control), additions to or exclusions from the test method (such as environmental conditions), and any non-standard conditions

that may have affected the quality of results, and including the use and definitions of data qualifiers;

11) measurements, examinations and derived results, supported by tables, graphs, sketches and photographs as appropriate, and any failures identified; identify whether data are calculated on a dry weight or wet weight basis; identify the reporting units such as µg/l or mg/kg; and for Whole Effluent Toxicity, identify the statistical package used to provide data;
12) when required, a statement of the estimated uncertainty of the test result;
13) a signature and title, or an equivalent electronic identification of the person(s) accepting responsibility for the content of the certificate or report (however produced), and date of issue;
14) at the laboratory's discretion, a statement to the effect that the results relate only to the items tested or to the sample as received by the laboratory;
15) at the laboratory's discretion, a statement that the certificate or report shall not be reproduced except in full, without the written approval of the laboratory;
16) clear identification of all test data provided by outside sources, such as subcontracted laboratories, clients, etc; and,
17) clear identification of numerical results with values outside of quantitation levels.

b) Laboratories that are operated by a facility and whose sole function is to provide data to the facility management for compliance purposes (in-house or captive laboratories) shall have all applicable information specified in 1 through 17 above readily available for review by the accrediting authority. However, formal reports detailing the information are not required if:
    1) The in-house laboratory is itself responsible for preparing the regulatory reports; or
    2) The laboratory provides information to another individual within the organization for preparation of regulatory reports. The facility management must ensure that the appropriate report items are in the report to the regulatory authority if such information is required.

c) Where the certificate or report contains results of tests performed by subcontractors, these results shall be clearly identified by subcontractor name or applicable accreditation number.

d) After issuance of the report, the laboratory report shall remain unchanged. Material amendments to a calibration certificate, test report or test certificate after issue shall be made only in the form of a further document, or data transfer including the statement "Supplement to Test Report or Test Certificate, serial number . . . [or as otherwise identified]", or equivalent form of wording. Such amendments shall meet all the relevant requirements of this Standard.

The QA Unit is responsible for reviewing all final reports prior to release to clients. Other senior managers may also review and sign final reports, including Project Managers, Senior Chemists, and the Laboratory Director. Reports are to be reviewed for:

1. Completeness - All parameters, detection limits, units, dates, descriptions, etc. must be complete and correct.

2. Consistency - All parameters must be internally consistent (CrVI $\leq$ Cr Total; TKN $\geq$ NH_3 - N, TS $\geq$ TDS, etc.)
3. Comparability - All parameters and units should be reported in such a way that data sets can be evaluated relative to each other as necessary.

12.7.1 All modifications to unreported, status 1, 5 or 7 samples in the LIMS system must be documented on the Sample Modification Form, Figure 12.2. Original entries or additions (comments, etc.) to original entries will not utilize this form. Any changes to Status 7 (complete) or 8 (released) samples are tracked by LIMS audit trail software. The laboratory will notify clients promptly, in writing, of any event such as the identification of defective measuring or test equipment that casts doubt on the validity of results given in any calibration certificate, test report or test certificate or amendment to a report or certificate.

The Project Manager or the QA Unit must approve any changes to the assigned test codes in LIMS. Completed Sample Modification Forms are forwarded to the sample receiving area for filing. Modifications to samples that are completed and released (LIMS status 8) are possible only by the QA Unit staff or the Senior Chemists. Any report that has been sent to a client and subsequently modified in any way by the QA Unit must be identified as an "Amended Report". The reason for the amendment, the date of amendment and the initials of the person making the amendment will be given on the certificate of analysis.

Several states require that detectable target analytes be estimated down to the value of their MDL. This eliminates the censoring of data that can be imposed on a laboratory by their client when detection limits (not to be lower) are specified. Laboratories are subject to fines and loss of certification from states for failure to report as the state regulations mandate. Clients requiring labs to only report results no lower than a permit limit or some other arbitrary level is the definition of censoring by some state regulatory agencies.

Clients sometimes ask for a method of analysis and do not clearly specify an analyte list prior to analysis; they might also not give special instructions to exclude additional findings related to that testing. In those cases, the standard (as defined by Heritage) analyte list and reporting protocol will be used.

Clients may also require specific detection limits above the normal lab reporting limits; those limits must be received and accepted by the laboratory in advance of laboratory analysis. If special detection limits are not received in advance (as documented in our files), the laboratory will not raise reporting detection limits in amended

reports. This policy protects the laboratory from charges of false and deceptive practices resulting from client pressure to change analytical results not to their liking (showing detectable results). Clients must take ownership and the responsibility to clearly specify and communicate (in writing) their analytical requirements in advance of analysis.

Analyte lists are not assumed from testing methods and are either defined by the laboratory or defined by the client in advance. As a matter of ethics, Heritage will not amend or censor laboratory reports to **exclude** information/results (routinely supplied) at the request of clients. This includes providing partial final reports for samples submitted as one sample.

ISO-Guide 17-025 requires that the report shall not be reproduced except in full without the permission of the laboratory.

12.7.2 Samples of final reports and computer (LIMS) QC summaries are contained in Appendix F, Final Report Examples. The examples do not contain all of the possible variations and data qualifiers that may be present on a laboratory report. Refer to Section 12.7 above for the content of a laboratory Certificate of Analysis and to SOP DD-20.1, Use of Data Qualifiers and Analysis Comments for a list of common qualifiers and comments.

12.7.3 Special Reporting Requirements

Sample analysis failing QC criteria due to matrix related interferences or samples requiring dilutions, etc. may have been analyzed 2 or more times. Heritage will report a maximum of two analyses in those cases, or each analysis if client desires, depending on client DQO's or negotiated terms. If a re-analysis of the sample fails the same criteria a second time and all other instrument criteria are in control, matrix interference is assumed and both analyses may be reported. If only the reanalysis is in control, only the reanalysis will be reported.

Estimated concentrations are reported when the sample concentration in the extract, sample or dilution exceeds the linear range of the method or is below (but greater than one-half) the reported detection limit. The linear range is very method specific and can extend to 10-25 times the reporting limit. When the linear range has been exceeded, lab policy is to report the original sample, add a replicate analysis and report the dilution separately. Detection limits are corrected for dilution.

Lab policy is to analyze a sample only twice for dilutions, so a report may have a compound estimated high on the first analysis and estimated low on the second, if there was a compound with much higher concentration in the sample. Results lower than the reporting limit must meet all identification criteria (ion ratios, peak pattern, etc.). If the client informs the laboratory before analysis that they are interested in gross results (low, medium, high) only, dilutions will not be done without consulting the client.

Exceptions to this policy will be made for contract requirements and/or different client DQO's.

12.7.3 Sub-contract data is reported in the same manner as internally generated data (and completely identified as such per the NELAC reporting requirements), with the exception that sub-contractor quality control data is not entered into the LIMS database. Sub-contract laboratories must be pre-approved and the required laboratory qualifications must be on file (see Section 7.13, Intra and Inter Laboratory Shipping & Sub-Contracting). The QA Unit, a Project Manager or the Data Entry Group may perform data entry into LIMS. The QA Unit reviews all sub-contract data and copies are kept on file. The sub-contract test report is appended to the LIMS Certificate of Analysis sent to the client.

12.8 Data Storage

The following data is maintained for long-term (5-year) storage.

- all custody records
- shipping receipts
- field notebooks, data sheets and documentation of the sampling event
- all notebooks/logbooks
- bench sheets
- chromatograms, printouts
- copies of final reports (electronic or paper, including sub-contractor)
- magnetic media used to store results
- invoices and financial statements
- project files
- customer data
- all raw data
- all data and results of performance evaluation samples

12.8.1 Records that are stored or generated by instrument data systems/computers or personal computers (PCs) have hard copy or write-protected backup copies. The records, hard copy and magnetic media, are kept on site for a period of six-months to a year. As necessary, records may be transferred to

an off-site record storage facility. The record storage facility must provide secure, access controlled and environmentally controlled storage of records.

After the completion of the requested work, records of the raw data, quality assurance data and reports will be kept by Heritage for at least five (5) years unless otherwise required by law or regulations. Magnetic tapes are maintained for the same 5-year term. The software necessary to interpret these tapes will be retained until no longer needed. Copies of this software should be archived with the data.

12.8.2 Records are protected against fire, theft, loss, environmental deterioration, vermin and in the case of electronic records, electronic or magnetic sources. Records stored on-site are in the fire protected and climate controlled environment of the laboratory. The commercial off-site storage facility is also equipped with fire alarms and fire suppression and climate control, including control of vermin and magnetic sources for stored electronic media. The following is an overview of how records are sent and retrieved.

To send a box off site to a commercial records storage facility the following three steps will be followed.

1. A box is filled with material of a related nature. The box is then marked to show the contents and the related service group and destruction date.

2. The box is then taken to the off-site storage coordinator where the box is given a unique number. The unique number, the contents, the associated service group, and the date stored are recorded in a ledger. Once the box is entered into the ledger, it is scheduled to be picked up or delivered to the off-site record storage facility.

3. The off-site record storage facility stores the box and gives it a unique location code. Once the location code is assigned off-site records storage facility contacts the off-site storage coordinator, who enters the location code into the box's ledger entry. This allows for the recall of individual boxes.

12.8.2.1 <u>Recalling Records</u>
Recalling records from off-site storage requires the Heritage box number and the record storage facility location code, both of which are kept in a record storage ledger. The off-site storage coordinator, who can also recall the box from storage, keeps a copy of the ledger.

12.8.3 The following applies to everything on the HP production system (hesk1): Six sets of tapes (A-F) are rotated. Heritage does full exports of the database and backs up the archive logs to tape Monday-Thursday. A hot backup (while the database is up) of the database .dbf files is done and taken off to tape. Saturday night the databases are brought down and the entire box is backed up to tape (called a cold backup). Monday morning the previous

week's set goes off-site to the vault and the records storage service brings us the set we will use for the current week.

This means in theory that Heritage can go back 6 weeks to get a file. Additionally, the tape used on the last Saturday of the month will be kept as an "end-of-month" tape for 12 months.

12.8.4 Data is not stored or organized per specific project unless contract or other client requirements dictate such. If storage by project is required, all raw data and final reports are copied and stored in a "central project file".

All original raw data and bench sheets are organized and stored in folders chronologically according to analytical batch and date of analysis or sample number.

12.9 Confidentiality and Proprietary Rights

Documented procedures shall be used if transmission of client test results by telephone, telefacsimile or other electronic means are required. Procedures shall ensure confidentiality to the extent possible.

Any reports faxed to clients will contain a fax cover sheet, identifying the sample ID's being faxed and the complete number of pages faxed. Also included will be the to, from, fax number, date, return address and phone number and a comments section. Also required is a 'Confidentiality Notice' containing words similar to the following:

> "The documents accompanying this telecopy transmission contain confidential information belonging to the sender which is legally privileged. The information is intended only for the use of the individual(s) or entity named above. If you are not the intended recipient, you are hereby notified that any disclosure, copying, distribution, or taking of any action in reliance on the contents of this telecopied information is strictly prohibited. If you have received this telecopy in error, please notify us by telephone at the above number to arrange for return of original documents to us. Thank You."

In addition, the fax machines are configured to provide a hardcopy fax confirmation page, indicating the status of the transmission. This fax confirmation page will be retained in the files as documentation.

If data is transmitted to clients electronically, it will be a secure transmission so that unintended recipients cannot access the data. Clients accessing laboratory data from Heritage via dial-up procedures must have an account and password. Verbal transmission of results is discouraged, but should only be given with the qualification that the data may not have undergone final review and may be subject to change. Project managers or other authorized personnel providing verbal data to clients should document in their telephone logs, if data is given verbally.

12.10 Error Correction on Laboratory Documents

The procedures for error correction and documentation of entries on laboratory documents are given in detail in Heritage SOP D-2.0, Error Correction on Laboratory Documents, or subsequent updates to this SOP. All entries are signed or initialed by the responsible staff. The reason for the signature or initials will be clearly indicated in the records (e.g., sampled by, prepared by, reviewed by, entered by, etc.). All generated data, except those that are generated by automated data collection systems, is recorded directly, promptly and legibly in permanent ink. Entries in records will not be obliterated by methods such as erasures, overwritten files or markings. All corrections to record keeping errors are made by drawing one line through the error, signing and initialing and dating the correction. These criteria also apply to electronically maintained records, which must contain an audit trail.

12.11 Transfer of Records Contingency

The NELAC standard requires that a laboratory have a plan to ensure that records are maintained or transferred according to the clients' instructions in the event that a laboratory transfers or goes out of business. In the event that the laboratory transfers ownership, records will be maintained and may become the property of the new owner, depending on the terms of sale negotiated. Records are archived regularly and will exist regardless of the existence of the company. It is Heritage's intent that records be transferred according to the client's instructions. In the event that the laboratory goes out of business, it is highly likely that there will not be a previous employee willing to volunteer their time to transfer the documents according to client's instructions. Records on-site at the time the laboratory goes out of business and records off-site will exist, but it will be up to the courts and to the individual clients to claim them. The language in the NELAC standards requires that records be maintained or transferred, but not both.

Table 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Volatile Methods: CLP-VOA			
Parameter	Water, Range %R	Soil, Range %R	Spike Amount
Benzene	76-127	66-142	50 Fg/L
Chlorobenzene	75-130	60-133	50 Fg/L
1,1-Dichloroethene	61-145	59-172	50 Fg/L
Toluene	76-125	59-139	50 Fg/L
Trichloroethene	71-120	62-137	50 Fg/L

Volatile Methods: EPA 624	
Parameter	Water, Range %R
Benzene	37-151
Bromodichloromethane	35-155
Bromoform	45-169
Bromomethane	D-242
Carbon tetrachloride	70-140
Chlorobenzene	37-160
Chloroethane	14-230
2-Chloroethylvinyl ether	D-305
Chloroform	51-138
Chloromethane	D-273
Dibromochloromethane	53-149
1,2-Dichlorobenzene	18-190
1,3-Dichlorobenzene	59-156
1,4-Dichlorobenzene	18-190
1,1-Dichloroethane	59-155
1,2-Dichloroethane	49-155
1,1-Dichloroethene	D-234
trans-1,2-Dichloroethene	54-156
1,2-Dichloropropane	D-210
cis-1,3-Dichloropropene	D-227
trans-1,3-Dichloropropene	17-183
Ethyl Benzene	37-162
Methylene chloride	D-221
1,1,2,2-Tetrachloroethane	46-157
Tetrachloroethene	64-148
Toluene	47-150

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Table 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Volatile Methods: EPA 624	
1,1,1-Trichloroethane	52-162
1,1,2-Trichloroethane	52-150
Trichloroethene	71-157
Trichlorofluoromethane	17-181
Vinyl chloride	D-251

D = Detected

Volatile Methods: EPA 601, 602	
Parameter	Water, Range %R
Bromodichloromethane	42-172
Bromoform	13-159
Bromomethane	D-144
Carbon tetrachloride	43-143
Chlorobenzene	38-150
Chloroethane	46-137
2-Chloroethylvinyl ether	14-186
Chloroform	49-133
Chloromethane	D-193
Dibromochloromethane	24-191
1,2-Dichlorobenzene	D-208
1,3-Dichlorobenzene	7-187
1,4-Dichlorobenzene	42-143
1,1-Dichloroethane	47-132
1,2-Dichloroethane	51-147
1,1-Dichloroethene	26-167
trans-1,2-Dichloroethene	38-155
1,2-Dichloropropane	44-156
cis-1,3-Dichloropropene	22-178
trans-1,3-Dichloropropene	22-178
Methylene chloride	25-162
1,1,2,2-Tetrachloroethane	8-184
Tetrachloroethene	26-162
1,1,1-Trichloroethane	41-138
1,1,2-Trichloroethane	39-136

Table 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Volatile Methods: EPA 601, 602	
Parameter	Water, Range %R
Trichloroethene	35-146
Trichlorofluoromethane	21-156
Vinyl chloride	28-163
Benzene	39-150
Ethylbenzene	32-160
Toluene	46-148
Chlorobenzene	55-136
1,2-Dichlorobenzene	37-154
1,3-Dichlorobenzene	50-141
1,4-Dichlorobenzene	42-143

D = Detected

Semi-Volatile Methods: CLP-SVOA		
Parameter	Water, Range %R	Soil, Range %R
Phenol	12-89	26-90
2-Chlorophenol	27-123	25-102
1,4-Dichlorobenzene	36-97	28-104
N-nitroso-di-n-propylamine	41-116	41-126
1,2,4-Trichlorobenzene	39-98	38-107
4-Chloro-3-methylphenol	23-97	26-103
Acenaphthene	46-118	31-137
4-Nitrophenol	10-80	11-114
2,4-Dinitrotoluene	24-96	28-89
Pentachlorophenol	9-103	17-109
Pyrene	26-127	35-142

Semi-Volatile Methods: 625	
Parameter	Water, Range %R
Acenaphthene	47-145
Acenaphthylene	33-145
Aldrin	D-166
Anthracene	27-133
Benzo(a)anthracene	33-143
Benzo(b)fluoranthene	24-159
Benzo(k)fluoranthene	11-162

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Table 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Semi-Volatile Methods: 625	
Parameter	Water, Range %R
Benzo(a)pyrene	17-163
Benzo(ghi)perylene	D-219
Benzyl butyl phthalate	D-152
9-BHC	24-149
Gamma-BHC	D-110
Bis(2-chloroethyl)ether	12-158
Bis(2-chloroethoxy)methane	33-184
Bis(2-chloroisopropyl)ether	36-166
Bis(2-ethylhexyl)phthalate	8-158
4-Bromophenyl phenyl ether	53-127
2-Chloronaphthalene	60-118
4-Chlorophenyl phenyl ether	25-158
Chrysene	17-168
4,4'-DDD	D-145
4,4'-DDE	4-136
4,4'-DDT	D-203
Dibenzo(a,h)anthracene	D-227
Di-n-butyl phthalate	1-118
1,2-Dichlorobenzene	32-129
1,3-Dichlorobenzene	D-172
1,4,-Dichlorobenzene	20-124
3,3'-Dichlorobenzidine	D-262
Dieldrin	29-136
Diethyl phthalate	D-114
Dimethyl phthalate	D-112
2,4-Dinitrotoluene	39-139
2,6-Dinitrotoluene	50-158
Di-n-octylphthalate	4-146
Endosulfan sulfate	D-107
Endrin aldehyde	D-209
Fluoranthene	26-137
Fluorene	59-121
Heptachlor	D-192
Heptachlor epoxide	26-155

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Table 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Semi-Volatile Methods: 625	
Parameter	Water, Range %R
Hexachlorobenzene	D-152
Hexachlorobutadiene	24-116
Hexachloroethane	40-113
Indeno(1,2,3-cd)pyrene	D-171
Isophorone	21-196
Naphthalene	21-133
Nitrobenzene	35-180
N-nitrosodi-n-propylamine	D-230
PCB-1260	D-164
Phenanthrene	54-120
Pyrene	52-115
1,2,4-Trichlorobenzene	44-142
4-Chloro-3-methylphenol	22-147
2-Chlorophenol	23-134
2,4-Dichlorophenol	39-135
2,4-Dimethylphenol	32-119
2,4-Dinitrophenol	D-191
2-Methyl-4,6-dinitrophenol	D-181
2-Nitrophenol	29-182
4-Nitrophenol	D-132
Pentachlorophenol	14-176
Phenol	5-112
2,4,6-Trichlorophenol	37-144

D = Detected

Organochlorine Pesticides/PCBs: CLP-Pest		
Parameter	Water, Range %R	Soil, Range %R
gamma-BHC (Lindane)	56-123	46-127
Heptachlor	40-131	35-130
Aldrin	40-120	34-132
Dieldrin	52-126	31-134
Endrin	56-121	42-139

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Table 12.1
ORGANIC SPIKE RECOVERY CRITERIA

4,4'-DDT	38-127	23-134

Organochlorine Pesticides/PCBs: EPA 608	
Parameter	Water, Range %R
Aldrin	42-122
apha-BHC	37-134
beta-BHC	17-147
delta-BHC	19-140
gamma-BHC	32-127
Chlordane	45-119
4,4'-DDD	31-141
4,4'-DDE	30-145
4,4'-DDT	25-160
Dieldrin	36-146
Endosulfan I	45-153
Endosulfan II	D-202
Endosulfan Sulfate	26-144
Endrin	30-147
Heptachlor	34-111
Heptachlor epoxide	37-142
Toxaphene	41-126
PCB-1016	50-114
PCB-122	15-178
PCB-1232	10-215
PCB-1242	39-150
PCB-1248	38-158
PCB-1254	29-131
PCB-1260	8-127

D = Detected

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Table 12.2

INORGANIC SPIKING LEVELS AND CONTROL LIMITS

Element	For ICP/AA			For Furnace AA			Other[5] (ug/L)	Control Limits % Recovery
	Water[1] (ug/L) Non-CLP	Soil[2] (mg/kg)CLP	Soil[4] (mg/kg) Non-CLP	Water[1] (ug/L) Non-CLP	Soil[2] (mg/kg) CLP	Soil[4] (mg/kg) Non-CLP		
Aluminum	2,000	400*	200*					75-125%R
Antimony[3]	500	100	50	100	20	10		75-125%R
Arsenic	2,000	400	200	40	8	4		75-125%R
Barium	2,000	400	200					75-125%R
Beryllium	50	10	5					75-125%R
Cadmium	50	10	5	2	0.40	0.20		75-125%R
Calcium	100,000*	20,000*	10,000*					75-125%R
Chromium	200	40	20	20				75-125%R
Cobalt	500	100	50					75-125%R
Copper	250	50	25	20				75-125%R
Iron	1,000	200*	100					75-125%R
Lead	500	100	50	20	4	2		75-125%R
Magnesium	100,000*	20,000*	10,000*					75-125%R
Manganese	500	100	50					75-125%R
Mercury							1/s/s/s=0.25	75-125%R
Nickel	500	100	50					75-125%R
Potassium	100,000*	20,000*	10,000*					75-125%R

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Table 12.2
INORGANIC SPIKING LEVELS AND CONTROL LIMITS

Element	For ICP/AA			For Furnace AA			Other[5] (ug/L)	Control Limits % Recovery
	Water[1] (ug/L) Non-CLP	Soil[2] (mg/kg)CLP	Soil[4] (mg/kg) Non-CLP	Water[1] (ug/L) Non-CLP	Soil[2] (mg/kg) CLP	Soil[4] (mg/kg) Non-CLP		
Selenium	2,000	400	200	10	2	1		75-125%R
Silver	50	10	5					75-125%R
Sodium	100,000*	20,000*	10,000*					75-125%R
Thallium	3,000	600	300	50	10	5		75-125%R
Vanadium	500	100	50					75-125%R
Zinc	500	100	50					75-125%R
Cyanide							100[6]	75-125%R

*No spike required. NOTE: Elements without spike levels and not designated with an asterisk, must be spiked at appropriate levels.
[1]These are suggested spiking levels only.
[2]Used for USEPA CLP ILM. The levels shown indicate concentrations in the final digestate of the spiked sample (100 mL for mercury and 200 mL for all other metals when the wet weight of 1 gram (for ICP, Furnace, and Flame AA), or 0.40 grams (for mercury) of sample is taken for analysis. Adjustment must be made to maintain these spiking levels when the weight of sample taken deviates by more than 10% of these values. Appropriate adjustment must be made for microwave digestion procedure where 0.5 grams of sample or 50.0 mL (45.0 mL of sample plus 5.0 mL of acid) of aqueous sample are required for analysis.
[4]Used for non-CLP analyses. The levels shown indicate concentrations in the final digestate of the spiked sample (100 mL for mercury and 100 mL for all other metals) when the wet weight of 1 gram (for ICP, Furnace, and Flame AA), or 0.40 grams (for mercury) of samples is taken for analysis. Spiking levels in this category are recommended and not required.
[5]Cyanide spiking level reported is for both water and soil/sediment matrices.
[6]The level shown indicates the amount of cyanide that must be added to the original (undistilled) sample. for instance, 100 ug must be added per each Liter of aqueous sample. If the sample volume is 500 mL, then 50 ug of cyanide must be added. If the volume if 50 mL, then 5 ug of cyanide must be added.
For soil samples, 25 ug of cyanide must be added per each gram of solid sample taken for analysis. The spiking level is dependent on the weight of the sample taken and the final distillate volume. If one gram of sample is taken for analysis, and the final distillate volume is 250 mL, then the distillate must contain cyanide at a concentration of 100 ug/L. If five grams of sample are taken, then the distillate must contain cyanide at a concentration of 500 ug/L. Assuming a sample of one gram, the manual and semi-automated colorimetric methods call for a cyanide concentration of 25 ug per the 500 mL mixture of the sample, reagents and water before distillation. The final distillate, in this case, contains cyanide at a concentration of 100 ut/L. Fo the midi-distillation method, a cyanide concentration of 25 ug must be added into the 50 mL mixture of sample reagents, and water before distillation. This yields a cyanide concentration of 500 ug/L in the final distillate of 50 mL.

Table 12.3
ORGANIC PRECISION CONTROL LIMITS

Volatile Methods: CLP-VOA		
Parameter	RPD, Water	RPD, Soil
Benzene	11	21
Chlorobenzene	13	21
1,1-Dichloroethene	14	22
Toluene	13	21
Trichloroethene	14	24

Semi-Volatile Methods: CLP-SVOA		
Parameter	RPD, Water	RPD, Soil
Phenol	42	35
2-Chlorophenol	40	50
1,4-Dichlorobenzene	28	27
N-Nitroso-di-n-propylamine	38	38
1,2,4-Trichlorobenzene	28	23
4-Chloro-3-methylphenol	42	33
Acenapthene	31	19
4-Nitrophenol	50	50
2,4-Dinitrotoluene	38	47
Pentachlorophenol	50	47
Pyrene	31	36

Organochlorine Pesticides/PCBs: CLP-Pest		
Parameter	RPD, Water	RPD, Soil
gamma-BHC (Lindane)	15	50
Heptachlor	20	31
Aldrin	22	43
Dieldrin	18	38
Endrin	21	45
4,4'-DDT	27	50

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Table 12.4

ACCEPTANCE CRITERIA AND CORRECTIVE ACTIONS FOR QUALITY CONTROL CHECKS

	QC CHECK	ACCEPTANCE CRITERIA
Microbiology	Monthly parameters Chlorine Residual Conductivity Heterotrophic Count	Per Page 305 of EPA-600/8-78-017
	Annual metals concentration	Per Page 305 of EPA-600/8-78-017
	Incubators	35 +/- 0.5 C or 44.5 +/- 0.2 C
	Duplicates	Within calculated precision criteria
	Positive and negative media controls	Per Table IV-A-4 of EPA-600/8-78-017
	MF Blanks	<1
	Membrane Filter Analysis	Verified colonies must be coliforms

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Table 12.5
INTERNAL STANDARD AREA CRITERIA

Instrument	Method	Criteria, χ = Absolute Area of Daily CCV
GC/MS	EPA 524.2	-30% > χ (Not less than 30% from most recent daily CCV). Not less than 50% of mean of Initial Cal. Areas.
GC/MS	EPA 525.2	-30% > χ (Not less than 30% from most recent daily CCV). Not less than 50% of mean of Initial Cal. Areas.
GC/PID/ELCD	EPA 502.2	± 3 SD from CAL Standards
GC/NPD	EPA 507	30% Difference from daily CCV
GC/ECD	EPA 508	30% Difference from daily CCV
GC/ECD	EPA 515.1, EPA515.2	30% Difference from daily CCV
HPLC	EPA 531.1	30% Difference from daily CCV
GC/MS	SW846-8240B	-50% > χ < +100% of mid-point check std. (CCV). Apply to CCV only.
GC/MS	SW846-8260B	-50% > χ < +100% of mid-point check std. (CCV). Apply to CCV only.
GC/MS	SW846-8270C	-50% > χ < +100% of mid-point check std. (CCV). Apply to CCV only.
GC/MS	CLP-VOA	-50% > χ < +100%
GC/MS	CLP-SVOA	-50% > χ < +100%
GC/MS	EPA 624[1]	-50% > χ < +100%
GC/MS	EPA 625[1]	-50% > χ < +100%
GC/ECD	SW846-8081, 8081A[2]	-50% > χ < +100%

on. Confidential No method criteria, Heritage has adopted these advisory criteria. Advisory criteria are not mandatory.

[2] Internal standard technique not normally used except for GC/MS methods.

Table 12.6
SURROGATE RECOVERY CRITERIA

Volatiles: CLP-VOA			
Parameter	Water, Range %R	Soil, Range %R	Spike Amount
4-Bromofluorobenzene	86-115	74-113	50 µg
1,2-Dichloroethane-d_4	76-114	70-121	50 µg
Toluene-d_8	88-110	84-117	50 µg

Semi-Volatiles: CLP-SVOA			
Parameter	Water, Range %R	Soil, Range %R	Spike Amount
Nitrobenzene-d_5	35-114	23-120	50 µg
2-Fluorobiphenyl	43-116	30-115	50 µg
p-Terphenyl-d_{14}	33-141	18-137	50 µg
Phenol-d_6	10-94	24-113	100µ g
2-Fluorophenol	21-100	25-121	100µ g
2,4,6-Tribromophenol	10-123	19-122	100 µg
2-Chlorophenol-d_4	33-110 (advisory)	20-130 (advisory)	150µ g
1,2-Dichlorobenzene-d_4	16-110 (advisory)	20-130 (advisory)	100 µg

Organochlorine Pesticide/PCBs: CLP-Pest (OLM)		
Parameter	Water, Range, %R	Soil, Range %R
Dibutylchlorendate (DBC)[1]	24-154 (advisory)	20-150 (advisory)
Tetrachloro-m-xylene (TCX)	60-150 (advisory)	60-150 (advisory)
Decachlorobiphenyl (DCB)	60-150 (advisory)	60-150 (advisory)

[1]DBC has been replaced by TCX & DCB for CLP-Pest OLM.

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Table 12.7
TEMPERATURE vs CONDUCTIVITY
0.01N KCl SOLUTION

TEMPERATURE (Degrees C)	CONDUCTIVITY (absolute micromhos/cm)
15	1141.5
16	1167.5
17	1193.6
18	1219.9
19	1246.4
20	1273.0
21	1299.7
22	1326.6
23	1353.6
24	1380.8
25	1408.1
26	1435.6
27	1463.2
28	1490.9
29	1518.7
30	1546.7

Table 12.8
CONDUCTIVITY CALCULATIONS

TEMPERATURE (Degrees C)	Km (C) (Denominator of Sample equation)
17	0.8472
18	0.8663
19	0.8854
20	0.9045
21	0.9236
22	0.9427
23	0.9618
24	0.9809
25	1.0000
26	1.0191
27	1.0382
28	1.0573

Figure 12.1
DATA REVIEW PROTOCOL FOR HERITAGE ENVIRONMENTAL SERVICES, LLC

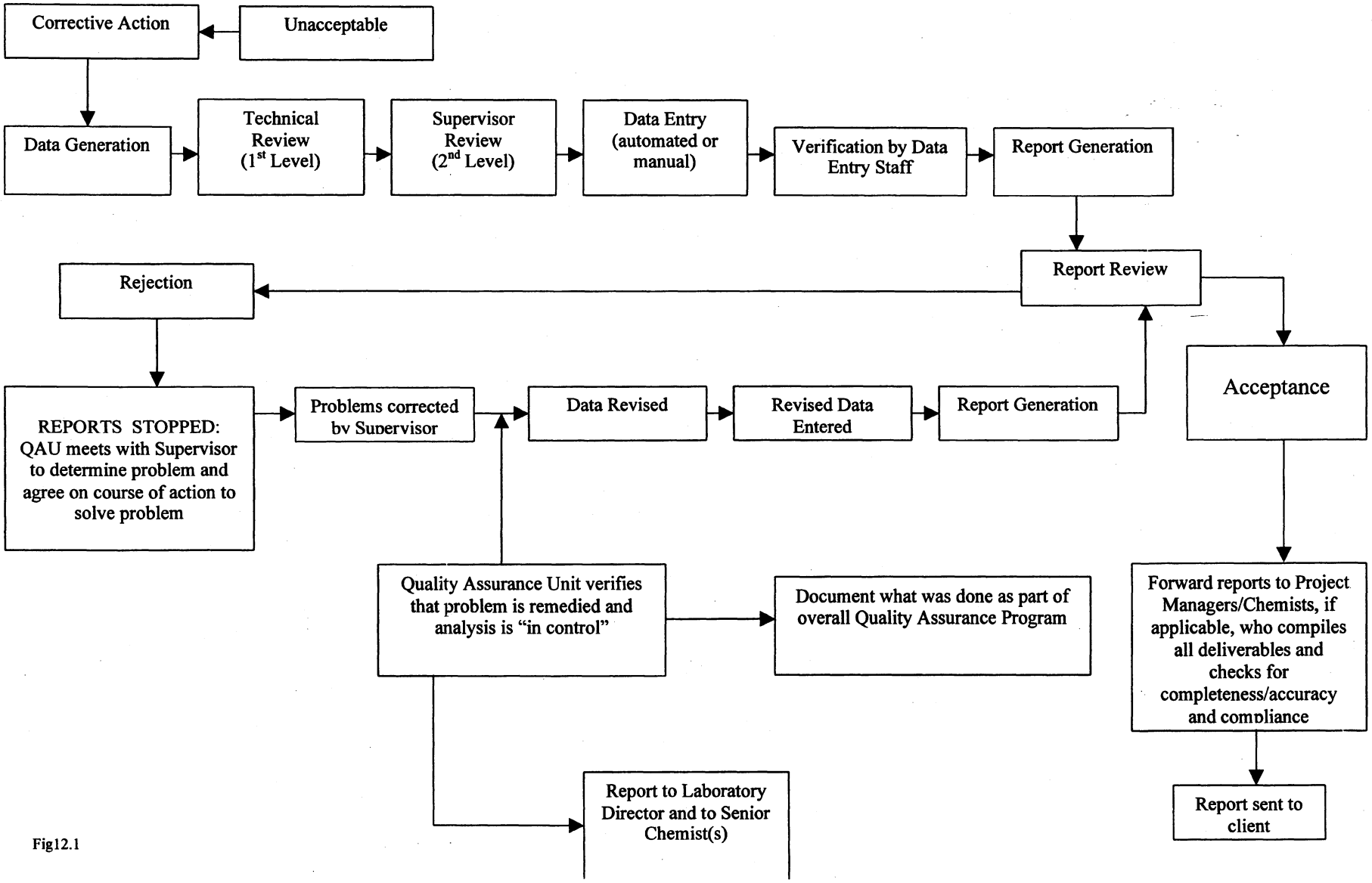

Fig12.1

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FIGURE 12.2

SAMPLE MODIFICATION

REQUEST FROM:_____ DATE_____

SAMPLE STATUS:_____

SAMPLE NUMBERS:_____

_____

CLIENT:_____

TEST CODE ADDED/CANCELLED:_____

TEST CODE CHANGED FROM _____ TO _____

RESULTS MODIFICATIONS:_____

_____

_____

_____

REASON FOR ADDITION OR CHANGE:_____

_____

_____

_____

MODIFIED BY:_____ DATE _____

PROJECT MANAGER'S APPROVAL INITIALS:_____ DATE _____

13.0 Corrective Action

13.1 Introduction

Criteria levels which designate in or out of control status are specified in the applicable sections of this QA Plan. The corrective actions recommended, that will return the analysis to an "in control" status, are summarized in Table 13.1, Corrective Actions.

Corrective action must be undertaken whenever any number of unacceptable conditions exists. Data sets containing unacceptable QC measurements will not be reported or may be reported with qualifiers with the permission of the QA Unit. If a specific quality control measure is found to be out of control, and the data is to be reported, all samples associated with the failed item must be reported with appropriate data qualifier(s). Refer to SOP DD-20.1, Use of Data Qualifiers And Analysis Comments.

13.2 Warning Limits

A first condition requiring corrective action occurs when external standards or otherwise specified quality control check samples are analyzed and results found to be outside established warning limits, upper or lower (UWL, LWL). Data may be acquired if the upper and lower control limits (UCL, LCL) are not exceeded in this condition, but corrective action must be undertaken. See Trends Analysis, Section 13.4.

Two successive readings outside of warning limits (but inside of control limits) are considered out of control. The analysis must be stopped and immediate corrective action is undertaken (see all Trends Analysis, below) unless the readings are within method or DQO specifications. If the readings are within specifications, but outside of SPC (System Process Control) limits, corrective action will take place at the earliest reasonable time, however, useable data will not be rejected.

13.3 Control Limits

Another condition is one in which either of the control limits have been violated. In this case, all analyses stop and immediate corrective action is undertaken, unless (as explained for warning limits), the readings are within the method or DQO specifications.

13.4 Trends Analysis

Analyses are out of control whenever any of the following occurs:

- 1 point is outside the control limit
- 2 consecutive points are outside the warning limits
- 7 consecutive points are on one side of the centerline

- 7 consecutive points increase or decrease
- An obvious trend is observed in the distribution of points

In any of the above cases, all analyses stop and immediate corrective action is undertaken, unless (as explained above) the points are within the method or DQO specifications.

Trends analysis will not be used for sample matrix QC types (spikes, duplicates).

13.5 Notification

In all of the above conditions, the determination is to be made by the analyst if the procedure is in control. If it is in control, analyses proceed; if it is out of control, all analyses are stopped and the following information is compiled immediately and in writing.

1. Test which is out of control.
2. Analyst.
3. Instrument.
4. A brief description of the problem.

At a minimum the problems will be written on the runs (bench sheets) and the QA Unit will be notified and consulted. When the seriousness of the problem warrants a more formal report, the following information will be supplied on the form in Figure 13.1.

The report is given immediately to the Group Supervisor, Lab Director and Quality Assurance Unit. The goal at this point is to return the analysis status to IN-CONTROL as soon as possible.

The Group Supervisor is responsible for returning the analysis status to in control and he or she may draw upon any or all of the resources at Heritage to accomplish this in a timely fashion.

13.6 Specific Corrective Actions

The nature of the corrective actions which may be required at the bench are too numerous to document within a manual such as this one. However, there are some common procedures which are generally appropriate to a number of trouble-shooting protocols including:

1. Review of analytical history: Is there a sudden problem or has an analysis slowly "drifted" out of control?
2. Prepare fresh standards: Have the standard or stock or working solutions expired or degraded?
3. Prepare fresh reagents: Have any reagents expired or degraded?
4. Review the method - ask for assistance: Has an analyst introduced an unnoticed, methodical error into the procedure?

Refer to Table 13.1, Corrective Actions for detailed procedures.

Heritage Environmental Services, LLC will subscribe to any reasonable corrective action deemed necessary by regulatory personnel. Corrective actions will also be initiated as needed as a result of systems or performance audits, split samples or data validation reviews. The Vice-President of Heritage or the QAO for the purpose of negotiating a corrective action must approve exceptions to this policy.

Following corrective action, any sample analyzed during the out of control period must be reanalyzed.

13.7 Corrective Action Documentation

Upon returning the analysis to an "in-control" status, the Group Supervisor is responsible for filing the following information in the method file:

1. Test which was out of control.
2. Analyst/Date.
3. Instrument I.D.
4. Brief description of the problem.
5. Corrective actions taken.
6. Current Status.
7. Date analysis returned to "in-control" status.
8. Person responsible for remedy.

Figure 13.1, Analytical Control Notification is a form that may be used for out of control and return to "in control" status reports.

Table 13.1
CORRECTIVE ACTIONS

QC Type	Recommended Corrective Actions
Instrument Blanks	Prepare another blank, if same response, determine cause of contamination: reagents, environment, instrument equipment failure, etc. Re-analyze any samples associated with unacceptable blanks.
Calibration Standards	Review prep logs for calculation/dilution errors and expired standards. Verify check standard. Poor instrument response - determine if preventative maintenance is required. Reanalyze standards. If still unacceptable, then remake standards. If still unacceptable try an alternate source or prepare from neat standards.
Continuing Calibration Verification Standards	Reanalyze CCV standard. If still unacceptable, then recalibrate and rerun samples from the last acceptable CCV standard. Only re-analysis of an acceptable CCV immediately following the failed CCV will allow continuing analysis with no corrective action.
Internal Standards	Inspect the chromatographic system for malfunctions and make corrections as required. Reanalyze affected samples. If reanalysis does not solve the problem and the system is not malfunctioning, report both analyses with comments, as required by some clients. Report only 1 analysis with comments for those clients not requiring replicate reporting.
Surrogates	Check for errors in calculations, formulation of spiking solution, internal standard responses and instrument performance. Check for outdated standards. Reanalyze the samples if none of the above reveals a problem. If an undiluted analysis with acceptable surrogate recoveries is being reported, do not reanalyze diluted samples if the surrogates are outside limits. MS/MSDs outside of control limits for surrogates are never reanalyzed except for specific contractual or DQO requirements. If the sample and its associated MS/MSD show the same surrogate recovery pattern, document this in a case narrative or analysis comments. If reanalysis does not solve the problem and the system is not malfunctioning, report both analyses with comments, as required by some clients. Report only 1 analysis with comments for those clients not requiring replicate reporting. Corrective actions are not required for advisory surrogate limits. For procedures involving extraction, when surrogates are outside the limits and require corrective actions reanalyze the extract first, to determine if the problem was with the analysis. If reanalysis does not solve the problem then re-extract and analyze the second extract. If surrogate recoveries in an extracted blank do not meet specifications upon re-analysis, re-extract and reanalyze all samples and a blank. If surrogates are biased high and sample results are below detection limits, the results may be accepted without repeat analysis. Poor surrogate recovery may indicate a problem with the sample composition and shall be reported to the client whose sample produced the poor recovery.

Table 13.1
CORRECTIVE ACTIONS

Method Blanks	Reanalyze blank (except for common lab solvents, see Section 12.5.1). If still positive, determine source of contamination. If sample results are greater than 10 times the method blank value or the sample results are below the detectable level, the analysis is acceptable. If necessary, reprocess (i.e. digest or extract) the sample set. If re-analysis is not possible then results may be: 1. Not reported if unusable in the opinion of the laboratory 2. Reported with qualifiers 3. If blank bias is high and samples in batch are BDL samples may be reported.
Initial Calibration Verification Standards (ICV)	Reanalyze ICV standards. If still unacceptable, then remake ICV standards and reanalyze. If still unacceptable, then recalibrate and reanalyze ICV. If still unacceptable evaluate source and validity of all standards as appropriate.
Post Digestion/Extraction Spike (MSA)	Check for error. Refer to Figures 11.1 or 11.2 for actions regarding the Method of Standard Additions for Metals analysis. For all other post digestion spikes, reanalyze. If reanalysis does not meet the criteria, flag the results with a comment and include in the case narrative.
Pre Digestion/Extraction Matrix Spike (MS/MSD)	For %R criteria only: Check for error. Check for outdated standards. If extracted standard (LCS, Lab Fortified Blank, QC check sample, etc.) meets criteria, then poor recovery is considered to be a matrix interference. Extracted standard or check standard must be prepared in same prep batch where applicable. Report results with a comment and include in the case narrative. If extracted standard fails, reprep and reanalyze all affected samples. CLP protocol testing will not require an LCS or LFB or reanalysis for organics testing unless a trend develops for poor accuracy.
Extracted Standards (QC Check Samples LCS, LFB)	Check for errors in preparation and analysis. Reanalyze and reprep all affected samples. If re-analysis is not possible then results may be: 1. Not reported if unusable in the opinion of the laboratory 2. Reported with qualifiers 3. If bias is high and samples in batch are BDL samples may be reported.
Duplicates and Duplicate Spikes	For RPD criteria only: Check for error. If extracted standard (DLCS, DLFB) meets criteria, then report the result. Poor precision may be due to sample inhomogeneity; check sample appearance. If obvious sample inhomogeneity is the problem, do not enter the outlier into the QCTS, but report results with a comment and include in the case narrative. Sample RPD's exceeding control limits or the method specific criteria (RCRA, CLP) with no obvious sample inhomogeneity problem must be reprepped and reanalyzed for all

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Table 13.1
CORRECTIVE ACTIONS

	affected samples from the same client. CLP protocol testing will not require reanalysis unless a trend develops for poor precision.
System Performance Checks	Pesticides: Poor column performance - replace/repack column Standard Reference Materials and QC Check Samples: Improper sample prep or analysis - review all protocols associated with sample preparation and analysis. Incorrect dilutions or calculations - recheck all calculations. Contamination: See blanks. Reanalyze all samples bracketing those from previous Acceptable QC check through next acceptable QC check. Reprocess all samples associated with QC check sample or standard reference material (unless the problem is unique to the processing of the check sample). Take measures to eliminate sources of contamination.
Titrating Solutions	Error in calculation - review/recheck all calculations. Error in preparing or using titrant and standard solutions - review all preparation and/or analytical logs (including sample preparation) for proper dilutions, solvents, buffers, etc. Check for outdated standards. Contamination problems - see blank Non-representative sample - review sample collection and/or sample processing protocols. Indistinct or inconsistent endpoint readings: 1. Take measures to eliminate contamination problems, reprocess if necessary 2. Review preparation, calculation and record keeping to determine if additional training or more stringent protocols are needed. 3. If replicate analyses are not acceptable, titrate additional aliquots. 4. Reanalyze samples from last acceptable QC check to next acceptable QC check. 5. Train analysts to titrate to consistent endpoint.
Microbiology - Duplicates	Non-representative sample/contamination problems: 1. Examine blanks and samples analyzed to determine possible sources of contamination 2. If sample is non-representative, data must be invalidated and resampling and retesting must occur.
Microbiology - ATCC and Biochemical Confirmation, Positive and Negative Media Controls	Check for problems with media preparation. Confirm proper incubator temperatures. Prepare new batch of media from the same lot to determine media acceptability or discard media if the shelf life has expired. Prepare new media from a different lot number. Invalidate all affected data linked to the media or testing system that was not functioning acceptably. Re-examine response for misidentifications. We alternate positive and negative control samples to confirm media response and check on original samples.

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Figure 13.1

ANALYTICAL CONTROL NOTIFICATION

1. Test _____

2. Analyst _____

3. Date _____

4. Instrument _____

5. Brief Description of Problem - Nature and Cause _____

_____

_____

_____

6. Corrective Actions Taken _____

_____

_____

_____

_____

7. Current Status _____

_____

_____

_____

8. Date Returned to In-Control _____

_____

9. Persons Responsible For Remedy _____

_____

_____

10. Follow-up Date _____

11. Corrective Action Approval:

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_____ QAO/Date

_____ Laboratory Manager/Date

14.0 Performance and Systems Audits

14.1 Performance Audits

A performance audit is an independent check to evaluate the data produced by a laboratory's analytical system, and may be categorized as a quantitative appraisal of quality. There are several ways this is done:

1. Worksheet review
2. Oral worksheet review
3. On-site analyst work review
4. Independent or check sample review
5. Intra and inter-laboratory check sample, or proficiency test (performance evaluation) sample analysis review
6. Internal QC procedures using statistical techniques.
7. Use of certified reference materials and/or in-house QC using secondary reference materials.
8. Replicate testing using the same or different test methods.
9. Re-testing of retained samples.
10. Correlation of results for different but related analysis of a sample.

14.1.1 Internal Performance Audits

The QA Officer and/or the QA Unit conduct internal performance audit worksheet reviews. These reviews must be conducted at a frequency necessary to assure the accuracy of either the total measurement system or its component parts. Worksheet reviews by the QAO and/or QAU will be on-going but will occur at a minimum frequency of semi-annually for selected tests. The laboratory will notify clients promptly, in writing, of any event such as the identification of defective measuring or test equipment that casts doubt on the validity of results given in any calibration certificate, test report or test certificate or amendment to a report or certificate.

Internal performance audit worksheet reviews will consist of evaluations of all data and related supporting documentation to assure that all required QC checks are being made and evaluation criteria followed. Reports relating to internal performance audit worksheet reviews are confidential and will be released only upon approval from the Senior Vice-President of Heritage Environmental Services, LLC.

14.1.2 Performance Audit-Proficiency Test Samples

Performance Audits at Heritage Laboratories also consist of analysis of independent or commercial check samples and participation in performance evaluation sample programs. Refer to Table 14.1, Reference Materials and Performance Evaluation Participation for the sources of reference materials used and the on-going performance audit participation. All information generated from Performance Evaluation (PE) sample programs is retained and will be made available during systems audits or upon request. Blind samples, split samples and previously analyzed samples (replicate testing using the same or different test methods) may be submitted as deemed necessary by the QAO or the QAU.

The National Environmental Laboratory Accreditation Conference (NELAC) contains specific levels of required participation. Heritage will meet or exceed the requirements

of the NELAC, Proficiency Testing Program. The Required Level of Participation is as follows:

> To be accredited initially and to maintain accreditation, a laboratory shall participate in two single blind, single-concentration PT studies, where available, per year for each PT field of testing for which it seeks or wants to maintain accreditation. Heritage will participate in two WP (Water Pollution, Clean Water Act Program) studies and two WS (Water Supply, Safe Drinking Water Act Program) studies per calendar year. Laboratories must obtain PT samples from a PTOB/PTPA-approved (NIST) PT Provider with the exception for solid waste PT samples. Each laboratory shall participate in at least two PT studies for each PT field of testing per year unless a different frequency for a given program is defined in the appendices.
>
> Section 2.5 describes the time period in which a laboratory shall analyze the PT samples and report the results. Data and laboratory evaluation criteria are discussed in Sections 2.6 and 2.7 of this NELAC chapter. Heritage will participate in two solid waste PT studies per year by a vendor that certifies compliance with NELAC specified criteria. Presently, NIST will not accredit any PE provider for solid waste.

Refer to Table 14.2, Certifications Held By Heritage Environmental Services, LLC, Commercial Laboratory Operations, for a summary list of certifications maintained.

14.2 Systems Audits

A systems audit is an on-site inspection and review of a laboratory's quality control system and may be categorized as a qualitative appraisal of quality. It will cover any or all of the operational quality control elements of the quality assurance program. Systems audits include but are not limited to the following:

1. Sample handling: receiving, custody, log-in, storage
2. Sample analysis: written SOPs and analytical methods, protocols
3. Records control
4. Documentation: bound notebooks where required; records of all sample handling and analytical procedures
5. Preventative maintenance: adequate records, procedures.
6. Proficiency testing
7. Personnel practices
8. Training
9. Workload
10. Instrumentation and facilities

14.2.1 External Systems Audits

Systems audits are performed frequently at Heritage by State and Federal agencies as part of the participation in sample analyses for governmental organizations. In addition, many commercial clients perform routine audits of Heritage. Evaluation by other appropriate outside experts may be performed in the event that regulatory personnel are not available. At a minimum, external systems audits will occur annually. Heritage will welcome any external audit from an organization which currently or proposes to submit samples for analysis.

14.2.2 Internal Systems Audits

An internal audit system has been established in order to verify that the laboratory is performing according to the established standards. Internal systems audits will be conducted no less frequently than annually. The auditor will be appointed by and directly responsible to the Senior Vice-President of Heritage Environmental Services, LLC.

The Vice-President may appoint for any given audit the following staff:

1. Quality Assurance Officer(s)
2. Quality Assurance Unit
3. Outside (Contracted) Auditor
4. Any properly trained Auditor approved by the Senior Quality Assurance Officer or the Senior Vice-President

Heritage also encourages the individual groups to perform a self-audit at periodic intervals to assess their overall operation; however, this cannot substitute for the audits performed by an independent auditor (not within the group).

All reports relating to internal systems audits will be treated as an internal document only; release to any outside entity will be only upon approval of the Senior Vice-President of Heritage Environmental Services, LLC. There is no NELAC requirement to provide the content and findings of internal audits to NELAC auditors. Auditors will be provided with the outline or the checklists used in the internal audit so to identify the areas audited, but neither NELAC nor state regulations require the laboratory to provide the details of the results of the internal audit. The laboratory must provide proof that the internal audit was performed and covered the entire technical operation at a frequency of annually. This is the same standard used and applied under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) - Good Laboratory Practice Standards Rule. Producing the details of internal audit findings can be compelled only under a legal order.

To facilitate the procedure and make it consistent, a set of audit procedures and protocols has been developed and will be used consistently throughout the corporation. These forms will be used as a guideline and a tool for documentation of problems and to assure that all important areas are covered. The forms are a means to an end and not an end in themselves. They will be subject to change/improvement by the QAO at his/her discretion in order to facilitate and improve or target the auditing process as needed. Refer to Appendix G, Internal Systems Audit Forms. Alternative checklists such as NELAC or A2LA checklists may be used if available and appropriate.

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14.2.3 Internal Systems Audits - Procedures and Protocols

Not all areas (service groups) will necessarily be audited during each visit. A schedule of review (audit) of testing done in each laboratory service group (ICP, ICP/MS, GFAA, TCLP, GC/MS, GC/ECD, etc.) will be established during the first quarter of every year so that the entire technical operation is reviewed at some time during the year. This schedule will be maintained in the QA Unit files. The schedule is only a guide and the order of audits may be altered as deemed appropriate by the QA Officer. During each audit, at least one analytical run will be randomly selected from the service group(s) chosen. This run will be thoroughly checked using the chosen audit checklist forms, established SOPs and pertinent audit questions. The review will be documented in a bound notebook, in checklists or both.

Upon completion of the audit, the auditor will conduct an exit interview with the QA Unit and the Laboratory Director and any other personnel deemed appropriate. A copy of the final audit report, as well as any supporting narrative, will be given to the QA Unit, the Laboratory Director and the Senior Vice-President immediately upon completion. The QAO will confer with the Senior Vice-President to prioritize items for the next audit.

Generally the audit will consist of the auditor reviewing with the group supervisor and/or the analyst all the steps involved in generating a run of reportable data. The systems audit will also include an overview of the entire lab and address issues relevant to the operation as a whole (i.e. cooler logs, log-in procedures, etc.). Any deficiencies will be noted on the forms. Deficiencies should be discussed at the time they are noted.

14.3 Data Integrity Audits

The laboratory as part of the internal auditing program shall insure that a review is conducted with respect to any evidence of inappropriate actions or vulnerabilities related to data integrity. Discovery of potential issues shall be handles in a confidential manner until such time as a follow-up evaluation, full investigation, or other appropriate actions have been completed and the issues clarified. All investigations that result in finding of inappropriate activity shall be documented and shall include any disciplinary actions involved, corrective actions taken, and all appropriate notifications of clients. All documentation of these investigation and actions taken shall be maintained for at least five years.

Table 14.1
REFERENCE MATERIALS AND
PERFORMANCE EVALUATION PARTICIPATION

Source	Type	Frequency	Parameters
WP – APG	Single Blind	Semi-Annually	All
WS – ERA	Single Blind	Semi-Annually	All
DMRQA – APG	Single Blind	Annually	General Chemistry, Metals
Army Corps of Engineers	Single Blind	Project Specific	Metals, Organic, Explosives, General Chemistry
ERA – Solid Waste	Single Blind	Semi-Annually	Solid Waste Metals, Organic, General Chemistry
ASI	Double Blind	Quarterly	All

Table 14.2
CERTIFICATIONS HELD BY HERITAGE LABORATORY

STATE or ORGANIZATION	CERTIFYING AGENCY	CERTIFICATE NUMBER	AREAS OF CERTIFICATION	DATE EXPIRES	Reciprocity, if Applicable
DELAWARE	Dept. of Health		SDWA	3/24/06	Indiana
ILLINOIS	Illinois EPA	100401	CWA, SDWA, RCRA	1/31/05	NELAP Accrediting Authority
INDIANA	Department of Health Services	C-49-01	SDWA	3/24/06	
INDIANA	Department of Health Services	RO272-49	Rad. materials/ machine facility	5/20/05	
ISO-9001-2000	Registrar: SGS.	US03/3365	Corporate, Indianapolis Treatment Plant and Commercial Lab	7/20/06	
ISO 14001	Self Declaration		Indianapolis Plant & Commercial Lab	Reassessment Semi-annually	
KANSAS	Department of Health and Environment	E-10177	CWA, SDWA, RCRA	4/30/04	Illinois NELAP
KENTUCKY	Department of Environmental Protection	90048	SDWA	12/31/04	Indiana
MICHIGAN	Department of Environment		SDWA	4/14/03 (Extended until further notice)	Indiana
MISSISSIPPI	Dept. of Health		SDWA	3/24/06	Indiana
NORTH CAROLINA	Dept. of Environment & Natural Resources	93	CWA, RCRA	12/31/04	
NORTH DAKOTA		R-087	CWA, RCRA	12/31/04	North Carolina
NEW MEXICO	Environment Department		SDWA	1/31/03 (Renewal in process)	Illinois NELAP
OKLAHOMA	Department of Environmental Quality	ID--9204	CWA, RCRA	8/31/05	
SOUTH CAROLINA	Dept. of Health & Environmental Control		SDWA (Metals only)	4/24/06	Indiana

Table 14.2
CERTIFICATIONS HELD BY HERITAGE LABORATORY

STATE or ORGANIZATION	CERTIFYING AGENCY	CERTIFICATE NUMBER	AREAS OF CERTIFICATION	DATE EXPIRES	Reciprocity, if Applicable
SOUTH CAROLINA	Dept. of Health & Environmental Control	95003	CWA, RCRA (TKN, Residue Metals only)	12/31/04	North Carolina
U.S. ARMY CORP OF ENGINEERS	Chemical Data Quality Management Branch	ID	CWA, RCRA	7/29/04	
VERMONT	Water Supply Division		SDWA	4/08/06	Indiana
WEST VIRGINIA	West Virginia Dept. of Environmental Protection	273	RCRA	10/31/04	
WISCONSIN	Dept. of Natural Resources, Office of Technical	999788130	CWA, RCRA	8/31/05	Direct Certification
WYOMING	Us EPA Region VIII		SDWA	3-24-05	Indiana

CWA = CLEAN WATER ACT
SDWA = SAFE DRINKING WATER ACT
RCRA = RESOURCE CONSERVATION AND RECOVERY ACT

15.0 Quality Assurance Reports

The Senior Vice-President of Heritage and the Laboratory Director (management) will be kept informed and will receive reports on all quality-related issues and reports of significance as they occur. The Quality Assurance officer will compile an annual summary report and forward it to the Senior Vice-President of Heritage and the Laboratory director for review. The report will contain key issues related to the quality program. This report is considered company confidential and may not be released to outside personnel. This report will facilitate management review of the quality system. QA reports and management reviews may consist of but are not limited to the following:

15.1 Correction of Deficiencies

A statement that the laboratory has corrected or has begun to correct deficiencies identified in the QA report. Included in this statement will be:

1. A brief narrative describing what was done.
2. A brief narrative describing what is yet to be done.

15.2 Performance and Systems Audits Summary

In addition, the Senior Vice-President and the Lab Director will be supplied with the results of all performance and systems audits most recently completed.

15.3 Significant Problems and Solutions

Significant quality problems and recommended solutions will be reported to the Senior Vice-President and Laboratory Director on a timely basis. "Significant" is defined as those problems affecting the accuracy and use of final results reported to clients.

15.4 Outside Reporting

Whenever regulatory authorities or other customers require submission of QA reports, such reports will be submitted to the appropriate QA officers of those agencies at a frequency prescribed by those agencies (e.g. quarterly, monthly).

15.5 Management Review

Based on definitions provided in ISO-8402, a quality audit is an examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives. Whereas a management review is a formal evaluation by top management of the status and adequacy of the quality system in relation to quality policy and objectives, these are separate functions and are treated separately (i.e., document one set of procedures for internal audits and another for management reviews).

The quality system shall be reviewed at least once a year by the laboratories executive management to ensure its continuing suitability and effectiveness and to introduce any necessary changes or improvements. All of the elements of the laboratory's quality system are reviewed in relation to:

a. matters arising from the previous review;
b. reports from third-party assessments;
c. reports from audits by clients;
d. results of internal audits, including corrective and preventative actions implemented;
e. results of participation in proficiency testing;
f. results of in-house quality checks;
g. details of any complaints or feedback from clients;
h. staff training (for both new and existing staff members);
i. adequacy of staff, equipment and facility resources; and
j. future plans and projections for new work, new staff, new equipment, etc.
k. suitability of policies and procedures;
l. reports from managerial and supervisory personnel;
m. changes in the volume and type of work;

Records of management reviews should include agendas, completed checklists, reports, proposed and completed corrective actions and follow up to ensure changes are implemented. The laboratory has a procedure (SOP) titled Quality System Review By Management, (QA-12.0 and subsequent updates) and maintains records of review findings and actions.

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PROCUREMENT OF SUPPLIES AND SERVICES

[Reserved]

APPENDIX A
Selected References

Quality Control/Quality Assurance

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30. Test Methods for Evaluating Solid Waste - Physical/Chemical Methods. EPA/SW 846. 3rd Edition, Update I, July 1992.

32. USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis. EPA. ILM01. 1990.

33. USEPA Contract Laboratory Program Statement of Work for Organic Analysis. EPA. OLM01. 1-8.

34. Quality Assurance Program Requirements for Environmental Programs. ANSI/ASQC-E4-19xx, September 1991.

35. 40 CFR Part 141, National Primary Drinking Water Regulations, July 1, 1991 Edition, Code of Federal Regulations, Subpart C (Monitoring and Analytical Requirements, Sections 141.21 to 141.30) and Subpart I (Control of Lead and Copper, Section 141.89).

36. 40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act, Tables IA, IB, IC, ID, and IE, as published in the Federal Register, Vol. 65, No. 165, pp. 50758-50770, October 8, 1991.

37. 40 CFR Part 261, Identification and Listing of Hazardous Waste, July 1, 1991, Appendix III (Chemical Analysis Test Methods).

38. USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, ILM02.0 (July 1990) and ILM02.1 (September 1991).

39. USEPA Contract Laboratory Program Statement of Work for Organic Analysis, OLM02.0 (July 1990) and OLM02.1 (September 1991).

40. Prescribed Procedures For Measurement of Radioactivity In Drinking Water, EPA-600/4-80-032. August 1980.

Modified Methods

EPA Methods 300.0 (Revised August 1991) and 9056 - Method 300.0 may be used for the analysis of the METHOD SPECIFIED ions in groundwater and surface water. Method 9056 may be used for the METHOD SPECIFIED ions EXCEPT fluoride.

EPA Methods 601, 602, 624 and 625 - Capillary columns may be used instead of the specified packed columns if the laboratory can meet the performance criteria (precision, accuracy and method detection limits) of the method.

EPA Methods 601 & 602 - The photoionization detector and electrolytic conductivity detector may be used in series if the laboratory can meet the performance criteria of the specified methods.

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EPA Methods 602, 8020 & 8021 - May include the analyses for xylenes and methyl tert-butyl ether (MTBE). Note: required for Chapter 17-770 work.

EPA Method 610, 625, 8100, 8310, 8250 & 8270 - May include the analyses for 1-methylnaphthalene and 2-methylnaphthalene. Note: required for Chapter 17-770 work.

EPA Method 5030/8010 - Must be modified to analyze for EDB in soils. An electron capture detector instead of a electrolytic conductivity detector must be used.

APPENDIX C
SAFETY ISSUES

MANDATORY SAFETY PROCEDURES & PRACTICES

This section is not meant as a comprehensive manual of safety practices, but only as a indicator of some of the important ones and how they are specifically applied at Heritage Laboratory Services, LLC. The Safety Officer is responsible for responding to any questions concerning safety procedures and policies. Refer to the Heritage Chemical Hygiene Plan for complete information.

SAFETY GLASSES

Approved protective eyewear must be worn by all Heritage Personnel at all times in all laboratory areas. Laboratory areas include all areas with quarry tile flooring and all working areas in front of fume hoods and lab benches. Non-prescription safety glasses and goggles are available free of charge to all employees. Contact lenses are not recommended for use in the laboratory and are not considered protective. All visitors should be advised to wear eye protection and should be offered a pair of safety glasses to use during their tour of designated lab areas.

INSPECTIONS

Periodic inspections of all laboratory areas will be performed by the Safety Officer. Inspections will assess current operating procedures and practices. Recommendations for improvement may be made or immediate remedial action may be necessary. Results of these inspections will be discussed with the Group Supervisors, the Senior Chemist(s) and the personnel directly involved with the area of inspection.

SMOKING

No smoking is allowed anywhere in the building. This policy applies to visitors as well.

FUME HOODS

Fume hoods must be used for all procedures involving concentrated acids, bases, and solvents. Fume hoods are maintained to deliver a face velocity of 100 fpm. When an individual is not working at the hood, the face glass should be closed. The glass curtain should be raised only to the extent necessary for easy access. Protective eye wear must be used when working at or near a fume hood. Each hood is marked to indicate a maximum sash level for safe operation.

PROTECTIVE CLOTHING

Lab coats, gloves, and shoe covers are available for use by all Heritage Laboratory employees. Protective clothing should not be worn into non-laboratory areas since it may transfer hazardous material onto surfaces otherwise assumed to be clean.

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It is recommended that a lab coat be worn in all laboratory areas to protect not only the individual but their clothing. Shoe covers are also recommended for procedures where splashing hazardous samples, or chemicals is probable.

Protective gloves should be used for procedures involving: handling hazardous waste samples; handling hot or cold materials; handling acids, solvents, or bases. Gloves should be made of a material which is impervious to the hazardous nature of the substance being handled.

General Lab Work - Natural Latex (Surgeons) Gloves.
Hot/Cold Work - Zetex, Leather or other non-flammable insulating material.
Acids - Nitrile, Neoprene
Bases - Neoprene, Nitrile
Solvents - Neoprene, Nitrile, Viton
Alcohol - Neoprene, Nitrile

Long hair must be tied back to avoid hazards such as fire and chemical contact.

FIRE/FIRE EXTINGUISHERS

Fire extinguishers are highly visible and located at all Heritage locations. All extinguishers are type ABC or Halon. ABC extinguishers may be used on paper trash and wood, burning liquids, and electrical equipment. It is recommended however, that Halon be used on electrical fires particularly in computers or instruments. A commercial safety service checks and maintains the fire extinguishers. Powder for extinguishing flammable metal fires is available in the safety cabinet. (See Evacuation Memo)

CLEANLINESS

A very important part of safety is good housekeeping. This includes:

1. Maintaining an organized work area.
2. Cleaning up every spill immediately, even water.
3. Keeping small objects off the floor and large objects out of traffic paths, particularly exit ways.
4. Returning unused chemicals, glassware, or equipment to its proper storage area.
5. Disposing of waste (chemicals, napkins, tongue blades, pipets) in the proper container.

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6. Disposing of broken glassware immediately in the proper containers.
7. Do not place contaminated chemical transfer utensils on the bare countertop.

SPILL CLEANUP

Spills must be cleaned up immediately after they happen. Even a water spill should be removed. Special kits are available for neutralizing and absorbing various liquid spills for disposal. These kits are located in the safety cabinet. If in doubt as to the type of spill, inform the Safety Officer; always assume the worst. Ask the Safety Officer when in doubt as to the proper method for cleanup or disposal. Chemicals should never be reused following a spill. Dry chemicals should be treated with as much caution as liquids. Many times, special equipment may be necessary (i.e. respirators, splash suit, caution signs, etc.) and should be used. If in doubt as to the safety equipment required for a particular spill, consult the Safety Officer.

REPORTING ACCIDENTS

All accidents no matter how small must be reported to the Safety Officer and the Group Supervisor. In some cases a form may need to be filled out describing the situation and result. If medical attention is indicated, the Safety Officer may direct the individual to the emergency care center or to a hospital.

COMPRESSED GASES

All gas cylinders must be affixed to an immobile surface when in use. All cylinders must be transported with the protective valve cap in place. Cylinders in storage must be chained to the wall or placed in the protective cage. Empty cylinders should be segregated from full cylinders for easy access during exchange. Flammable gases must be segregated from oxidizers and non-flammable gases (this includes 'empty' tanks). Empty cylinders should be marked as such.

COMMON PROCEDURES

1. Always add acid to water, never water to acid.
2. Never pipet by mouth, use a suction bulb.
3. Never store food or drink in a sample cooler
4. Never eat in the laboratory, use the breakroom.
5. Always lubricate glass tubing before inserting in stopper.
6. Always dispose of waste properly, consider the janitor.
7. Keep balance and balance area clean.
8. Always read the label and MSDS.
9. Always report accidents to the Safety Officer.
10. When in doubt about an element of Safety - ASK QUESTIONS
11. All sample and chemical containers are to be returned to storage and closed overnight.

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SAFETY SHOWERS/EYE WASH

Safety showers should always be used in instances of gross contamination of clothing or skin. The eye wash should always be used when foreign matter is introduced into or around the eye. The safety shower and eye wash stations are periodically checked and maintained. Operation of the safety shower includes disrobing from the contaminated clothing and rinsing for at least 15 minutes. The eye wash should be used at least 15 minutes and contact lenses should be removed as soon as possible.

CHEMICAL HANDLING/STORAGE

Read the label and MSDS on each and every chemical used. The safety related item which should be understood are: Fire Hazard, Health Hazard, Reactivity Hazard, Protective Equipment, Disposal, Storage, and First Aid. If the chemical is used in making a stock solution, clearly label the new container with the date, analysts initials, expiration date, contents and any other pertinent information. Never use anything from an unlabeled container. Follow the storage recommendations. Flammables always go in an approved container and storage cabinet. Acids always go in an acid storage cabinet. Incompatible chemicals should not be stored together. Large quantities of chemicals should not be 'pigeon holed' at work locations. Properly dispose of and reorder chemicals found to be past their expiration date. Transport chemicals in protective containers if breakage is a possibility. Keep chemical containers clean with tight fitting lids and readable labels. In disposing of chemicals, samples, damaged equipment or expendable materials consider the potentialities of the action (eg. incompatible waste, exposure to the janitor).

FIRST AID

First aid kits are maintained by a commercial first aid company. Any of the materials in these kits may be used to self treat minor accidents or common ailments. All accidents, no matter how small, must be reported to the Group Leader and the Safety Officer. The instructions and labels on all medications and materials should be read and understood by the user prior to application or use. A Red Cross first aid manual is available for reference in the safety cabinet.

SAFETY CABINET

All safety related supplies are maintained in a dedicated cabinet centrally located in the laboratory. The contents includes; fire extinguishers; respirators; spill clean up kits; gloves; splash suits; shoe covers; safety manuals; and material safety data sheets (MSDS).

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These items are regularly inventoried, however, all destructive uses of these items should come to the attention of the Safety Officer. All items should be replaced after use and not stored elsewhere in the laboratory. Any items routinely necessary for specific procedures should be obtained and stored separately near the area in which they are used.

EATING/DRINKING IN LAB

No eating or drinking is allowed in any laboratory area. Never store food or beverages in a cooler/refrigerator used for incubation, chemical or sample storage.

ALCOHOL/DRUG USE

No person under the influence of alcohol or drugs will be allowed to work in any laboratory area. Such an individual will be subject to disciplinary action which may include termination. Any individual who is required to take a prescribed medication which might affect his/her judgement should inform the Safety Officer so that non-laboratory work can be assigned.

VISITOR AREAS

We want to show off the lab in a safe and efficient manner. In general, visitors should be restricted to the hallways and non-quarry tile areas. Viewing windows are available and should be used. Anyone wishing to tour inside the lab should make prior arrangements with the Quality Assurance Officer or the Safety Officer. Visitors should always be supplied with safety glasses/goggles. Visitors must be accompanied on tours, not only for their safety but to maintain confidentiality.

EVACUATION PROCEDURES

In case evacuation of the building is necessary, because of fire, chemical spill, or other emergency, the person discovering the accident should page "70" and inform all occupants to evacuate the building and the source or location of the accident. The Laboratory Director or designee will mak an accounting of all personnel outside while the Safety Officer or designee will assure the proper authorities are notified.

MATERIAL SAFETY DATA SHEETS

Material safety data sheets are maintained for each chemical used in the lab. These sheets provide information on handling, disposal, spill cleanup, health hazards, physical/chemical data and safety measures. The MSDS should be consulted by the analyst prior to using any new or unfamiliar chemical. Each analyst should be familiar with the major hazards of each chemical they work with (flash point, contact hazard, etc.) The MSDS manual is kept in the safety cabinet and should be returned after each use. Each chemical supplier is required to provide a MSDS with each chemical shipped.

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WORKING AFTER HOURS

Employees working after business hours or on weekends must inform their Group Supervisor of when and for how long they will work. Procedures requiring the use of concentrated acids, bases or solvents should be avoided by individuals working alone.

CONTAMINATION CONTROL

All sample and chemical containers must be closed using screw top lids, ground glass stoppers, or a similar device and not allowed to stand open overnight. Before disposal all materials (rags, towels, etc.) used to clean up volatile solvent spills should be kept in an open container in a working fume hood until all traces of the solvent have evaporated. All utensils (spoons, spatulas, pipets, etc.) used to transfer materials should be cleaned weekly or as needed. All reasonable measures should be taken to avoid environmental contamination.

Soiled lab coats should be exchanged for clean coats frequently and once used should not leave the laboratory area. Soiled lab coats should be stored in the proper hamper. Personal items (coats, etc.) should not be taken into the lab areas.

APPENDIX D
DEFINITIONS AND ACRONYMS

ABSORBANCE - a measure of the decrease in incident light passing through a sample into the detector. It is defined mathematically as:

Where, I = radiation intensity

$$A = \frac{I(solvent)}{I(solution)} = \log \frac{Io}{I}$$

ACCEPTANCE CRITERIA – specified limits placed on characteristics of an item, process, or service defined in requirement documents.

ACCURACY - The closeness of agreement between an observed value and an accepted reference value. When applied to a set of observed values, accuracy will be a combination of a random component and of a common systematic error (or bias) component which are due to sampling and analytical operations; a data quality indicator.

ALIQUOT - a measured portion of a field sample taken for analysis.

ANALYSIS - a specific test applied to a specific sample.

ANALYSIS DATE/TIME - the date and military time (24-hour clock) of the introduction of the sample, standard, or blank into the analysis system.

ANALYTE - the element, compound or ion an analysis seeks to determine; the parameter of interest.

ANALYTICAL DETECTION LIMIT – the smallest amount of an analyte that can be distinguished in a sample by a given measurement procedure throughout a given (e.g., 0.95) confidence interval. (Applicable only to radiochemistry)

ANALYTICAL REAGENT (AR) GRADE – designation for the high purity of certain chemical reagents and solvents given by the American Chemical Society.

ANALYTICAL SAMPLE - Any solution or media introduced into an instrument on which an analysis is performed excluding instrument calibration, initial calibration verification, initial calibration blank, continuing calibration verification and continuing calibration blank. Note the following are all defined as analytical samples: undiluted and diluted samples (EPA and non-EPA), predigestion spike samples, duplicate samples, serial dilution samples, analytical spike samples, post-digestion spike samples, interference check samples (ICS), CRDL standard for AA (CRA), CRDL standard for ICP (CRI), laboratory control sample (LCS), preparation blank (PB) and linear range analysis sample (LRS).

ANALYTICAL SET - the basic unit for analytical quality control. Also known as sample set or analytical batch. The analytical set is defined as samples which are analyzed (or sampled together) with the same method sequence, the same lots of reagents and with the same treatment common to all samples. The samples must have been analyzed (or collected) within the same specified time period or in continuous sequential time periods. Samples in each set should be of similar composition (same matrix).

on. Confidentia**ANALYTICAL SPIKE** - a post-digestion spike. The addition of a known amount of standard after digestion/extraction.

AUDITS - A systematic check to determine the quality of the operation of some function or activity.

Performance Audits: Quantitative data are independently obtained for comparison with routinely obtained data in a measurement system. Examples of these audits are EPA performance evaluation programs, commercial performance evaluation programs, split sampling program involving at least two laboratories, blind spike samples.
Systems Audit: These are qualitative in nature and consist of an on-site review and evaluation of a laboratory or field operations quality assurance system and physical facilities for sampling calibration and measurements.

AUTOZERO - zeroing the instrument at the proper wavelength. It is equivalent to running a standard blank with the absorbance set at zero.

AVERAGE INTENSITY - the average of two or more different injections (exposures).

BACKGROUND CORRECTION - a technique to compensate for variable background contribution to the instrument signal in the determination of trace elements.

BAR GRAPH SPECTRUM - a plot of the mass-to-charge ratio (m/e) versus relative intensity of the ion current.

BATCH – environmental samples which are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A **preparation batch** (also referred to as a sample prep set) is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting the above mentioned criteria. The maximum time between the start of processing of the first and last sample in the batch shall be 24 hours. An **analytical batch** is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group using the same instrument calibration curve or factor. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

BIAS - the deviation due to matrix effects of the measured value (x_s - x_u) from a known spiked amount. Bias can be assessed by comparing a measured value to an accepted reference value in a sample of known concentration or by determining the recovery of a known amount of contaminant spiked into a sample (matrix spike). Thus, the bias (B) due to matrix effects based on a matrix spike is calculated as:

$$B = (x_s - x_u) - K$$

where:

x_s = measured value for spiked sample
x_u = measured value for unspiked sample, and
K = known value of the spike in the sample.

Using the following equations yields the percent recovery (%R). The value of %R may be used to correct the measured values for that batch of data. Thus,

$$\%R = 100\,(x_s - x_u)/\,K$$

and

$$x_c = 100\,(x_u/\%R)$$

where x_c = corrected value.

Correction for bias may be applicable except when the recovery of the analyte is between 80% to 120%, when using bias correcting methods (e.g. isotope dilution), or when recovery is greater than 100%. In some cases, when the uncorrected concentration is above a regulatory threshold bias correction is not needed. The measured value will be considered the minimum amount present. In all other cases correction for bias may be used. Bias correction will only be applied when required by regulation.

BLANK - an artificial sample of an analytical matrix designed to monitor the introduction of artifacts into the system.

a. Field Quality Control Blanks

1. **Field Blanks**: Blanks of analyte free water that are prepared on-site by filling appropriate sample containers with the water, adding appropriate preservatives, sealing the containers, and completing the appropriate documentation. These blanks should be prepared during the middle to end of a sampling event by filling sample containers with water from the equipment decontamination water transport containers. They are to be treated, stored, transported, and analyzed in a same manner as the sample group for which it was intended. These blanks may be submitted for all water parameter groups.

2. **Equipment Blank**: Blanks of analyte-free water that are prepared on-site by pouring the equipment decontamination water through decontaminated field equipment. Appropriate sample containers, for each analyte group must be used, preservatives added, if required, and appropriate documentation must be completed. These blanks are to be stored, transported and analyzed with the intended parameter groups. At least one equipment blank is required for each water and solid matrix analytical group, and must be collected at the beginning of the sampling episode. If field decontamination is performed on-site, additional equipment blanks must be submitted for all water and solid matrix analytical groups.

3. **Trip Blank**: These blanks are required only for water samples for VOCs. Blanks of volatile organic free water are prepared by the organization that is providing the sample containers. These are transported to the site with the empty VOC sample containers, and shipped to the analyzing laboratory in the same containers as the VOC samples. They remain unopened for the entire trip. Proper labeling and documentation must be completed. A trip blank must be submitted for each cooler that transports VOC samples.

b. Laboratory

1. **Method Blank**: A blank of an appropriate analyte-free matrix that is processed (digested, extracted, etc.) and analyzed with a specified sample set (See BLA02, BLA01).

2. **Reagent Blank**: An aliquot of analyte-free water or solvent that is analyzed with a sample set. (See BLA01).

BLIND SAMPLE – a subsample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. It is used to test the analyst's or laboratory's proficiency in the execution of the measurement process.

CALIBRATE – to determine, by measurement or comparison with a standard, the correct value of each scale reading on a meter or other device, or the correct value for each setting of a control knob. The levels of the applied calibration standard should bracket the range of planned ore expected sample measurements.

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CALIBRATION - process by which the correlation between instrument response and actual value of a measured parameter is determined.

a. Calibration Curve: a curve which plots the concentration of known analyte standards against the instrument response to the analyte. Also known as a Standard Curve.

b. Calibration Standard: Solutions or dilutions of a substance or material with a verifiable accuracy which are used to evaluate the sample property of an unknown sample. In analytical terms, these standards are used to establish a calibration curve or standard instrument response factors.

c. Continuing Calibration Standard: Standards that are analyzed during an analytical set to verify the accuracy of the calibration curve.

d. Internal Standard: a compound having similar chemical characteristics to the compounds of interest but which is not normally found in the environment or does not interfere with the compounds of interest. A known and specified concentration of the standard is added to each sample prior to analyses. The concentration in the sample is based on the response of the internal standard relative to that of the calibration standard and the compound in the standard.

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. A case consists of one or more Sample Delivery Groups.

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act ("Superfund").

CERTIFIED REFERENCE MATERIAL (CRM) – a reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body.

CHAIN OF CUSTODY – an unbroken trail of accountability that documents the physical security of samples, data and records.

CLP - Contract Laboratory Program (USEPA).

CHARACTERIZATION - a determination of the approximate concentration range of compounds of interest used to choose the appropriate analytical protocol.

COEFFICIENT OF VARIATION (CV) - the standard deviation as a percent of the arithmetic mean.

CONCENTRATION LEVEL (low or medium) - characterization of soil samples or sample fractions as low concentration or medium concentration is made on the basis of the laboratory's preliminary screen, if performed or the client's designation.

CONFIRMATION – verification of the presence of a component through the use of an approach different from the original test method. These may include:

Second column confirmation
Alternative wavelength
Derivatization
Mass spectral interpretation
Alternative detectors or
Additional cleanup procedures.

CONTINUING CALIBRATION - analytical standard run at a specified frequency to verify the calibration of the on. / Confidentia system.

CONTINUOUS LIQUID-LIQUID EXTRACTION - used herein synonymously with the terms continuous extraction, continuous liquid extraction, and liquid extraction. This extraction technique involves boiling the extraction solvent in a flask and condensing the solvent above the aqueous sample. The condensed solvent drips through the sample, extracting the compounds of interest from the aqueous phase.

CONTRACT REQUIRED DETECTION LIMIT (CRDL) - minimum level of detection acceptable under a contract Statement of Work. Equivalent to Contract Required Quantitation Limit (CRQL).

CONTROL LIMITS - a range within specified measurement results must fall to be compliant. Control limits may be mandatory, requiring corrective action if exceeded, or advisory, requiring that noncompliant data be flagged.

CONTROL SAMPLE - a QC sample introduced into a process to monitor the performance of the system.

CONFIDENCE LEVEL - the statistical probability associated with an interval of precision (or accuracy) values in a QC chart. The values of confidence intervals are generally expressed as percent probability. It is a commonly accepted convention that the result being tested is significant if the calculated probability is greater than 90 percent, and is highly significant if the probability is greater than 99 percent.

CORRECTIVE ACTION – action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence.

CORRELATION COEFFICIENT - a number (r) which is a measure of the linear relationship between two variables (i.e. concentration - absorbance). The correlation coefficient (r) may have values between +1 and -1. When r = 1, there is a perfect positive correlation. When r = 0 there is no correlation. When r = -1, there is a perfect negative correlation (one variable increases, the other decreases).

CWA - Clean Water Act.

DATA QUALITY - the totality of features and characteristics of data that bears on its ability to satisfy a given purpose. The characteristics of major importance are accuracy, precision, completeness, representativeness, and comparability. These characteristics are defined as follows:

a. **Accuracy** - the degree of agreement of a measurement (or an average of measurements of the same thing), X, with an accepted reference or true value, T, usually expressed as the difference between the two values, X-T, or the difference as a percentage of the reference or true value, 100 (X-T)/T, and sometimes expressed as a ratio, X/T. Accuracy is a measure of the bias in a system.

b. **Precision** - a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation. Various measures of precision exist depending upon the "prescribed similar conditions."

c. **Representativeness** - expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

d. **Comparability** - expresses the confidence with which one data set can be compared to another.

DATA QUALITY OBJECTIVES - a set of specifications that the environmental data must meet in order to be acceptable for its intended use in a program area. DQOs are commonly established for limits of detection and quality of data (precision, accuracy, representativeness and comparability).

DAY - unless otherwise specified, day shall mean calendar day.

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DETECTION LIMITS - The lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated degree of confidence. Detection limits are further defined as:

a. **Method Detection Limit** - the smallest concentration of an analyte of interest that can be measured and reported with 99 percent confidence that the concentration is greater than zero. The MDLs are determined from the analysis of a sample in a given matrix containing the analyte at a specified level. Determination of MDLs must be done by procedures determined in Appendix B of 40 CFR, part 136. Equivalent procedures to determine MDLs must be approved by the applicable regulatory agencies. Note: Reporting results at the MDL may result in a relative uncertainty of the result greater than ± 100%. The Limit of Detection (LOD) is approximately equal to the MDL for those tests where the MDL can be calculated.

b. **Practical Quantitation Limit** - the smallest concentration of an analyte of interest that can be reported with a specific degree of confidence. PQLs shall be determined in the same way as MDLs by using the procedures outlined in Appendix B of 40 CFR, Part 136. The standard deviation (sd) derived from the procedures will be used to calculate the PQL: PQL = 10 sd which corresponds to an uncertainty of ± 30 percent in the measured value at the 99 percent confidence level. Also known as the "Reporting Detection Limit" or the Limit of Quantitation (LOQ).

c. **Instrument Detection Limit** - the smallest amount of an analyte of interest that generates an instrument response (signal) under prescribed conditions such that the magnitude of the signal is larger than the absolute uncertainty (error) associated with it. IDLs are determined by multiplying by 3.143 (3.0 for CLP) the average standard deviation obtained for the analysis of a standard solution (each analyte in reagent water) at a concentration of 3X-5X the estimate of the IDL on three nonconsecutive days with seven consecutive measurements per day (compute the standard deviation for each day, then average the standard deviations).

DOCUMENT CONTROL – The act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed.

DIGESTION LOG - an official record of the sample preparation (digestion).

DILUTION TEST – a sample is diluted by a minimum of five-fold (1+4) and re-analyzed. If all samples in the analytical batch are below 10 times the detection limits, a 1-point method of standard additions is performed. Agreement within 10% between the concentration for the undiluted sample and five times the concentration for the diluted sample indicates the absence of interferences and such sample may be analyzed without using the method of standard additions. This test is also known as Serial Dilution Analysis, See SW-846 7000A, Section 8.6.

DISSOLVED METALS - analyte elements which have not been digested prior to analysis and which will pass through a 0.45 um filter.

DUPLICATE ANALYSES – the analyses of measurements of the variable of interest performed identically on two subsamples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory.

DUPLICATE (LAB) - a second aliquot of a sample that is treated the same as the original sample in order to determine the precision of the method. Also known as a laboratory replicate (See DUP01 and DUP02, Replicate Sample, Matrix Spike Duplicate, Field Duplicate).

DRY WEIGHT - the weight of a sample based on percent solids. The weight after drying in an oven.

$$Dry\ Weight = Wet\ Weight\ Basis\ x\ \frac{100}{D}$$

$$Where\ D = Total\ Solids, \%.$$

ENVIRONMENTAL DETECTION LIMIT (EDL) – the smallest level at which a radionuclide in an environmental medium can be unambiguously distinguished for a given confidence interval using a particular combination of sampling and measurement procedures, sample size, analytical detection limit, and processing procedure. The EDL shall be specified for the 0.95 or greater confidence interval. The EDL shall be established initially and verified annually for each test method and sample matrix.

ENVIRONMENTAL SAMPLE - any sample from a natural source or sources that reasonably may be expected to contribute pollution to or receive pollution from ground waters or surface waters. This includes, but is not limited to: receiving waters; waters used to define natural background conditions; soils; sediments; industrial, domestic or municipal discharge effluents; chemical storage or handling facilities; waste disposal facilities or areas; industrial or agricultural chemical handling or application areas; surface water run-off; and facilities for handling or applying of chemicals for weed or insect control

EPA - Environmental Protection Agency (USEPA)

EQUIPMENT BLANK - see Equipment Rinsate.

EQUIPMENT RINSATE - a sample of the media which has been used to rinse the sampling equipment. The media used for rinsing is acceptable if the concentration of any analyte of concern in the media is no higher than the highest of either:

a. the detection limit, or

b. five percent of the regulatory limit for that

c. five percent of the measured concentration in that

It is collected after completion of decontamination and prior to sampling. This blank is useful in documenting adequate decontamination of sampling equipment.

EXTRACTABLE - a compound that can be partitioned into an organic solvent from the sample matrix. Extractables include semivolatile (BNA) and pesticide/Aroclor compounds.

FIELD DUPLICATES - independent samples which are collected as close as possible to the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. These duplicates are useful in documenting the precision of the sampling process.

FIFRA - Federal Insecticide, Fungicide, and Rodenticide Act.

FLAME ATOMIC ABSORPTION (AA) - atomic absorption which utilizes flame for excitation.

GRAPHITE FURNACE ATOMIC ABSORPTION (GFAA) - atomic absorption which utilizes a graphite cell for excitation.

HOLDING TIMES (Maximum Allowable Holding Times) – the maximum times that samples may be held prior to analysis and still be considered valid without qualification.

HOMOGENEITY - the degree to which a property or substance is randomly distributed throughout a material. Homogeneity depends on the size of the units under consideration. Thus, a mixture of two minerals may be inhomogeneous at the molecular or atomic level, but homogeneous at the particulate level.

INDEPENDENT STANDARD - a Contractor-prepared standard solution that is composed of analytes from a different source than those used in the standards for the initial calibration.

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INDUCTIVELY COUPLED PLASMA (ICP) - a technique for the simultaneous or sequential multi-element determination of elements in solution. The basis of the method is the measurement of atomic emission by an optical spectroscopic technique. Characteristic atomic line emission spectra are produced by excitation of the sample in a radio frequency inductively coupled plasma.

IN-HOUSE - in a Heritage laboratory facility.

INITIAL CALIBRATION - analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the instrument to the target compounds.

INITIAL DEMONSTRATION OF CAPABILITY – procedure to establish the ability of the laboratory to generate acceptable accuracy and precision.

INJECTION - introduction of the analytical sample into the instrument for the purpose of measuring absorbance, emission or concentration of an analyte. May also be referred to as exposure.

INSTRUMENT CALIBRATION - analysis of analytical standards for a series of different specified concentrations; used to define the quantitative response, linearity, and dynamic range of the instrument to target analytes.

INTERFERENTS - substances which affect the analysis for the parameter of interest.

INTERNAL STANDARDS – a known amount of standard added to a test portion of a sample and carried through the entire measurement process as a reference for evaluating and controlling the precision and bias of the applied analytical test method.

LABORATORY - synonymous with Contractor as used herein. Body that calibrates and/or tests.

LABORATORY CONTROL SAMPLE (LCS, however named, such as laboratory fortified blank or spiked blank) - a control sample of known composition. Aqueous and solid laboratory control samples are analyzed using the same sample preparation, reagents, and analytical methods employed for the samples received.

LABORATORY RECEIPT DATE - the date on which a sample is received at the inventory's facility, as recorded on the shipper's delivery receipt and sample Traffic Report. Also referred to as VTSR (validated time of sample receipt).

LABORATORY SAMPLE - a sample, intended for testing or analysis, prepared from a gross sample or otherwise obtained. The laboratory sample must retain the composition of the gross sample. Often reduction in particle size is necessary in the course of reducing the quantity.

LEGAL CHAIN OF CUSTODY (COC) – an unbroken trail of accountability that ensures the physical security of samples, data and records.

LINEAR RANGE, LINEAR DYNAMIC RANGE - the concentration range over which the analytical calibration curve remains linear. The plot may be normal-normal, log-normal or log-log. At the upper and lower bounds of this region, the response of the analyte's signal deviates from a linearity.

LOT - a quantity of bulk material of similar composition whose properties are under study.

MATRIX - the predominant material of which the sample to be analyzed is composed. Matrix is not synonymous with phase (liquid or solid). See 'Sample Matrix' definition.

MATRIX DUPLICATE - an intralaboratory split sample which is used to document the precision of a method in a given sample matrix.

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MATRIX MODIFIER - salts used in AA to lessen the effects of chemical interferents, viscosity, and surface tension.

MATRIX SPIKE - an aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

MATRIX SPIKE DUPLICATES – Intra-laboratory split samples spiked with identical concentrations of target analyte(s). The spiking occurs prior to sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix.

MCL - Maximum Contaminant Level (regulatory level) is a numerical value expressing the maximum allowable concentration of a compound in drinking water.

METHOD BLANK (previously termed reagent blank) - an analytical control consisting of all reagents, internal standards and surrogate standards, that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination.

METHOD DETECTION LIMIT (MDL) - The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte. See Detection Limits.

For operational purposes, when it is necessary to determine the MDL in the matrix, the MDL shall be determined by multiplying the appropriate one-sided 99% t-statistic by the standard deviation obtained from a minimum of three analyses of a matrix spike containing the analyte of interest at a concentration three to five times the estimated MDL, where the t-statistic is obtained from standard references or the table below.

No. of samples:	t-statistic
3	6.96
4	4.54
5	3.75
6	3.36
7	3.14
8	3.00
9	2.90
10	2.82

METHOD OF STANDARD ADDITIONS (MSA) - the addition of 3 increments of a standard solution (spikes) to sample aliquots of the same size. measurements are made on the original and after each addition. The slope, x-intercept and y-intercept are determined by least-square analysis. The analyte concentration is determined by the absolute value of the x-intercept. Ideally, the spike volume is low relative to the sample volume (approximately 10% of the volume). Standard addition may counteract matrix effects; it will not counteract spectral effects. Also referred to as Full Method of Standard Additions (3-Point MSA).

METHOD OF STANDARD ADDITIONS, SINGLE ADDITIONS - the simplest version of MSA is the single-addition method, in which two identical aliquots of the sample solution, each of Volume V_x, are taken. To the first (labeled A) is added a small volume V_s of a standard analyte solution of concentration c_s. To the second (labeled B) is added the same volume V_s of the solvent. The analytical signals of A and B are measured and corrected for nonanalyte signals. The unknown sample concentration c_x may be calculated as follows:

$$c_x = \frac{S_B V_s c_s}{(S_A - S_B) V_x}$$

where S_A and S_B are the analytical signals (corrected for the blank) of solutions A and B, respectively. V_s and c_s should be chosen so that S_A is roughly twice S_B on the average. It is best if V_s is made much less than V_x, and thus c_s is much greater than c_x, to avoid excess dilution of the sample matrix. If a separation or concentration step is used, the additions are best made first and carried through the entire procedure.

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m/z - Mass to charge ratio, synonymous with "m/e", used in mass spectrometry

NARRATIVE (SDG Case Narrative) - a portion of a 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.

NEGATIVE CONTROL – measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results.

NELAC – National Environmental Laboratory Accreditation Conference. A voluntary organization of state and federal environmental officials and interest groups purposed primarily to establish mutually acceptable standards for accrediting environmental laboratories. A subset of NELAP.

NELAP – the overall National Environmental Laboratory Accreditation Program of which NELAC is a part.

NPDES - National Pollutant Discharge Elimination System (regulated under the CWA).

ORGANIC-FREE REAGENT WATER - For volatiles, all references to water in the methods refer to water in which an interferant is not observed at the method detection limit of the compounds of inters. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water. Organic-free reagent water may also be prepared by boiling water for 15 minutes and, subsequently, while maintaining the temperature at 90°C, bubbling a contaminant-free inert gas through the water for 1 hour.

For semivolatiles and nonvolatiles, all references to water in the methods refer to water in which an interferant is not observed at the method detection limit of the compounds of interest. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water.

PARAMETER GROUP - Is defined as a group of samples that have been preserved in the same manner, prepared by similar protocols and analyzed using instruments of similar technology (also known as analyte group). Examples of parameter groups are:

Volatiles (EPA methods 601, 602, and 624)
Pesticides (EPA methods 608, 614, 622)
Trace Metals (All metals except mercury)
Nutrients (Total Kjeldahl Nitrogen, Nitrate ± Nitrite, Total Phosphorous)

PERCENT SOLIDS - the proportion of solid in a sample determined by drying an aliquot of the sample.

PERCENT DIFFERENCE (%D) - As used in this QAP and elsewhere to compare two values, the percent difference indicates both the direction and the magnitude of the comparison, i.e., the percent difference may be either negative, positive, or zero. (In contrast, see relative percent difference below).

PERCENT MOISTURE - an approximation of the amount of water in a soil/sediment sample made by drying an aliquot of the sample at 105°C. The percent moisture determined in this manner also includes contributions from all compounds that may volatilize at or below 105°C, including water. Percent moisture may be determined from decanted samples and from samples that are not decanted.

PERFORMANCE AUDIT – the routine comparison of independently obtained quantitative measurement system data with routinely obtained data in order to evaluate the proficiency of an analyst or laboratory.

PERFORMANCE BASED MEASUREMENT SYSTEM (PBMS) – a set of processes wherein the data quality needs, mandates or limitations of a program or project are specified and serve as criteria for selecting appropriate test methods to meet those needs in a cost-effective manner.

PERFORMANCE EVALUATION SAMPLES - A sample submitted for analysis whose composition and concentration are known to the submitter but unknown to the analyst. Also known as a Blind Sample.

POSITIVE CONTROL – measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects.

PRECISION - the agreement among a set of replicate measurements without assumption of knowledge of the true value. Precision is estimated by means of duplicate/replicate analyses. These samples should contain concentrations of analyte above the MDL, and may involve the use of matrix spikes. The most commonly used estimates of precision are the relative standard deviation (RSD) or the coefficient of variation (CV),

$$RSD = CV = 100\, S/\bar{x},$$

Where: x = the arithmetic mean of the x_i measurements, and S = variance;
and the relative percent difference (RPD) when only two samples are available.

$$RPD = 100\, [(x_1 - x_2)/(x_1 + x_2)/2].$$

PREPARATION BLANK (regent blank, method blank) - an analytical control that contains distilled, deionized water and reagents, which is carried through the entire analytical procedure (digested and analyzed). An aqueous method blank is treated with the same reagents as a sample with a water matrix; a solid method blank is treated with the same reagents as a soil sample.

PRESERVATION – refrigeration and or reagents added at the time of sample collection to maintain the chemical and or biological integrity of the sample.

PROJECT - single or multiple data collection activities that are related through the same planning sequence.

PROTOCOL - a compilation of the procedures to be followed with respect to sample receipt and handling, analytical methods, data reporting and deliverables, and document control. Used synonymously with Statement of Work (SOW).

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 a gas chromatographic column.

QUALITY ASSURANCE – an integrated system of activities involving planning, quality control, quality assessment, reporting and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence.

QUALITY ASSURANCE PLANS (QAP) - an orderly assembly of detailed and specific procedures which delineates how data of a known and accepted quality is produced.

a. Comprehensive Quality Assurance Plan (CompQAP) - a QA plan that outlines all the capabilities of the specified organization, the routinely used quality control measures, the routine QA targets for precision and accuracy, and all documentation, calibration and maintenance activities that are necessary to produce data of a known and acceptable quality.

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b. **Quality Assurance Project Plans (QAPP)** - a QA plan that is written for a specific project outlining specific QA targets and data quality objectives as well as all protocols and QC measures needed to meet the project specific objectives.

c. **Research Quality Assurance Plans (RQAP)** - a special type of Quality Assurance Project Plan that is generally written as a requirement of a direct contract with the Florida DER for research activities. The specific activities are defined in section 6.0 of the guidelines. The content and format requirements are different from those of any other QAP.

QUALITY CONTROL - the overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users.

A. **Quality Control Checks** - standards of samples from an independent source that are analyzed at a specified frequency.

1. **Quality Control Check Standards** - standard solutions from a source other than normal calibration standards that are certified and traceable. These standards are used to check the accuracy of a calibration curve.

2. **Quality Control Check Sample (also known as Reference Materials)** - samples obtained from an independent source for which the level(s) of analytes have been validated. These samples are prepared and analyzed with a sample set of similar matrix. If these samples have been obtained from the National Institute of Standards and Testing (formerly National Bureau of Standards), these are referred to as Standard Reference Materials.

B. **QCTS - Quality Control Tracking System** - the computerized system utilized to contain, compile and report quality control data.

1. Quality Control Types

a. **BLA01** - Reagent blank, calibration blank.

An aliquot of de-ionized (DI) water containing the same reagents as the sample but is NOT taken through preparation. This sample is used as the calibration zero concentration for initial calibration purposes. The BLA01 is analyzed as a sample as frequently as required in the QAP. The BLA01 can be used to re-zero only after it has been analyzed as a sample. Instrument response is entered on bench sheets. If the instrument response is above the Control Limit when the BLA01 is run as a sample and calculated as a concentration, the samples back to the last acceptable BLA01 must be re-analyzed. If BLA01 is 0.5-0.99 of MDL, the concentration may be entered into the data base. Otherwise, enter less than 0.4X MDL. Entries into the data base MUST BE CONSISTENT, e.g., either instrument response OR concentration -NOT both, and must have units reported.

b. **BLA02** - Method Blank or Preparation Blank.

Same as above but is carried through the complete steps of analysis from digestion/extraction/etc. in the exact same manner (e.g., same glassware, reagents, storage bottle) as the sample. BLA02 is matrix specific and must be run with each matrix and each prep run. A prep run consists of only 1 analyst on 1 day, utilizing the same reagents and glassware. Subtraction of the method blank is addressed by each method. A general rule applies to the BLA02: If the BLA02 is equal to or exceeds the method detection limit (MDL), samples in that group must be re-prepped. Therefore a BLA02 must be run with each sample set. Instrument response is recorded on bench sheets, but concentration is entered into the QC data base in all cases. If BDL, enter <0.4X MDL into the QC data base.

c. **CAL01** - Calibration Standard.

Calibration standards (the number and frequency of which are specified in each method) are used to establish an analytical curve for that analyte based on absorbance, emission intensity, area or other type of measurable response for known standards. They are prepared using exactly the same reagents used in the analysis of the sample. Note that some methods require a CDL standard be included as a CAL standard.

d. **CCV** - Continuing Calibration Verifications.

Analytical standard that is run with a frequency specified in the QAP - at a minimum frequency of 10% BUT may be alternated with ICV01 to meet the frequency requirements. The CCV may be from the same source as calibration standards or a different source depending on the method used. All runs must culminate with this sample's analysis except for GC/MS. Report % Diff or % Rec. **CCVD** is used to report CCV % Difference. **CCVN** is used for EPA method 624 (GC/MS, volatiles), reporting absolute concentration only. **CCVH** and **CCVL** are used when both high and low concentrations are checked, reporting % recovery.

e. **CDL01** - Contract Detection Limit Standard.

A reagent sample to verify analytes are quantifiable at the detection limit stated. The amount of analyte in this sample may be specified by a method, project, or client. In general, twice the analyte concentration of the regulatory detection limit or CRDL is a good CDL01 amount. (Required weekly for drinking water organic analyses). Some methods mandate use of this standard for inclusion into the calibration curve. Report conc. and % recovery.

f. **DLCS** - Duplicate Laboratory Control Sample.

Duplicate control sample of known analyte concentration and source analyzed by exactly the same method as the samples. DLCS must be of the same matrix as the samples but must be from a different source than the calibration standards (EPA or NIST traceable when possible). Results are expressed as % recovery and RPD. Report conc., % Rec and RPD.

g. **DLCS1** - Duplicate Laboratory Control Sample.

Duplicate control sample of known analyte concentration and source analyzed by exactly the same method as the samples. DLCS must be of the same matrix as the samples but must be from a different source than the calibration standards (EPA or NIST traceable when possible). Report conc., % recovery and RPD. This "1" designation is a programming device used to indicate that no separable prep exists for the method.

h. **DLFB** - Duplicate Laboratory Fortified Blank (or DLFB1)

A duplicate control sample of known analyte concentration and source analyzed by exactly the same method as the samples. The DLFB's purpose is to determine whether the methodology is in control and whether the laboratory is capable of making accurate and precise measurements at the required detection limit. Report conc., % recovery and RPD. Note: Also may be DLFB1 - this "1" designation is a programming device used to indicate that no separable prep exists for the method.

i. **DPS01** - Reagent Duplicate, Matrix Spike.

An aliquot of sample (water, oil, S/S/S) spiked with a known quantity of the analyte of interest - but added after preparation or if no preparation is involved in analysis of sample. The sample is split and spiked with exactly the same amount of analyte. Report conc., % Recovery and Relative Percent Difference (RPD) or as required.

j. **DPS02** - Duplicate Spike (Prepped).

Same as DPS01 but the sample is split in as representative a way as possible, spiked with equal amounts of the analyte, and carried through the preparation step(s). Report conc., % Recovery and RPD or as required.

k. **DUP01** - Duplicate Sample Analysis (Non-prepped).

For samples not requiring digestion/extraction/etc., a homogeneous, representative aliquot (water, oil, S/S/S) is split and carried through the analytical steps to quantitation. Report conc., % Recovery and as RPD.

l. **DUP02** - Duplicate Sample Analysis (Prepped).

Same as DUP01 but split before any required preparation and carried through to quantitation exactly as its counterpart. Results are expressed as conc., % Recovery RPD.

m. **ICV01** - Initial Calibration Verification.

This standard verifies the calibration curve, and this analyte must be from a different source as the calibration standards (EPA or NIST traceable when possible). Report conc., % Recovery or % diff.

n. **ICV02** - Initial Calibration Verification.

Same as ICV01 but analyte carried through any required preparation. May be equivalent to an LCS when reagent water is utilized as the spiking medium.

o. **LCS** - Laboratory Control Sample.

Control sample of known analyte concentration and source analyzed by exactly the same method as the samples. LCS should be of same matrix as samples (must utilize the same procedures) but spiked standards must be from a different source than the calibration standards (EPA or NIST traceable when possible). Report conc., % Recovery.

p. **LCS01** - Laboratory Control Sample.

Control sample of known analyte concentration and source analyzed by exactly the same method as the samples. LCS should be of the same matrix as samples (must utilize the same procedures) but must be from a different source than the calibration standards (EPA or NIST traceable when possible). This "01" designation is a programming convention used to indicate that no separable prep exists for the method. Report conc., % Recovery.

q. **LFB** - Laboratory Fortified Blank (or LFB01)

A control sample of known analyte concentration and source analyzed by exactly the same method as the samples. Drinking water methods do not require the standards to be an external source. The LFB's purpose is to determine whether the methodology is in control,

and whether the laboratory is capable of making accurate measurements at the required detection limit. Results are expressed as % recovery. Note: Also may be LFB01 - This "01" designation is a programming device used to indicate that no separable prep exists for the method. Report conc., % Recovery.

r. **SDIL01** – Serial Dilution Analysis

A dilution used to determine whether interferences are present. The sample is diluted by a minimum of five-fold (1+4) and re-analyzed. The concentration of the analyte must be at least 25 times the estimated detection limit (reporting limit) for atomic absorption (FAA,CVAA, GFAA) methods or 10 times the Instrument Detection Limit for ICP methods before this technique is required. This test is also referred to as the 'Dilution Test'.

s. **SPI01** - Matrix Spike (Standard Addition).

A post digestion/extraction spike, or a method with no separable prep. An aliquot of homogeneous sample (water, oil, S/S/S) fortified (spiked) with a known quantity of specific compound(s) and carried through the analysis and quantitation steps. At least one spike per matrix and concentration must be analyzed per run or frequency specified by QAP or SOW. Report conc., % Recovery.

t. **SPI02** - Matrix Spike (Pre-digestion/extraction; prepped).

Same as a SPI01 but is used when preparations are required. Report conc. and percent recovery, unless a method or client specifies differently.

u. **SPI03** – TCLP Matrix Bias Spike

A TCLP extract fortified (spiked) with a known quantity of specific compound(s) prior to preservation of the leachate solution. At least one spike per matrix and concentration must be analyzed per run or frequency specified by regulatory agencies.

QUALITY SYSTEM – a structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC.

RANGE – the difference between the minimum and the maximum of a set of values.

RAW DATA – any original factual information from a measurement activity or study recorded in a laboratory notebook, worksheets, records, memoranda, notes, or exact copies thereof that are necessary for the reconstruction and evaluation of the report of the activity or study. Raw data may include photography, microfilm or microfiche copies, computer printouts, magnetic media, including dictated observations, and recorded data from automated instruments. If exact copies of raw data have been prepared (e.g., tapes which have been transcribed verbatim, data and verified accurate by signature), the exact copy or exact transcript may be submitted.

RCRA - the Resource Conservation and Recovery Act.

REAGENT BLANK - see Method Blank.

REAGENT GRADE - analytical reagent (AR) grade, ACS reagent grade, and reagent grade are synonymous terms for reagents which conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society.

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REAGENT WATER - water that has been generated by any method which would achieve the performance specifications for ASTM Type II water, and in which an interferant is not observed at or above the minimum quantitation limit of the parameters of interest.

RECONSTRUCTED ION CHROMATOGRAM (RIC) - a mass spectral graphical representation of the separation achieved by a gas chromatograph; a plot of total ion current versus retention time.

RELATIVE PERCENT DIFFERENCE (RPD) - as used in this QAP and elsewhere to compare two values, 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. (In contrast, see percent difference above).

RELATIVE RESPONSE FACTOR (RRF) - a measure of the relative mass spectral response of an analyte compared to its internal standard. Relative Response Factors are determined by analysis of standards and are used in the calculation of concentrations of analytes in samples. RRF is determined by the following equation:

Install Equation Editor and double-click here to view equation.

Where

A = area of the characteristic ion measured

C = concentration

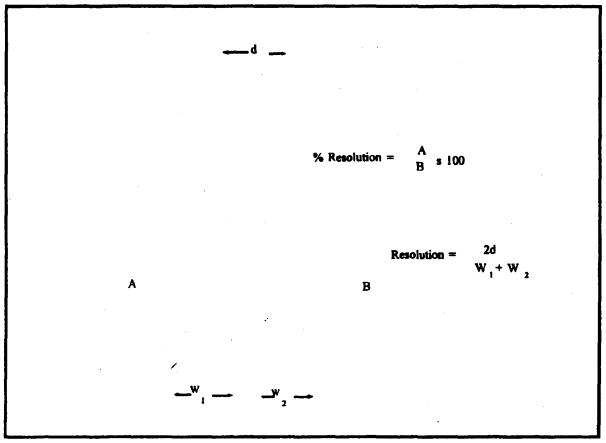
is = internal standard

x = analyte of interest

REPLICATE SAMPLE - samples that have been collected at the same time from the same source (field replicates) or aliquots of the same sample that are prepared and analyzed at the same time (laboratory replicates). Duplicate samples are one type of replicate sample. The analytical results from replicates are used to determine the precision of a system. If the concentration of analytes in the sample are below detectable limits, Duplicate Spike Samples may be used to determine precision. Blind Replicates (Duplicates) are replicates that have been collected (field replicate) or prepared (laboratory replicate) and are submitted and analyzed as separate samples (analyst does not know they are replicates).

REPORTING LIMIT – is an arbitrary number, which may or may not be statistically determined, or which may be an estimate of the LOQ, which is based upon the experience and judgement of the analyst. Analytical results below the reporting limit are expressed as "less than" the reporting limit.

RESOLUTION - percent resolution is 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 is determine taking 2 times the difference in elution times between two peaks and dividing that by the sum of the baseline peak widths of the two peaks.



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RUN - a continuous analytical sequence consisting of

prepared samples and all associated quality assurance measurements as required by the QAP.

SAMPLE - a portion of material to be analyzed that is contained in single or multiple containers and identified by a unique sample number.

a. **Sample Custody** - all records and documentation that is required to trace a sample from point of origin through disposal after analysis. These records must include, but are not limited to:

1. Field notebooks;
2. Field sample ID tags;
3. Laboratory transmittal forms (if applicable);
4. Laboratory sample receipt logs and or checklists;
5. Sample extraction/preparation logs or worksheets;
6. Analytical (instrument) logs or worksheets;
7. Calibration and quality control data associated with a sample set;
8. Instrument maintenance logs;
9. Sample disposition logs; and
10. Final reports.

b. **Legal Chain of Custody** - is a special type of sample custody in which all events associated with a specific sample must be documented in writing. In addition to the records described above, chain of custody records must include the follows:

1. Sample transmittal forms or tags that have adequate spaces for the dated, original signatures of all individuals who handle the sample (or cleaned the sample containers if obtained from a contracted laboratory) from time of collection (or container receipt) through laboratory delivery.

2. Laboratory sample storage logs that identify date, time, and individuals who remove samples from storage.

3. Secure, limited access storage areas.

SAMPLE DELIVERY GROUP (SDG) - a unit within a sample Case that is used to identify a group of samples for delivery. An SDG is a group of 20 or fewer samples within a Case, received over a period of up to 14 calendar days. Data from all samples in an SDG are due concurrently. A Sample Delivery Group is defined by one of the following, whichever occurs first:

a. Case; or

b. Each 20 samples within a Case; or

c. Each 14-day calendar period during which samples in a Case are received, beginning with receipt of the first sample in the Case or SDG.

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Samples may be assigned to Sample Delivery Groups by matrix (i.e., all soils in one SDG, all waters in another), at the discretion of the laboratory.

SAMPLE MATRIX - means that characteristic of an environmental or laboratory sample, associated with its physical and chemical properties, which defines how such a sample is handled when subjected to the intended analytical process. The following samples matrices (major matrix groups), as defined below, should be used in QA plans whenever specifying data quality objectives:

a. **Reagent Water**: A sample of water which conforms to ASTM grades I, II, III or IV.

b. **Drinking Water**: Includes finished (treated) or raw source water designated as potable water. Such sources may be from surface or groundwater.

c. **Aqueous**: Any aqueous sample excluded from the definition of a drinking water matrix or Saline/Estuarine source. Includes surface water, ground water and effluents.

d. **Saline/Estuarine**: Any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.

e. **Non-Aqueous Liquid**: Any organic liquid with <15% settleable solids (solvents).

f. **Chemical Waste**: A product or by-product of a industrial process that results in a matrix not previously defined.

g. **Solids**: Include soils, sediments, sludges and other matrices with >15% settleable solids.

h. **Biological Tissue**: Any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

i. **Oils**: Includes any oily matrix. This matrix is a subset of the definitions of Chemical Waste and non-aqueous liquids.

j. **Air** Samples: Whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter or other device.

SAMPLE NUMBER (Client Sample Number) - a unique identification number designated by the client for each sample. The Sample Number appears on the sample Chain of Custody which documents information on that sample.

SDWA - Safe Drinking Water Act.

SEMIVOLATILE COMPOUNDS - compounds amenable to analysis by extraction of the sample with an organic solvent. Used synonymously with Base/Neutral/Acid (BNA) compounds.

SERIAL DILUTION - the dilution of a sample by a factor of five. When corrected by the dilution factor, the diluted sample must agree with the original undiluted sample within specified limits. Serial dilution may reflect the influence of interferents.

SOIL - synonymous with soil/sediment or sediment as used herein.

SPECIFICATION - A term used in the QAP to indicate a method criteria or requirement or a project specific data quality objective (DQO). This "specification" will be different from an "SPC" (statistically determined) control limit derived from actual laboratory observations.

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SPLIT SAMPLES - aliquots of sample taken from the same container and analyzed independently. In cases where aliquots of samples are impossible to obtain, field duplicate samples must be taken for the matrix duplicate analysis.

These are usually taken after mixing or compositing and are used to document intra-or interlaboratory precision, recognizing their limitations.

SPIKED SAMPLES - samples fortified to a known and validated concentration of analyte. Percent recoveries are calculated for each compound in the spike.

a. Field: An environmental sample fortified to a known and validated concentration in the field. These may be submitted as blind spike (laboratory does not know they are spiked) or as identified field spikes. The use of this QC check **is not** recommended.

b. Laboratory:

1. **Reagent Spikes**: Samples of an appropriate analyte-free matrix (deionized water, sand, soil, etc.) that are fortified to a known and validated concentration of analyte(s) before sample preparation (See LCS).

2. **Sample (Matrix Spikes)**: Environmental sample selected from a set (not blanks) that are fortified to a known and validated concentration of analyte(s) before sample preparation. The concentration of each analyte in the spiking solution should be approximately 3-5 times the level expected in the sample (see SPI02, DPS02).

2. **Surrogate Spikes**: A compound having similar chemical characteristics to the compounds of interest, but which is not normally found in environmental samples. Known concentrations of these compounds are added to all samples in the set before sample preparation.

STANDARD ADDITION - the practice of adding a known amount of an analyte to a sample immediately prior to analysis. It is typically used to evaluate interferences. See Method of Standard Additions.

STANDARD ANALYSIS - an analytical determination made with known quantities of target compounds; used to determine response factors.

STANDARD CURVE - a plot of concentrations of known analyte standards versus the instrument response to the analyte. Calibration standards are prepared by successively diluting a standard solution to produce working standards which cover the working range of the instrument. Standards should be prepared at the frequency specified in the appropriate section. The calibration standards must be prepared using the same type of acid or solvent and at the same concentration as will result in the samples following sample preparation. This is applicable to organic and inorganic chemical analyses.

STOCK SOLUTION - a standard solution which can be diluted to derive other standards.

SUBSAMPLE - a portion taken from a sample. A laboratory sample may be a subsample of a gross sample; similarly, a test portion may be a subsample of a laboratory SVOA sample.

SURROGATES (Surrogate Standard) - for semivolatiles and pesticides/Aroclors, compounds added to every blank, sample, matrix spike, matrix spike duplicate, and standard; used to evaluate analytical efficiency by measuring recovery. Surrogates are brominated, fluorinated, or isotopically labelled compounds not expected to be present in environmental media.

SYSTEM MONITORING COMPOUNDS - compounds added to every blank, sample, matrix spike, matrix spike duplicate, and standard for volatile analysis, and used to evaluate the performance of the entire purge and trap-gas chromatograph-mass spectrometer system. These compounds are brominated or deuterated compounds not expected to be present in environmental media. Also known as surrogates.

TARGET COMPOUND LIST (TCL) - a list of compounds designated at the primary targets for analysis.

TENTATIVELY IDENTIFIED COMPOUNDS (TIC) - compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates. Up to 30 peaks (those greater than 10% of peak areas or heights of nearest internal standards) are subjected to mass spectral library searches for tentative identification.

TEST PORTION (also called specimen, test specimen, test unit, aliquot) - that quantity of a material of proper size for measurement of the property of interest. Test portions may be taken from the gross sample directly, but often preliminary operations, such as mixing or further reduction in particle size, are necessary.

TIME - when required to record time on any deliverable item, time shall be expressed as Military Time, i.e., a 24-hour clock.

TRACEABILITY – the property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons.

TRAFFIC REPORT (TR) - an EPA sample identification form filled out by the sampler, which accompanies the sample during shipment to the laboratory and which is used for documenting sample condition and receipt by the laboratory.

TRIP BLANK - a sample of media taken from the laboratory to the sampling site and returned to the laboratory unopened. The media used for the trip blank is acceptable if the concentration of any analyte of concern in the media is no higher than the highest of either:

a. The detection limit, or

b. Five percent of the regulatory limit for that analyte, or

c. Five percent of the measured concentration in the sample.

A trip blank is used to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organics samples.

TWELVE-HOUR TIME PERIOD - the twelve (12) hour time period (when applicable) for GC/MS system instrument performance check, standards calibration (initial or continuing calibration), and method blank analysis begins at the moment of injection of the DFTPP or 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/Aroclor analyses performed by GC/EC, the twelve hour time period in the analytical sequence begins at the moment of injection of the instrument blank that precedes sample analyses, and ends after twelve hours have elapsed according to the system clock.

VALIDATED TIME OF SAMPLE RECEIPT (VTSR) - the date on which a sample is received at the Contractor's facility, as recorded on the shipper's delivery receipt and Sample Traffic Report.

VOLATILE COMPOUNDS - compounds amenable to analysis by the purge and trap technique. Used synonymously with purgeable compounds.

WET WEIGHT - the weight of a sample aliquot including moisture (undried).

WIDE BORE CAPILLARY COLUMN - a gas chromatographic column with an internal diameter (ID) that is greater than 0.32mm. Columns with lesser diameters are classified as narrow bore capillaries.

COMMON LABORATORY ACRONYMS AND ABBREVIATIONS

AA	Atomic Absorption
BDL	Below Detection Limit
BED	Below Estimated Limit of Detection
BTU	British Thermal Unit
CCC	Calibration Check Compound
CVAA	Cold Vapor Atomic Absorption
DL	Detection Limit
ECD	Electron Capture Detector (GC)
ELCD	Electrolytic Conductivity Detector (GC)
EP	Extraction Procedure
FAA	Flame Atomic Absorption
FID	Flame Ionization Detector (GC)
FPD	Flame Photometric Detector (GC)
FTIR	Fourier Transform Infra-Red
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
GFAA	Graphite Furnace Atomic Absorption
HOC	Halogenated Organic Compounds (Appendix III of 40 CFR Part 268)
ICP	Inductively Couple Plasma Atomic Emission Spectroscopy
IDL	Instrument Detection Limit
LIMS	Laboratory Information Management System
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram (ppm)
mg/L	Milligrams per Liter (ppm)
ND	Not Detected
NPD	Nitrogen Phosphorus Detector (GC)
OVA	Organic Vapor Analyzer
PCB	Polychlorinated Biphenyls
PID	Photoionization Detector (GC)
ppb	Parts per Billion
ppm	Parts per Million
PQL	Practical Quantitation Limits
QA/QC	Quality Assurance/Quality Control
SPCC	System Performance Check Compound
S/S/S	Soil/Sediment/Sludge
SVOC	Semivolatile Organic Compound
SVOA	Semivolatile Organic Analysis
SW-846	"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods"
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TOX	Total Organic Halogen
TSS	Total Suspended Solids
TTO	Total Toxic Organics
TX	Total Halogen
µg/kg	Micrograms per Kilogram (ppb)
µg/L	Micrograms per Liter (ppb)
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

Job Description

PRESIDENT

QUALIFICATIONS

Position	Education	Experience
President	BS/BA	10 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include business, sales, laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Designate or assure that a Service Center Manager is designated at each facility and replaced as necessary.

Designate a Senior Vice-President and replace as necessary.

Assure that the managers appointed clearly understand their functions and responsibilities and have the authority and resources needed to discharge their duties.

Establish and revise company policies and operating procedures as necessary.

Assure the laboratory is organized in such a way that its personnel are free from any commercial, financial and other pressures which might adversely affect the quality of their work.

Provide adequate budget for equipment, facilities and people.

Job Description

SERVICE CENTER MANAGER

QUALIFICATIONS

Position	Education	Experience
Service Center Manager	BS/BA	10 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include business, sales, laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Designate a Laboratory Director who has overall responsibility for the technical operation of the environmental testing laboratory and replace as necessary.

Assure that the managers appointed clearly understand their functions and responsibilities and have the authority and resources needed to discharge their duties.

Assure that personnel, resources, facilities, equipment, materials and methodologies are known and available as scheduled.

Establish and revise company policies and operating procedures as necessary.

Establish, maintain and enforce procedures for contract and purchase order review.

Job Description

SENIOR VICE-PRESIDENT

QUALIFICATIONS

Position	Education	Experience
Vice-President	BS/BA	10 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include business, sales, laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Establish and review HCLO Quality Policy.

Review and approve a Quality Assurance Plan.

Assure there is a designated Senior Quality Assurance Officer.

Assure that the managers appointed clearly understand their functions and responsibilities and have the authority and resources needed to discharge their duties.

Assure that any deviation from policy reported by the Quality Assurance Officer is communicated to the Laboratory Director and corrective actions are taken, documented and followed-up.

Assure that the quality system is reviewed at least once a year by the management to ensure its continuing suitability and effectiveness and to introduce any necessary changes or improvements. Participate in regular management reviews of the quality program.

Assure that all review findings and any corrective actions that arise from them are documented.

Assure that personnel, resources, facilities, equipment, materials and methodologies are known and available as scheduled.

Establish and revise company policies and operating procedures as necessary.

Job Description

LAB DIRECTOR/ASSISTANT LAB DIRECTOR

QUALIFICATIONS

Position	Education	Experience
Lab Director	BS/BA Science	7 years
Asst. Lab Director	BS/BA Science	5 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience. The technical director(s) means a full-time member of the staff of an environmental laboratory who exercises actual day-to-day supervision of laboratory procedures and reporting of results as defined by NELAC.

DUTIES/RESPONSIBILITIES

Supervision of all personnel employed by the laboratory.

Assure that personnel, resources, facilities, equipment, and materials are known and available as required to produce data on time according to methods, SOP's, the QAP and client data quality objectives.

Assure that methods, SOP's, the QAP and the CHP are established, approved and followed. Assure that corrective action is taken in response to deviations when necessary.

Assure that analytical methods are as specified in the work plan. Maintain working knowledge of local, state and federal regulations as they relate to services performed by the lab.

Defining the minimal level of qualification, experience and skills necessary for all positions in the laboratory.

Ensuring that all technical laboratory staff have demonstrated capability in the activities for which they are responsible and documenting such demonstration.

Assure that appropriate and adequate training is provided and that training records are maintained.

Assure that raw data is appropriately archived.

Assure that laboratory waste is properly disposed.

Nominate a Quality Assurance Officer for approval.

Assure that the Quality Assurance Unit clearly understands their duties.

Assure that all laboratory personnel know, understand, and carry out their responsibilities.

Assure that test data are accurately recorded and verified.

Assure that raw data is appropriately archived.

Assure that the laboratory is maintained and kept clean.

Ensure that all sample acceptance criteria are verified and that samples are logged into the sample tracking system and properly labeled and stored.

Perform other duties as required or as needed.

Job Description

QUALITY ASSURANCE OFFICER

QUALIFICATIONS

Position	Education	Experience
QA Officer	BS/BA Science	7 years

Documented training and/or experience in QA/QC procedures and be knowledgeable in the quality system as defined under NELAC. Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Assure the inspection of systems (audit) and operations for conformance to methods, SOP's, the QAP, regulations and client data quality objectives at all locations. Document and report the results of the inspections and any deviations from methods, SOP's, and the QAP as they occur to the Vice-President along with corrective actions taken.

Perform follow-up inspections, etc. to assure that corrective actions have been taken. Coordinate development and revision of the Quality Assurance Plan (QAP) as required.

Recommend HCLO Quality Policy and improvements as needed.

Coordinate and document certifications by local, state, and federal regulatory authorities at all locations.

Provide technical support and training to Quality Assurance Units and staff on methods, SOP's, regulations and the QAP. Maintain working knowledge of local, state and federal regulations and quality technology as they relate to services performed by the lab.

Assure that all QAP, method and SOP requirements are met prior to initiation of a new procedure.

Have a general knowledge of the analytical test methods for which data review is performed.

Final authority to terminate or correct any incorrect or improper analytical or measurement procedure in order to conform to requirements of the QA Plan.

Assure coordination and documentation of internal and external audits and performance evaluation programs. Assure the coordination of responses to external QA audits or performance evaluations. Assure the development of responses to other QA questions.

Submit to management annual written status reports on the laboratory noting any problems and corrective actions, and report to the SVP any ongoing quality issues or problems as well as any awards or citations within seven calendar days of discovery.

Evaluate data objectively and perform assessments without outside (e.g., managerial) influence.

Promptly notify management if any issues arise relating to work-related undue pressures which would compromise the quality of work.

Advise purchasing on the quality of materials, supplies and equipment.

Perform other duties as required or as needed.

Job Description

QUALITY ASSURANCE UNIT

QUALIFICATIONS

Position	Education	Experience
QA Unit	BS/BA Science	4 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Inspect systems and operations adequately and perform performance evaluation studies to assure conformance to methods, SOP's, the QAP, regulations and client data quality objectives. Audit data entry and other data management systems to assure accuracy and completeness.

Document and report to the Quality Assurance Officer and Lab Director results of inspections and any deviations from methods, SOP's, and the QAP along with suggested corrective action.

Review and accept or reject client specific QAP's. Maintain documentation trail of all methods, SOP's and QAP's.

Provide technical support and training to staff on methods, SOP's and the QAP. Maintain working knowledge of local, state and federal regulations and quality technology as they relate to services performed by the lab and the related quality assurance issues.

Document that all QAP, method and SOP requirements are met prior to initiation of a new procedure. Maintain records of detection limit studies and Initial Demonstrations of Capability.

Review the Certificate of Analysis and other data deliverables for conformance with methods, SOP's, client data quality objectives and the QAP. Respond to QA questions on Certificate of Analysis and other deliverables.

Coordinate and document internal and external audits and performance evaluation programs. Host and respond to QA audits or external performance evaluation studies.

Advise purchasing on the quality of materials, supplies and equipment.

Function as QA Unit for GLP projects.

Perform other duties as required or as needed.

Job Description

SENIOR SCIENTIST-Technical Director

QUALIFICATIONS

Position	Education	Experience
Chief Chemist	BS/BA Science	5 years
Senior Chemist	BS/BA Science	3 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience. The technical director(s) means a full-time member of the staff of an environmental laboratory who exercises actual day-to-day supervision of laboratory procedures and reporting of results as defined by NELAC.

DUTIES/RESPONSIBILITIES

Provide technical support and training on instruments, methodologies, regulations and the QAP to staff. Assist in troubleshooting analytical problems.

Plan and assist in the implementation of new methods, instruments and equipment to meet changing regulatory or production requirements. Assure compliance with methods, SOP's, the QAP and CHP prior to startup.

Perform and manage special or non-routine projects requiring new or unique methods, SOP's or data quality objectives.

Maintain working knowledge regulations and new developments in analytical and environmental chemistry as they relate to services performed by the lab.

Write and revise SOP's and methods as necessary.

Perform other duties as required or as needed.

Job Description

PROJECT CHEMIST / MANAGER / PROJECT COORDINATOR

QUALIFICATIONS

Position	Education	Experience
Project Manager	BS/BA Science	2 years
Project Coordinator	HS	3 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Provide primary interface between the customer and the lab. Assure that the customers regulatory and data quality objectives, schedule and workload (volume) are known to the lab. Maintain contact and document correspondence with customers through all phases of project.

Prepare quotations, proposals and work plans to match the clients regulatory and data quality objectives. Assure that the lab's methods, pricing and capacity are known to the client. Obtain all appropriate business related information.

Maintain working knowledge of local, state and federal regulations as they relate to services performed by the lab.

Review sample submission documentation and appropriate LIMS reports to insure correctness prior to initiation of work.

Review data deliverables for completeness and conformance to customer requirements.

Refer questions (client or other) related to data quality to the Quality Assurance Officer as necessary.

Perform other duties as required or as needed.

Job Description

GROUP SUPERVISOR / ASSISTANT GROUP SUPERVISOR-Technical Director

QUALIFICATIONS

Position	Education	Experience
Group Supervisor	BS/BA Science	3 years
Asst. Group Supervisor	BS/BA Science	2 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience. The technical director(s) means a full-time member of the staff of an environmental laboratory who exercises actual day-to-day supervision of laboratory procedures and reporting of results as defined by NELAC.

DUTIES/RESPONSIBILITIES

Schedule personnel, equipment and resources to produce data which complies with methods, SOP's, the QAP and customer data quality objectives and customer due dates.

Insure training of analysts on methods, SOP's, the CHP and the QAP prior to performing procedures. Document training and maintain training files. Maintain methods, SOP's, the QAP and the CHP on file and ensure document control.

Assure instruments and equipment are inspected, cleaned, maintained and as applicable, calibrated and standardized.

Review raw data for conformance with methods, SOP's, the QAP and client data quality objectives. Document all deviations from methods, SOP's and the QAP. Provide case narratives and supporting analytical documentation for data packages when necessary. Forward data to Data Management Group. Archive raw data files following data entry.

Inform the Lab Director immediately of any personnel, instrument, equipment or materials problems. Inform the Lab Director, Project Managers and QA Unit(s) of any deviations from schedule, methods, SOP's or the QAP.

Respond to and undertake corrective action to external and internal audits.

Perform other duties as required or as needed.

Job Description

LAB ANALYST / LAB TECHNICIAN / FIELD TECHNICIAN

QUALIFICATIONS

Position	Education
Lab Analyst	Degree Preferred
Field Technician	Degree Preferred

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Perform sample collection, preparation and analysis in conformance with methods, SOP's and the QAP to meet client due dates and data quality objectives.

Obtain training on and read and understand all methods, SOP's and the QAP prior to performing new procedures.

Inspect, clean, calibrate, standardize and maintain sampling, analysis and measurement equipment, glassware and instrumentation. Document these activities as required by SOP's, methods and the QAP.

Accurately and neatly document all calculations, observations and deviations as required by methods, SOP's and the QAP and forward raw data to Group Leader.

Handle lab chemicals and samples per custody requirements, SOP's, QAP and the CHP. Properly dispose of laboratory waste. Maintain organized work area.

Inform the Group Leader or Lab Director immediately of any personnel, instrument, equipment or material problems or shortages. Inform the Group Leader or Lab Director of any deviations from schedule, methods, SOP's or the QAP.

All field technicians must obtain (provided by Heritage) 40 hour HZWPR training.

Perform other duties as required or as needed.

Job Description

SAMPLE CUSTODIAN / SHIPPING COORDINATOR

QUALIFICATIONS

Position	Education
Sample Custodian	BS/BA Science
Shipping Coordinator	HS

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Receive, handle, ship, store and dispose of samples and sample containers in conformance with methods, SOP's, the CHP, the QAP and shipping regulations to meet client due dates and data quality objectives. Coordinate shipping and receiving with client and Project Manager.

Maintain inventory of all supplies.

Validate and maintain legal chain of custody of samples and necessary documentation. Document and inform Project Managers immediately of any deviations from anticipated work volume or schedule, methods, SOP's or the QAP.

Obtain training on and read and understand all methods, SOP's and the QAP prior to performing new procedures.

Maintain organization of sample and waste storage areas. Coordinate disposal of samples and lab waste.

Assure that samples are logged into the LIMS timely and accurately.

Perform other duties as required or as needed.

Job Description

DATA PACKAGE COORDINATOR / DATA ENTRY TECHNICIAN / DOCUMENT CONTROL OFFICER

QUALIFICATIONS

Position	Education
Data Package Coordinator	HS
Document Control Officer	HS
Data Entry Technician	HS

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Accurately and expediently record all required analytical, sample, and accounting data in LIMS in conformance with methods, SOP's and the QAP.

Obtain training on and read and understand all relevant methods, SOP's and the QAP prior to performing new procedures.

Assemble, copy and distribute to the Project Manager, data packages and data deliverables per client specified requests, SOP's and the QAP to meet clients' due dates.

Coordinate archiving of raw data for GLP, CLP and other client specified projects.

Inform the Lab Director immediately of any personnel or equipment problems. Inform the Lab Director of any deviations from schedule, methods, SOP's or the QAP.

Perform other duties as required or as needed.

FINAL REPORT EXAMPLES

SAMPLE QUOTATION

QUOTATION FOR ANALYTICAL SERVICES

Service Location	Effective	Quote Number
HERITAGE ENVIRONMENTAL SERVICES, INC. Commercial Laboratory Operations 7901 W. Morris St. Indianapolis, IN 46231 (317)243-8304	26-JAN-00	Z136025
	Expires 25-FEB-00	PO Number .....
	Printed 01-FEB-00	Project

Quote To

CUSTOMER
HERITAGE ENVIRONMENTAL SERVICES, LLC
7901 WEST MORRIS ST.
INDIANAPOLIS, IN 46231-3301

Sample Description

DESCRIPTION: EXAMPLE QUOTATION

Method	Description	Unit Price	Qty	SubTotal
SW846-3050A	FAA OR ICP ACID DIGESTION OF S/S/S SAMPLES	0.00	1	
SW846-6010B	ARSENIC TRACE ICP	0.00	1	
SW846-6010B	BARIUM ICP	0.00	1	
SW846-6010B	CADMIUM ICP	0.00	1	
SW846-6010B	CHROMIUM ICP	0.00	1	
SW846-6010B	LEAD ICP	0.00	1	
SW846-6010B	SELENIUM TRACE ICP	0.00	1	
W846-6010B	SILVER ICP	0.00	1	0.00
SW846-7471A	MERCURY CVAA ACID DIGESTION OF S/S/S SAMPLES	0.00	1	
SW846-7471A	MERCURY CVAA	0.00	1	0.00
SW846-8260B	VOLATILE ORGANICS (CAPILLARY COLUMN)	0.00	1	0.00
	EPA SPECIFIED CONTAINERS AND PRESERVATIVES	0.00	1	
	SAMPLE AND SAMPLE WASTE DISPOSAL	0.00	1	0.00

Quote Total 0.00

Quote Comments

Prices applicable for sludge, soil, solid or sediment. Tests with priority other than normal include applicable premiums. Please provide a purchase order number when samples are delivered.

All work performed is subject to the Terms and Conditions attached. Please reference this quote number on all correspondence. This quote reflects our best estimate of the testing required for the method(s) and detection limit(s) requested. Pursuant to regulations, additional testing may be necessary due to sample matrix interferences, multi-phase samples or other factors which cannot be anticipated prior to testing. Client acknowledges that such additional testing may result in additional charges. To initiate the project, please sign the quotation below and return a copy to Heritage Laboratories.

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Approved By : _____ Accepted By : _____

FINAL REPORT EXAMPLES

SAMPLE CERTIFICATE OF ANALYSIS

The Certificate of Analysis (test report per NELAC) is always provided to the client as evidence of completion of testing. This report includes all of the information required by most accreditation standards, regulators and clients including: laboratory name and location, sample description, method of analysis, method of sample preparation, parameter, result, detection limits, units of measure, qualifiers, analyst, date analyzed, date sampled, time sampled and relevant quality control and process information.

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C E R T I F I C A T E O F A N A L Y S I S

Service Location	Received	Project	Lab ID
HERITAGE ENVIRONMENTAL SERVICES, LLC COMMERCIAL LABORATORY OPERATIONS 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8304	11-FEB-03		A619766
	Complete	PO Number	
	25-MAR-03	NO CHARGE	
	Printed	Sampled	
	29-APR-03		

Report To	Bill To
GREG BUSCH HERITAGE LABORATORIES, INC. 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231	GARY KLINGLER HERITAGE ENVIRONMENTAL SERVICES, LLC 7901 WEST MORRIS STREET INDIANAPOLIS, IN 46231

Sample Description

CLIENT ID: WP APG FEB-03
MATRIX TYPE: NON-SPECIFIC WATER
DESCRIPTION: WATER POLLUTION LABORATORY PERFORMANCE STUDY
APG-FEB. 2003
+ WP PESTICIDES
Submitter Code :2362

ALUMINUM ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M401.3.0

Parameter	Result	Det. Limit	Units
ALUMINUM	2370	50.	ug/L

ALUMINUM ICP/MS EPA 200.8 REV. 5.4 NELAC:N
Analyst: A. STOCKBURGER Analysis Date: 18-FEB-03 20:45 Instrument: ICP/MS Test: V401.3.0

Parameter	Result	Det. Limit	Units
ALUMINUM	2190	250	ug/L

DILUTION 1:50

BARIUM ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M404.3.0

Parameter	Result	Det. Limit	Units
BARIUM	1860	10.	ug/L

BARIUM ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V404.3.0

Parameter	Result	Det. Limit	Units
BARIUM	1770	2.0	ug/L

DILUTION 1:10

BERYLLIUM ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M405.3.0

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Parameter	Result	Det. Limit	Units
BERYLLIUM	65.6	4.0	ug/L

BERYLLIUM ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V405.3.0

Parameter	Result	Det. Limit	Units
BERYLLIUM	66.5	2.0	ug/L

DILUTION 1:10

CADMIUM ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M408.3.0

Parameter	Result	Det. Limit	Units
CADMIUM	114	5.0	ug/L

CADMIUM ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V408.3.0

Parameter	Result	Det. Limit	Units
CADMIUM	115	2.0	ug/L

DILUTION 1:10

CADMIUM GFAA SW846-7131A NELAC:Y
Analyst: S. O'NEAL Analysis Date: 10-MAR-03 05:16 Instrument: GFAA Test: M108.2.0

Parameter	Result	Det. Limit	Units
CADMIUM	112	50	ug/L

1:50 Dilution.

CHROMIUM ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M410.3.0

Parameter	Result	Det. Limit	Units
CHROMIUM	407	10.	ug/L

CHROMIUM ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V410.3.0

Parameter	Result	Det. Limit	Units
CHROMIUM	411	10.	ug/L

DILUTION 1:10

CHROMIUM GFAA SW846-7191 NELAC:Y
Analyst: S. O'NEAL Analysis Date: 10-MAR-03 07:31 Instrument: GFAA Test: M110.2.0

Parameter	Result	Det. Limit	Units
CHROMIUM	396	200	ug/L

1:100 Dilution.

COBALT ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 18-FEB-03 23:37 Instrument: ICP Test: M411.3.0

Confidential

Parameter	Result	Det. Limit	Units
COBALT	626	10.	ug/L

COBALT ICP/MS EPA 200.8 REV. 5.4 NELAC:N
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V411.3.0

Parameter	Result	Det. Limit	Units
COBALT	628	1.0	ug/L

DILUTION 1:10

COPPER ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M412.3.0

Parameter	Result	Det. Limit	Units
COPPER	40.1	20.	ug/L

COPPER ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V412.3.0

Parameter	Result	Det. Limit	Units
COPPER	39.3	5.0	ug/L

DILUTION 1:10

COPPER GFAA EPA 220.2 NELAC:N
Analyst: S. O'NEAL Analysis Date: 06-MAR-03 07:34 Instrument: GFAA Test: M412.2.0

Parameter	Result	Det. Limit	Units
COPPER	40.1	5.0	ug/L

IRON ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M415.3.0

Parameter	Result	Det. Limit	Units
IRON	158	20.	ug/L

LEAD ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 18-FEB-03 23:37 Instrument: ICP Test: M416.3.0

Parameter	Result	Det. Limit	Units
LEAD	1200	10.	ug/L

LEAD ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V416.3.0

Parameter	Result	Det. Limit	Units
LEAD	1170	1.0	ug/L

DILUTION 1:10

LEAD GFAA SW846-7421 NELAC:Y
Analyst: S. O'NEAL Analysis Date: 19-FEB-03 08:19 Instrument: GFAA Test: M116.2.0

Parameter	Result	Det. Limit	Units
LEAD	1240	500	ug/L

1:100 Dilution.

MANGANESE ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 18-FEB-03 23:37 Instrument: ICP Test: M419.3.0

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Parameter	Result	Det. Limit	Units
MANGANESE	2700	10.	ug/L

MANGANESE ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V419.3.0

Parameter	Result	Det. Limit	Units
MANGANESE	2670	10.	ug/L

DILUTION 1:10

NICKEL ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 18-FEB-03 23:37 Instrument: ICP Test: M422.3.0

Parameter	Result	Det. Limit	Units
NICKEL	2140	10.	ug/L

NICKEL ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V422.3.0

Parameter	Result	Det. Limit	Units
NICKEL	2100	5.0	ug/L

DILUTION 1:10

THALLIUM ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M434.3.0

Parameter	Result	Det. Limit	Units
THALLIUM	574	10.	ug/L

THALLIUM ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V434.3.0

Parameter	Result	Det. Limit	Units
THALLIUM	575	1.0	ug/L

DILUTION 1:10

THALLIUM GFAA EPA 279.2 NELAC:N
Analyst: S. O'NEAL Analysis Date: 22-FEB-03 02:50 Instrument: GFAA Test: M434.2.0

Parameter	Result	Det. Limit	Units
THALLIUM	574	8.0	ug/L

1:40 Dilution.

SILVER ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M430.3.0

Parameter	Result	Det. Limit	Units
SILVER	60.4	10.	ug/L

SILVER ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V430.3.0

Parameter	Result	Det. Limit	Units
SILVER	56.9	2.5	ug/L

DILUTION 1:10

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HERITAGE ENVIRONMENTAL SERVICES, LLC **Sample ID: A619766 WP APG FEB-03**

STRONTIUM ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M432.3.0

Parameter	Result	Det. Limit	Units
STRONTIUM	76.6	10.	ug/L

VANADIUM ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M438.3.0

Parameter	Result	Det. Limit	Units
VANADIUM	2890	10.	ug/L

VANADIUM ICP/MS EPA 200.8 REV. 5.4 NELAC:N
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V438.3.0

Parameter	Result	Det. Limit	Units
VANADIUM	2830	5.0	ug/L

DILUTION 1:10

ZINC ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 18-FEB-03 23:37 Instrument: ICP Test: M439.3.0

Parameter	Result	Det. Limit	Units
ZINC	332	20.	ug/L

ZINC ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V439.3.0

Parameter	Result	Det. Limit	Units
ZINC	337	20.	ug/L

DILUTION 1:10

ARSENIC ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M403.3.0

Parameter	Result	Det. Limit	Units
ARSENIC	135	10.	ug/L

ARSENIC ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V403.3.0

Parameter	Result	Det. Limit	Units
ARSENIC	139	10.	ug/L

DILUTION 1:10

ARSENIC GFAA SW846-7060A NELAC:Y
Analyst: S. O'NEAL Analysis Date: 21-FEB-03 07:29 Instrument: GFAA Test: M103.2.0

Parameter	Result	Det. Limit	Units
ARSENIC	133	50	ug/L

1:10 Dilution.

SELENIUM ICP EPA 200.7 REV. 4.4 NELAC:Y
Analyst: J. KRAMER Analysis Date: 14-FEB-03 20:19 Instrument: ICP Test: M428.3.0

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Parameter	Result	Det. Limit	Units
SELENIUM	955	10.	ug/L

SELENIUM ICP/MS EPA 200.8 REV. 5.4 NELAC:Y
Analyst: A. STOCKBURGER Analysis Date: 17-FEB-03 19:10 Instrument: ICP/MS Test: V428.3.0

Parameter	Result	Det. Limit	Units
SELENIUM	945	10.	ug/L

DILUTION 1:10

SELENIUM GFAA EPA 270.2 NELAC:N
Analyst: S. O'NEAL Analysis Date: 21-FEB-03 05:20 Instrument: GFAA Test: M428.2.0

Parameter	Result	Det. Limit	Units
SELENIUM	922	500	ug/L

1:100 Dilution.

MERCURY CVAA ACID DIGESTION EPA 245.1 REV. 3.0
Analyst: D. THOMPSON Analysis Date: 01-MAR-03 12:00 Instrument: PREP Test: P131.2.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	80		uL
FINAL VOLUME	40		mL

MERCURY CVAA EPA 245.1 REV. 3.0 NELAC:Y
Analyst: D. DRABENSTOTT Analysis Date: 03-MAR-03 15:24 Instrument: CVAA Test: M420.2.0
Prep: MERCURY CVAA ACID DIGESTION EPA 245.1 REV. 3.0 P131.2.0

Parameter	Result	Det. Limit	Units
MERCURY	14.4	1.0	ug/L

1:5 Dilution.

CYANIDE DISTILLATION EPA 335.2
Analyst: J. TITLEY Analysis Date: 03-MAR-03 18:00 Instrument: PREP Test: P101.3.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

CYANIDE, TOTAL (AUTOMATED) EPA 335.3 NELAC:Y
Analyst: B. BATTANI Analysis Date: 05-MAR-03 Instrument: AUTO-ANALYZER Test: G101.3.0
Prep: CYANIDE DISTILLATION EPA 335.2 P101.3.0

Parameter	Result	Det. Limit	Units
CYANIDE	0.549	0.005	mg/L

RESIDUAL CHLORINE EPA 330.5 NELAC:N
Analyst: E. SOTKIEWICZ Analysis Date: 12-MAR-03 07:15 Test: G103.6.0

Parameter	Result	Det. Limit	Units
CHLORINE	2.75	0.10	mg/L

1:2 Dilution

TOTAL ORGANIC HALIDES (TOX) SW846-9020B NELAC:Y
Analyst: M. ADKINS Analysis Date: 20-FEB-03 13:59 Instrument: TOX Test: O404.0.0

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Parameter	Result	Det. Limit	Units
TOTAL ORGANIC HALOGEN (TOX)	79.1	10	ug/L

HEXAVALENT CHROMIUM SM 3500-CR D 18TH ED NELAC:Y
Analyst: E. SOTKIEWICZ Analysis Date: 12-MAR-03 08:05 Test: M410.6.0

Parameter	Result	Det. Limit	Units
HEXAVALENT CHROMIUM	.660	0.01	mg/L

HEXANE OIL AND GREASE (SOLID PHASE EXTRACTION) EPA 1664A NELAC:Y
Analyst: W. PENNYCOFF Analysis Date: 06-MAR-03 10:00 Test: G166.0.0

Parameter	Result	Det. Limit	Units
HEXANE EXTRACTABLE MATERIAL (OIL AND GREASE	43.2	5.0	mg/L

NITRATE-NITROGEN BY ION CHROMATOGRAPHY EPA 300.0 REV. 2.1 NELAC:Y
Analyst: J. MONTGOMERY Analysis Date: 05-MAR-03 21:23 Instrument: IC Test: G300.5.0

Parameter	Result	Det. Limit	Units
NITROGEN, NITRATE	5.64	0.05	mg/L

PHENOLICS DISTILLATION EPA 420.1
Analyst: B. BATTANI Analysis Date: 03-MAR-03 13:00 Instrument: PREP Test: P405.9.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

PHENOLICS 4AAP (AUTOMATED) EPA 420.2 NELAC:Y
Analyst: B. BATTANI Analysis Date: 07-MAR-03 10:00 Instrument: AUTO-ANALYZER Test: O405.9.0

Parameter	Result	Det. Limit	Units
PHENOLICS	0.05	0.01	mg/L

BIOCHEMICAL OXYGEN DEMAND EPA 405.1 NELAC:Y
Analyst: T. DRIGGERS Analysis Date: 14-MAR-03 13:00 Test: G801.4.0

Parameter	Result	Det. Limit	Units
BIOCHEMICAL OXYGEN DEMAND	94	2	mg/L

Initial pH =2.98
Adjusted sample pH to 7.69 before analysis.

CARBONACEOUS BIOCHEMICAL OXYGEN DEMAND-NITRIFICATION INHIB. SM 5210 18TH ED NELAC:Y
Analyst: T. DRIGGERS Analysis Date: 14-MAR-03 14:30 Test: G805.0.0

Parameter	Result	Det. Limit	Units
BIOCHEMICAL OXYGEN DEMAND, NITRIFICATION INHI	114	2	mg/L

Initial pH =2.98
Adjusted sample pH to 7.80 before analysis.

TOTAL ORGANIC CARBON EPA 415.1 NELAC:N
Analyst: K. FULLMER Analysis Date: 23-MAR-03 16:18 Instrument: TOC Test: O401.1.0

Parameter	Result	Det. Limit	Units
TOTAL ORGANIC CARBON (TOC)	60.6	1.0	mg/L

CHEMICAL OXYGEN DEMAND (COLORIMETRIC) EPA 410.4 NELAC:Y
Analyst: W. PENNYCOFF Analysis Date: 10-MAR-03 13:45 Test: G301.1.0

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Parameter	Result	Det. Limit	Units
CHEMICAL OXYGEN DEMAND	175	10	mg/L

AMMONIA NITROGEN EPA 350.3 NELAC:Y
Analyst: E. SOTKIEWICZ Analysis Date: 10-MAR-03 13:00 Test: G203.4.0

Parameter	Result	Det. Limit	Units
NITROGEN, AMMONIA	10.4	0.50	mg/L

1:5 Dilution

KJELDAHL NITROGEN, TOTAL (TKN), ION SELECTIVE ELECTRODE EPA 351.4 NELAC:Y
Analyst: E. SOTKIEWICZ Analysis Date: 10-MAR-03 09:45 Test: G202.6.0

Parameter	Result	Det. Limit	Units
NITROGEN, KJELDAHL	8.90	0.60	mg/L

1:2 Dilution

PHOSPHORUS, TOTAL (AUTOMATED) EPA 365.1 REV. 2.0 NELAC:Y
Analyst: A. GRUESBECK Analysis Date: 04-MAR-03 12:25 Instrument: AUTO-ANALYZER Test: G207.2.0

Parameter	Result	Det. Limit	Units
PHOSPHORUS	3.51	0.15	mg/L

PHOSPHORUS, ORTHO (AUTOMATED) EPA 365.1 REV. 2.0 NELAC:Y
Analyst: A. GRUESBECK Analysis Date: 06-MAR-03 10:47 Instrument: AUTO-ANALYZER Test: G207.3.0

Parameter	Result	Det. Limit	Units
ORTHO-PHOSPHORUS	1.01	0.05	mg/L

NITROGEN, NITRATE (COLORIMETRIC AUTOMATED) EPA 353.2 REV. 2.0 NELAC:Y
Analyst: A. GRUESBECK Analysis Date: 12-MAR-03 10:09 Instrument: AUTO-ANALYZER Test: G106.3.0

Parameter	Result	Det. Limit	Units
NITROGEN, NITRATE	5.70	0.10	mg/L

1:10 Dilution

FLUORIDE (ION SELECTIVE ELECTRODE) EPA 340.2 NELAC:Y
Analyst: E. SOTKIEWICZ Analysis Date: 11-MAR-03 07:30 Test: G104.4.0

Parameter	Result	Det. Limit	Units
FLUORIDE	.253	0.1	mg/L

FLUORIDE BY ION CHROMATOGRAPHY EPA 300.0 REV. 2.1 NELAC:Y
Analyst: J. MONTGOMERY Analysis Date: 06-MAR-03 17:10 Instrument: IC Test: G300.1.0

Parameter	Result	Det. Limit	Units
FLUORIDE	0.247	0.10	mg/L

PH (AQUEOUS) EPA 150.1 NELAC:Y
Analyst: L. SMITH Analysis Date: 12-FEB-03 22:15 Test: G607.4.0

Parameter	Result	Det. Limit	Units
PH	8.80	0.1	Std. Units

TOTAL SOLIDS EPA 160.3 NELAC:Y
Analyst: J. RING Analysis Date: 28-FEB-03 18:00 Test: G401.7.0

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Parameter	Result	Det. Limit	Units
SOLIDS	416	10	mg/L

TOTAL SUSPENDED SOLIDS EPA 160.2 NELAC:Y
Analyst: J. RING Analysis Date: 28-FEB-03 13:40 Test: G403.7.0

Parameter	Result	Det. Limit	Units
SUSPENDED SOLIDS	26	1	mg/L

DISSOLVED SOLIDS EPA 160.1 NELAC:Y
Analyst: J. RING Analysis Date: 06-MAR-03 15:30 Test: G402.7.0

Parameter	Result	Det. Limit	Units
DISSOLVED SOLIDS	379	10	mg/L

GRO PURGE AND TRAP METHOD SW846-5030B
Analyst: J. OSBORNE Analysis Date: 15-MAR-03 Instrument: PREP Test: P239.0.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	5		mL
FINAL VOLUME	5		mL

GRO (CA/IA/IN/OK/WI) BY P&T GC/FID SW846-8015B NELAC:Y
Analyst: J. OSBORNE Analysis Date: 17-MAR-03 15:08 Instrument: GC/FID Test: O409.9.0
Prep: GRO PURGE AND TRAP METHOD SW846-5030B P239.0.0

Parameter	Result	Det. Limit	Units
GASOLINE RANGE ORGANICS (GRO)	3.4	0.10	mg/L
...			
SURROGATE RECOVERY			

(TRIFLUOROMETHYL)BENZENE	90.0		% Rec

DRO SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510C
Analyst: S. BRYAN Analysis Date: 25-FEB-03 Instrument: PREP Test: P233.3.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	1		mL

DRO (CA/IA/IN/OK/WI) BY GC/FID SW846-8015B NELAC:Y
Analyst: S. BRYAN Analysis Date: 26-FEB-03 17:31 Instrument: GC/FID Test: O409.8.0
Prep: DRO SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510C P233.3.0

Parameter	Result	Det. Limit	Units
DIESEL RANGE ORGANICS (DRO)	2.19	0.010	mg/L
...			
SURROGATE RECOVERY			

1-CHLOROOCTADECANE	122.6		% Rec

ORGANOCHLORINE PESTICIDES AND PCBS EXTRACTION EPA 608
Analyst: T. PINCKERT Analysis Date: 12-FEB-03 Instrument: PREP Test: P223.1.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	10		mL

ORGANOCHLORINE PESTICIDES AND PCBS IN WATER/WASTEWATER EPA 608 NELAC:Y
Analyst: T. PINCKERT Analysis Date: 21-FEB-03 02:53 Instrument: GC/ECD Test: O305.0.0
Prep: ORGANOCHLORINE PESTICIDES AND PCBS EXTRACTION EPA 608 P223.1.0

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Parameter	Result	Det. Limit	Units
HEPTACHLOR	.887	.50	ug/L
ALDRIN	J .199	.50	ug/L
HEPTACHLOR EPOXIDE	1.31	.50	ug/L
DIELDRIN	4.62	1.0	ug/L
4,4'-DDE	1.38	1.0	ug/L
4,4'-DDD	3.33	1.0	ug/L
4,4'-DDT	3.17	1.0	ug/L
...			
SURROGATE RECOVERY			

DECACHLOROBIPHENYL (DCB)	146.1		% Rec

1:10 Dilution.

PCB EXTRACTION EPA 608
Analyst: G. CLOUSE Analysis Date: 14-FEB-03 Instrument: PREP Test: P222.1.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	5.0		mL

POLYCHLORINATED BIPHENYLS (PCBS) EPA 608 NELAC:Y
Analyst: M. WRIGHT Analysis Date: 17-FEB-03 11:49 Instrument: GC/ECD Test: O301.1.0
Prep: PCB EXTRACTION EPA 608 P222.1.0

Parameter	Result	Det. Limit	Units
PCB AROCLOR 1016	7.42	1.0	ug/L
PCB AROCLOR 1221	BDL	2.0	ug/L
PCB AROCLOR 1232	BDL	1.0	ug/L
PCB AROCLOR 1242	BDL	1.0	ug/L
PCB AROCLOR 1248	BDL	1.0	ug/L
PCB AROCLOR 1254	BDL	1.0	ug/L
PCB AROCLOR 1260	BDL	1.0	ug/L
PCB AROCLOR 1262	BDL	1.0	ug/L
...			
SURROGATE RECOVERY			

DECACHLOROBIPHENYL (DCB)	67.4		% Rec

1:10 Dilution.

PREP FOR POLYNUCLEAR AROMATICS HYDROCARBONS BY HPLC (CWA) EPA 610
Analyst: T. PINCKERT Analysis Date: 19-FEB-03 Instrument: PREP Test: P630.3.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	5		mL

POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC (CWA) EPA 610 NELAC:Y
Analyst: G. CLOUSE Analysis Date: 05-MAR-03 22:24 Instrument: HPLC Test: O630.3.0
Prep: PREP FOR POLYNUCLEAR AROMATICS HYDROCARBONS BY HPLC (CWA) EPA 610 P630.3.1

Parameter	Result	Det. Limit	Units
NAPHTHALENE	21.400	0.16	ug/L
ACENAPHTHYLENE	BDL	0.40	ug/L
ACENAPHTHENE	8.790	0.16	ug/L
FLUORENE	6.420	0.13	ug/L

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Parameter	Result	Det. Limit	Units
PHENANTHRENE	1.090	0.16	ug/L
ANTHRACENE	1.770	0.08	ug/L
FLUORANTHENE	BDL	0.08	ug/L
PYRENE	BDL	0.08	ug/L
BENZ(A)ANTHRACENE	0.787	0.13	ug/L
CHRYSENE	0.305	0.05	ug/L
BENZO(B)FLUORANTHENE	BDL	0.10	ug/L
BENZO(K)FLUORANTHENE	BDL	0.06	ug/L
BENZO(A)PYRENE	1.410	0.23	ug/L
DIBENZ(A,H)ANTHRACENE	BDL	0.13	ug/L
BENZO(G,H,I)PERYLENE	BDL	0.20	ug/L
INDENO(1,2,3-CD)PYRENE	BDL	0.13	ug/L
...			
SURROGATE RECOVERY			

2-FLUOROBIPHENYL	93.5		% Rec

Pyrene reported from 220 UV Detector.

DIAZOMETHANE HERBICIDE DERIVATIZATION SW846-8151A
Analyst: S. BRYAN Analysis Date: 19-FEB-03 Instrument: PREP Test: P201.4.1

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	10		mL

DIAZOMETHANE HERBICIDE DERIVATIZATION SW846-8151A
Analyst: T. PINCKERT Analysis Date: 17-FEB-03 Instrument: PREP Test: P201.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	10		mL

CHLORINATED HERBICIDES (2,4 D, SILVEX AND 2,4,5-T) SW846-8151A NELAC:Y
Analyst: M. KEEZER Analysis Date: 24-FEB-03 21:15 Instrument: GC/ECD Test: O253.1.0
Prep: DIAZOMETHANE HERBICIDE DERIVATIZATION SW846-8151A P201.4.1

Parameter	Result	Det. Limit	Units
2,4,5-TRICHLOROPHENOXYACETIC ACID (2,4,5-T)	2.90	1.0	ug/L
2,4-DICHLOROPHENOXYACETIC ACID	3.86	1.0	ug/L
SILVEX (2,4,5-TP)	1.71	1.0	ug/L
DICAMBA	7.48	1.0	ug/L
DINOSEB	4.68	1.0	ug/L
...			
SURROGATE RECOVERY			

DCAA	77.6		% Rec

VOLATILE PRIORITY POLLUTANTS EPA 624 NELAC:Y
Analyst: H. WILLIAMS Analysis Date: 10-MAR-03 04:57 Instrument: GC/MS VOA Test: O502.3.0

Parameter	Result	Det. Limit	Units
1,1,1-TRICHLOROETHANE	16.5	5.0	ug/L
1,1,2,2-TETRACHLOROETHANE	54.1	5.0	ug/L
1,1,2-TRICHLOROETHANE	31.1	5.0	ug/L
1,1-DICHLOROETHANE	7.93	5.0	ug/L
1,1-DICHLOROETHENE	17.3	5.0	ug/L

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Parameter	Result	Det. Limit	Units
1,2-DICHLOROETHANE	62.4	5.0	ug/L
1,2-DICHLOROPROPANE	49.8	5.0	ug/L
BROMODICHLOROMETHANE	44.6	5.0	ug/L
BROMOFORM	27.1	5.0	ug/L
BROMOMETHANE	BDL	10	ug/L
CARBON TETRACHLORIDE	9.48	5.0	ug/L
CHLOROBENZENE	21.2	5.0	ug/L
CHLOROETHANE	BDL	10	ug/L
CHLOROFORM	38.7	5.0	ug/L
CHLOROMETHANE	BDL	10	ug/L
DIBROMOCHLOROMETHANE	22.9	5.0	ug/L
DICHLOROMETHANE (METHYLENE CHLORIDE)	34.4	5.0	ug/L
TETRACHLOROETHENE	53.4	5.0	ug/L
TRANS-1,2-DICHLOROETHENE	31.2	5.0	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	5.0	ug/L
TRICHLOROETHENE	40.0	5.0	ug/L
TRICHLOROFLUOROMETHANE	BDL	5.0	ug/L
VINYL CHLORIDE	BDL	10	ug/L
...			
SURROGATE RECOVERY			

DICHLOROETHANE-D4	109		% Rec
TOLUENE-D8	103		% Rec
4-BROMOFLUOROBENZENE	109		% Rec

SEMI-VOLATILE EXTRACTION (ACID FRACTION) EPA 625
Analyst: P. SIMS Analysis Date: 25-FEB-03 11:00 Instrument: PREP Test: P241.1.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	1.0		mL

SEMI-VOLATILE PRIORITY POLLUTANTS (ACID FRACTION) EPA 625 NELAC:Y
Analyst: L. CALLAHAN Analysis Date: 27-FEB-03 02:36 Instrument: GC/MS SVOA Test: O506.3.0
Prep: SEMI-VOLATILE EXTRACTION (ACID FRACTION) EPA 625 P241.1.0

Parameter	Result	Det. Limit	Units
2,4,6-TRICHLOROPHENOL	119	10	ug/L
2,4,5-TRICHLOROPHENOL	122	10	ug/L
4-CHLORO-3-METHYLPHENOL	45.5	10	ug/L
2-CHLOROPHENOL	28.4	10	ug/L
2,4-DICHLOROPHENOL	95.4	10	ug/L
2,4-DIMETHYLPHENOL	105	10	ug/L
2-NITROPHENOL	23.8	10	ug/L
4-NITROPHENOL	J 8.17	50	ug/L
2,4-DINITROPHENOL	81.0	50	ug/L
4,6-DINITRO-O-CRESOL	EX	50	ug/L
PENTACHLOROPHENOL	119	50	ug/L
PHENOL	49.4	10	ug/L
...			
SURROGATE RECOVERY			

2-FLUOROPHENOL	63		% Rec
PHENOL-D5	55		% Rec
2,4,6-TRIBROMOPHENOL	73		% Rec

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SEMI-VOLATILE PRIORITY POLLUTANTS (ACID FRACTION) EPA 625 NELAC:Y
Analyst: L. CALLAHAN Analysis Date: 27-FEB-03 10:42 Instrument: GC/MS SVOA Test: O506.3.1
Prep: SEMI-VOLATILE EXTRACTION (ACID FRACTION) EPA 625 P241.1.0

Parameter	Result	Det. Limit	Units
4,6-DINITRO-O-CRESOL	132	100	ug/L
...			
SURROGATE RECOVERY			

2-FLUOROPHENOL	67		% Rec
PHENOL-D5	57		% Rec
2,4,6-TRIBROMOPHENOL	79		% Rec

1:2 Dilution
Dilution necessary due to high concentration of target compounds.

SURFACTANTS (MBAS) EPA 425.1 NELAC:Y
Analyst: M. GRIZZLE Analysis Date: 26-FEB-03 09:00 Test: G208.5.0

Parameter	Result	Det. Limit	Units
SURFACTANTS, MBAS	1.21	0.1	mg/L

PREP FOR POLYNUCLEAR AROMATICS HYDROCARBONS BY HPLC (CWA) EPA 610
Analyst: D. EISELE Analysis Date: 04-MAR-03 Instrument: PREP Test: P630.3.1

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	5.0		mL

Sample Comments

BDL Below Detection Limit
EX Exceeds calibration range. See Replicate
J Estimated, below calibration range.

All aqueous samples are reported on a wet weight basis unless otherwise noted.

This Certificate shall not be reproduced, except in full, without the written approval of the lab.
The sample results relate only to the analytes of interest tested or to the sample as received by the lab.
Heritage Environmental Services, LLC certifies that the test results indicated as NELAC (National Environmental Laboratory Accreditation Conference) accredited (Yes for NELAC) meet all requirements of NELAC and Illinois EPA Part 186 unless otherwise explained or justified as to the the exact nature of the deviations.
Heritage Environmental Services, LLC is accredited under Illinois NELAC accreditation number 100401.
Arizona License Number AZ0627.

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Approved : G A Busch, QAO

FINAL REPORT EXAMPLES

SUMMARY OF QUALITY CONTROL DATA

Note: Quality Assurance Summary is not a part of the test report (Certificate of Analysis). The Quality Assurance Summary is supporting documentation only.

QUALITY ASSURANCE REPORT

Service Location	Report Date
HERITAGE ENVIRONMENTAL SERVICES, LLC COMMERCIAL LABORATORY OPERATIONS 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8304	29-APR-03

Submitter

HERITAGE LABORATORIES, INC.
BRENDA BYRER
7901 WEST MORRIS ST.
INDIANAPOLIS, IN 46231-3301

Client ID	Lab ID	Date-Time Sampled	Date Received	Date Complete	Description
APG-WP FEB-03	A619767		11-FEB-03	25-MAR-03	DESCRIPTION: WATER POLLUTION LABORATORY PERFORMANCE STUDY
					MINERALS, CHLORDANE, B/N, BTEX, HERBICIDES
					PCB'S WATER-2, NELAC PESTICIDES

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HERITAGE ENVIRONMENTAL SERVICES, LLC

CHLORIDE (COLORIMETRIC, AUTOMATED) EPA 325.2 — G102.7

Run: R449069 Analyst.: A GRUESBECK Run Date...: 03-MAR-03 Instrument: AUTO-ANALYZER
NALYTICAL Reviewer: B SHRAKE Review Date: 03-MAR-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CDL01	Q1474097		CHLORIDE	1		1.15	mg/L	115	
ICV01	Q1474098		CHLORIDE	33		33.5	mg/L	101.5	
DUP01	Q1474102	A620909	CHLORIDE	61		61	mg/L		0
CCV	Q1474112		CHLORIDE	10		9.89	mg/L	98.9	
BLA01	Q1474113		CHLORIDE			BDL 1	mg/L		
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
CCV	Q1474114		CHLORIDE	10		9.94	mg/L	99.4	
BLA01	Q1474115		CHLORIDE			BDL 1	mg/L		
SPI01	Q1474116	A621137	CHLORIDE	99	100	210	mg/L	111	
DPS01	Q1474117	A621137	CHLORIDE	99	100	211	mg/L	112	.9

Comments

Q1474102 1:10 Dilution.
Q1474116 1:10 Dilution.
Q1474117 1:10 Dilution.

SULFATE (TURBIDIMETRIC) EPA 375.4 — G108.5

Run: R449568 Analyst.: K CRAWFORD Run Date...: 12-MAR-03
ANALYTICAL Reviewer: B SHRAKE Review Date: 12-MAR-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CDL01	Q1477220		SULFATE	5		3.09	mg/L	61.8	
01	Q1477221		SULFATE	32.1		29.2	mg/L	91	
V	Q1477223		SULFATE	20		19	mg/L	95	
BLA01	Q1477224		SULFATE			BDL 5	mg/L		
SPI01	Q1477225	A622060	SULFATE	108	50	149	mg/L	82	
DPS01	Q1477226	A622060	SULFATE	108	50	153	mg/L	90	9.3
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
DUP01	Q1477227	A619767	SULFATE	5.85		6.3	mg/L		7.4
CCV	Q1477228		SULFATE	20		18.7	mg/L	93.5	
BLA01	Q1477229		SULFATE			BDL 5	mg/L		

Comments

Q1477225 1:5 Dilution
Q1477226 1:5 Dilution

CHLORIDE BY ION CHROMATOGRAPHY EPA 300.0 REV. 2.1 — G300.2

Run: R449358 Analyst.: J MONTGOMERY Run Date...: 06-MAR-03 Instrument: IC
ANALYTICAL Reviewer: E WERNZ Review Date: 10-MAR-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
BLA01	Q1475821		CHLORIDE			BDL 0.2	mg/L		
CCVL	Q1475822		CHLORIDE	1.25		1.25	mg/L	100	
CCVH	Q1475823		CHLORIDE	12.5		12.1	mg/L	96.8	
LFB01	Q1475824		CHLORIDE	2.5		2.61	mg/L	104.4	
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
CCVL	Q1475827		CHLORIDE	1.25		1.37	mg/L	109.6	
H	Q1475828		CHLORIDE	12.5		12.1	mg/L	96.8	

HERITAGE ENVIRONMENTAL SERVICES, LLC

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
LA01	Q1475829		CHLORIDE			BDL 0.1	mg/L		
PI01	Q1475835	A620997	CHLORIDE	15.2	12.5	27.1	mg/L	95.2	
01	Q1475836	A620997	CHLORIDE	15.2	12.5	26.3	mg/L	88.8	7

Comments

Q1475835 1:5 Dilution.
Q1475836 1:5 Dilution.

SULFATE BY ION CHROMATOGRAPHY EPA 300.0 REV. 2.1 G300.7

Run: R449358 Analyst.: J MONTGOMERY Run Date...: 06-MAR-03 Instrument: IC
ANALYTICAL Reviewer: E WERNZ Review Date: 10-MAR-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
BLA01	Q1475821		SULFATE			BDL 0.25	mg/L		
CCVL	Q1475822		SULFATE	2.5		2.61	mg/L	104.4	
CCVH	Q1475823		SULFATE	25		23.8	mg/L	95.2	
LFB01	Q1475824		SULFATE	5		5.35	mg/L	107	
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
CCVL	Q1475827		SULFATE	2.5		2.59	mg/L	103.6	
CCVH	Q1475828		SULFATE	25		24	mg/L	96	
BLA01	Q1475829		SULFATE			BDL 0.25	mg/L		
SPI01	Q1475830	A621207	SULFATE	419	125	561	mg/L	113.6	
DPS01	Q1475831	A621207	SULFATE	419	125	550	mg/L	104.8	8.1

Comments

Q1475830 1:25 Dilution.
Q1475831 1:25 Dilution.

DISSOLVED SOLIDS EPA 160.1 G402.7

Run: R449456 Analyst.: J RING Run Date...: 06-MAR-03
ANALYTICAL Reviewer: B SHRAKE Review Date: 11-MAR-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
BLA01	Q1476522		DISSOLVED SOLIDS			BDL 10	mg/L		
LCS01	Q1476523		DISSOLVED SOLIDS	827		815	mg/L	98.5	
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
DUP01	Q1476527	A619767	DISSOLVED SOLIDS	176		196	mg/L		10.8
SPI01	Q1476528	A621605	DISSOLVED SOLIDS	700	250	946	mg/L	98.4	
DPS01	Q1476529	A621605	DISSOLVED SOLIDS	700	250	940	mg/L	96	2.5
LCS01	Q1476530		DISSOLVED SOLIDS	827		802	mg/L	97	
BLA01	Q1476531		DISSOLVED SOLIDS			BDL 10	mg/L		

SPECIFIC CONDUCTANCE EPA 120.1 G604.3

Run: R449150 Analyst.: K CRAWFORD Run Date...: 05-MAR-03
ANALYTICAL Reviewer: B SHRAKE Review Date: 05-MAR-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
BLA01	Q1474720		CONDUCTIVITY			BDL 5	umHOS/cm		
LFB01	Q1474721		CONDUCTIVITY	616		619	umHOS/cm	100.5	
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
01	Q1474722	A619767	CONDUCTIVITY	485		486	umHOS/cm		.2

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QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CCV	Q1474723		CONDUCTIVITY	1412		1500	umHOS/cm	106.2	
BLA01	Q1474725		CONDUCTIVITY			BDL 5	umHOS/cm		

ALKALINITY TOTAL EPA 310.1 — G605.2

Run: R449214 Analyst.: L STUBBLEFIELD Run Date...: 05-MAR-03
ANALYTICAL Reviewer: B SHRAKE Review Date: 05-MAR-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
LFB01	Q1475078		ALKALINITY	17		16	mg/L	94.1	
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
DUP01	Q1475079	A619767	ALKALINITY	18		18	mg/L		0
CCV	Q1475080		ALKALINITY	125		120	mg/L	96	

HARDNESS SM 2340B 18TH — G608.0

Run: R448292 Analyst.: J KRAMER Run Date...: 17-FEB-03 Instrument: ICP
ANALYTICAL Reviewer: S ENDERSEN Review Date: 18-FEB-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						

CALCIUM ICP EPA 200.7 REV. 4.4 — M409.3

Run: R448292 Analyst.: J KRAMER Run Date...: 17-FEB-03 Instrument: ICP
ANALYTICAL Reviewer: S ENDERSEN Review Date: 18-FEB-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q1468980	SPEX	CALCIUM	20		20.1	mg/L	100.5	
ICS-A	Q1468986	PERKIN	CALCIUM	500		492.	mg/L	98.4	
CCV	Q1468987	INORGAN	CALCIUM	50.0		50.8	mg/L	101.6	
BLA01	Q1468988	NA	CALCIUM			< 0.0400	mg/L		
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
CCV	Q1468989	INORGAN	CALCIUM	50.0		50.8	mg/L	101.6	
BLA01	Q1468990	NA	CALCIUM			< 0.0400	mg/L		
DUP02	Q1468769	A620020	CALCIUM	24.2		23.6	mg/L		2.5
SPI02	Q1468768	A620020	CALCIUM	24.2	100	122.	mg/L	97.8	
ICS-A	Q1469006	PERKIN-	CALCIUM	500		500.	mg/L	100	

MAGNESIUM ICP EPA 200.7 REV. 4.4 — M418.3

Run: R448292 Analyst.: J KRAMER Run Date...: 17-FEB-03 Instrument: ICP
ANALYTICAL Reviewer: S ENDERSEN Review Date: 18-FEB-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q1468980	SPEX	MAGNESIUM	20		19.9	mg/L	99.5	
ICS-A	Q1468986	PERKIN	MAGNESIUM	500		520.	mg/L	104	
CCV	Q1468987	INORGAN	MAGNESIUM	50.0		49.2	mg/L	98.4	
BLA01	Q1468988	NA	MAGNESIUM			< 0.0400	mg/L		
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
CCV	Q1468989	INORGAN	MAGNESIUM	50.0		49.2	mg/L	98.4	
BLA01	Q1468990	NA	MAGNESIUM			< 0.0400	mg/L		
DUP02	Q1468769	A620020	MAGNESIUM	23.0		23.0	mg/L		0
SPI02	Q1468768	A620020	MAGNESIUM	23.0	100	124.	mg/L	101	

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QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CS-A	Q1469006	PERKIN-	MAGNESIUM	500		527.	mg/L	105.4	

POTASSIUM ICP EPA 200.7 REV. 4.4 — M426.3

Run: R448387 ANALYTICAL — Analyst.: J LEAK — Reviewer: S ENDERSEN — Run Date...: 19-FEB-03 — Review Date: 20-FEB-03 — Instrument: ICP

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q1469763	PERKIN	POTASSIUM	10		10.1	mg/L	101	
ICV01	Q1469764	SPEX	POTASSIUM	20		19.6	mg/L	98	
CCV	Q1469771	INORGAN	POTASSIUM	50		50.7	mg/L	101.4	
BLA01	Q1469772	NA	POTASSIUM			< 0.0400	mg/L		
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
CCV	Q1469773	INORGAN	POTASSIUM	50		50.0	mg/L	100	
BLA01	Q1469774	NA	POTASSIUM			< 0.0400	mg/L		
SPI02	Q1469078	A620079	POTASSIUM	119	100	279	mg/L	160	
DPS02	Q1469081	A620079	POTASSIUM	119	100	276	mg/L	157	1.9

Comments

Q1469078 There was matrix interference for this element. Both the matrix spike and matrix spike duplicate results were outside control limit criteria. Results for this sample are estimated. (Cu, Ni, Pb, K)

Q1469081 There was matrix interference for this element. Both the matrix spike and matrix spike duplicate results were outside control limit criteria. Results for this sample are estimated. (Cu, Pb, Ni, K)

SODIUM ICP EPA 200.7 REV. 4.4 — M431.3

Run: R448292 ANALYTICAL — Analyst.: J KRAMER — Reviewer: S ENDERSEN — Run Date...: 17-FEB-03 — Review Date: 18-FEB-03 — Instrument: ICP

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q1468979	PERKIN	SODIUM	1		0.907	mg/L	90.7	
ICV01	Q1468980	SPEX	SODIUM	20		20.4	mg/L	102	
CCV	Q1468987	INORGAN	SODIUM	50		52.8	mg/L	105.6	
BLA01	Q1468988	NA	SODIUM			< 0.0400	mg/L		
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
CCV	Q1468989	INORGAN	SODIUM	50		52.9	mg/L	105.8	
BLA01	Q1468990	NA	SODIUM			< 0.0400	mg/L		
DUP02	Q1468769	A620020	SODIUM	333.		335.	mg/L		.6
SPI02	Q1468768	A620020	SODIUM	333.	100	455.	mg/L	122	

POLYCHLORINATED BIPHENYLS (PCBS) EPA 608 — O301.1

Prep: PCB EXTRACTION EPA 608

Run: R448243 PREP — Analyst.: J LEE — Reviewer: T PINCKERT — Run Date...: 14-FEB-03 — Review Date: 17-FEB-03

QC Type	Lab ID	Source	Anal Run
BLA02	Q1468700	EMS	R448325
LCS	Q1468701		R448325
SPI02	Q1468702	A620025	R448325
DPS02	Q1468703	A620025	R448325
SAMPLE	A619767	Rep: 0	R448325

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QC Type	Lab ID	Source	Anal Run
BLA02	Q1468920	EMS	R448325
LCS	Q1468921		R448325

Run: R448325 Analyst.: M WRIGHT Run Date...: 17-FEB-03 Instrument: GC/ECD
ANALYTICAL Reviewer: E WERNZ Review Date: 18-FEB-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q1469194		PCB AROCLOR 1016	450		584	mg/L	129.8	
ICV01	Q1469194		PCB AROCLOR 1260	450		465	mg/L	103.3	
CCV	Q1469195		PCB AROCLOR 1248	100		102	ug/L	102	
BLA02	Q1468700	EMS	PCB AROCLOR 1016			BDL 0.01	ug/L		
BLA02	Q1468700	EMS	PCB AROCLOR 1221			BDL 0.02	ug/L		
BLA02	Q1468700	EMS	PCB AROCLOR 1232			BDL 0.01	ug/L		
BLA02	Q1468700	EMS	PCB AROCLOR 1242			BDL 0.01	ug/L		
BLA02	Q1468700	EMS	PCB AROCLOR 1248			BDL 0.01	ug/L		
BLA02	Q1468700	EMS	PCB AROCLOR 1254			BDL 0.01	ug/L		
BLA02	Q1468700	EMS	PCB AROCLOR 1260			BDL 0.01	ug/L		
BLA02	Q1468700	EMS	PCB AROCLOR 1262			BDL 0.01	ug/L		
LCS	Q1468701		PCB AROCLOR 1260	0.5		0.342	ug/L	68.4	
SPI02	Q1468702	A620025	PCB AROCLOR 1260	0	1.02	0.854	ug/L	83.7	
DPS02	Q1468703	A620025	PCB AROCLOR 1260	0	1.02	0.917	ug/L	89.9	7.1
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
CCV	Q1469196		PCB AROCLOR 1242	100		106	ug/L	106	
CCV	Q1469196		PCB AROCLOR 1260	100		93.4	ug/L	93.4	
BLA02	Q1468920	EMS	PCB AROCLOR 1016			BDL 0.01	ug/L		
BLA02	Q1468920	EMS	PCB AROCLOR 1221			BDL 0.02	ug/L		
BLA02	Q1468920	EMS	PCB AROCLOR 1232			BDL 0.01	ug/L		
BLA02	Q1468920	EMS	PCB AROCLOR 1242			BDL 0.01	ug/L		
BLA02	Q1468920	EMS	PCB AROCLOR 1248			BDL 0.01	ug/L		
02	Q1468920	EMS	PCB AROCLOR 1254			BDL 0.01	ug/L		
A02	Q1468920	EMS	PCB AROCLOR 1260			BDL 0.01	ug/L		
BLA02	Q1468920	EMS	PCB AROCLOR 1262			BDL 0.01	ug/L		
LCS	Q1468921		PCB AROCLOR 1260	0.5		0.273	ug/L	54.6	

Comments

Q1468921 Insufficient sample available to re-prep with new LCS.

ORGANOCHLORINE PESTICIDES AND PCBS IN WATER/WASTEWA EPA 608 O305.0

Prep: ORGANOCHLORINE PESTICIDES AND PCBS EXTRACTION EPA 608

Run: R448125 Analyst.: T PINCKERT Run Date...: 12-FEB-03
PREP Reviewer: E WERNZ Review Date: 13-FEB-03

QC Type	Lab ID	Source	Anal Run
BLA02	Q1467955	LAB	R448669
LCS	Q1467956	EMS	R448669
DLCS	Q1467957	EMS	R448669
SAMPLE	A619767	Rep: 0	R448669
SAMPLE	A619767	Rep: 1	R448669

Run: R448669 Analyst.: T PINCKERT Run Date...: 21-FEB-03 Instrument: GC/ECD
ANALYTICAL Reviewer: E WERNZ Review Date: 25-FEB-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
SAMPLE	A619767		See Cert. of Analysis, Rep: 1						
CCV	Q1471513		ALPHA-BHC	20		21.1	ug/L	105.5	
	Q1471513		ENDOSULFAN I	20		21.2	ug/L	106	

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QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CCV	Q1471513		ENDRIN	40		45.2	ug/L	113	
CCV	Q1471513		GAMMA-BHC (LINDANE)	20		21.3	ug/L	106.5	
	Q1471513		METHOXYCHLOR	200		224.5	ug/L	112.3	
BLA02	Q1467955	LAB	ALPHA-BHC			BDL 0.05	ug/L		
BLA02	Q1467955	LAB	BETA-BHC			BDL 0.05	ug/L		
BLA02	Q1467955	LAB	DELTA-BHC			BDL 0.05	ug/L		
BLA02	Q1467955	LAB	ENDOSULFAN I			BDL 0.05	ug/L		
BLA02	Q1467955	LAB	ENDOSULFAN II			BDL 0.1	ug/L		
BLA02	Q1467955	LAB	ENDOSULFAN SULFATE			BDL 0.1	ug/L		
BLA02	Q1467955	LAB	ENDRIN			BDL 0.1	ug/L		
BLA02	Q1467955	LAB	ENDRIN ALDEHYDE			BDL 0.1	ug/L		
BLA02	Q1467955	LAB	GAMMA-BHC (LINDANE)			BDL 0.05	ug/L		
BLA02	Q1467955	LAB	METHOXYCHLOR			BDL 0.5	ug/L		
LCS	Q1467956	EMS	ENDRIN	1		1.16	ug/L	116	
LCS	Q1467956	EMS	GAMMA-BHC (LINDANE)	0.5		0.477	ug/L	95.4	
DLCS	Q1467957	EMS	ENDRIN	1		1.15	ug/L	115	.9
DLCS	Q1467957	EMS	GAMMA-BHC (LINDANE)	0.5		0.47	ug/L	94	1.5

PURGEABLE AROMATICS BY GC/PID ELCD (BTEX) EPA 602 — O458.1

Run: R449657 — Analyst.: T REECE — Run Date...: 14-MAR-03 — Instrument: GC/PID ELCD
ANALYTICAL — Reviewer: L SMITH — Review Date: 20-MAR-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
			Date and time of analysis	05-FEB-02	16:05:00				
CAL01	Q1477621		BENZENE	1770000					3.38
CAL01	Q1477621		ETHYL BENZENE	1460000					5.29
·01	Q1477621		M/P-XYLENE	1630000					6.69
L01	Q1477621		O-XYLENE	1180000					1.67
CAL01	Q1477621		TOLUENE	1620000					2.91
CAL01	Q1477621		XYLENES (O/M/P-XYLENE)	1630000					6.69
CAL01	Q1477621		FLUOROBENZENE	1520000					0.63
CAL01	Q1477621		CHLOROFLUOROBENZENE	1700000					1.42
			Date and time of analysis	13-MAR-03	18:52:00				
LCS01	Q1477622		BENZENE	20		22.0	ug/L	110	
LCS01	Q1477622		ETHYL BENZENE	20		21.7	ug/L	108.5	
LCS01	Q1477622		M/P-XYLENE	40		44.3	ug/L	110.8	
LCS01	Q1477622		O-XYLENE	20		21.4	ug/L	107	
LCS01	Q1477622		TOLUENE	20		21.9	ug/L	109.5	
LCS01	Q1477622		XYLENES (O/M/P-XYLENE)	60		65.7	ug/L	109.5	
			Date and time of analysis	14-MAR-03	18:40:00				
CCVD	Q1477818		BENZENE	20		20.4	ug/L		2
CCVD	Q1477818		ETHYL BENZENE	20		20.1	ug/L		.5
CCVD	Q1477818		M/P-XYLENE	40		41.1	ug/L		2.8
CCVD	Q1477818		O-XYLENE	20		19.7	ug/L		1.5
CCVD	Q1477818		TOLUENE	20		20.2	ug/L		1
CCVD	Q1477818		XYLENES (O/M/P-XYLENE)	60		60.8	ug/L		1.3
			Date and time of analysis	15-MAR-03	10:14:00				
BLA01	Q1477839		BENZENE			BDL 1.0	ug/L		
BLA01	Q1477839		ETHYL BENZENE			BDL 1.0	ug/L		
BLA01	Q1477839		M/P-XYLENE			BDL 1.0	ug/L		
BLA01	Q1477839		O-XYLENE			BDL 1.0	ug/L		
BLA01	Q1477839		TOLUENE			BDL 1.0	ug/L		
01	Q1477839		XYLENES (O/M/P-XYLENE)			BDL 1	ug/L		

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QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
LA01	Q1477839		FLUOROBENZENE					95.5	
A01	Q1477839		CHLOROFLUOROBENZENE					89.2	
			Date and time of analysis	15-MAR-03	11:10:00				
SPI01	Q1477840	A621558	BENZENE	0	20	19.4	ug/L	97	
SPI01	Q1477840	A621558	ETHYL BENZENE	0	20	19.7	ug/L	98.5	
SPI01	Q1477840	A621558	M/P-XYLENE	0	40	40.4	ug/L	101	
SPI01	Q1477840	A621558	O-XYLENE	0	20	19.3	ug/L	96.5	
SPI01	Q1477840	A621558	TOLUENE	0	20	19.7	ug/L	98.5	
SPI01	Q1477840	A621558	XYLENES (O/M/P-XYLENE)	0	60	59.7	ug/L	99.5	
			Date and time of analysis	15-MAR-03	12:06:00				
DPS01	Q1477841	A621558	BENZENE	0	20	21.4	ug/L	107	9.7
DPS01	Q1477841	A621558	ETHYL BENZENE	0	20	21.6	ug/L	108	9.1
DPS01	Q1477841	A621558	M/P-XYLENE	0	40	44.1	ug/L	110.3	8.9
DPS01	Q1477841	A621558	O-XYLENE	0	20	21.2	ug/L	106	9.5
DPS01	Q1477841	A621558	TOLUENE	0	20	21.6	ug/L	108	9.4
DPS01	Q1477841	A621558	XYLENES (O/M/P-XYLENE)	0	60	65.3	ug/L	108.8	8.9
			Date and time of analysis	15-MAR-03	19:31:00				
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
			Date and time of analysis	16-MAR-03	11:31:00				
BLA01	Q1477967		BENZENE			BDL 1.0	ug/L		
BLA01	Q1477967		ETHYL BENZENE			BDL 1.0	ug/L		
BLA01	Q1477967		M/P-XYLENE			BDL 1.0	ug/L		
BLA01	Q1477967		O-XYLENE			BDL 1.0	ug/L		
BLA01	Q1477967		TOLUENE			BDL 1.0	ug/L		
BLA01	Q1477967		XYLENES (O/M/P-XYLENE)			BDL 1	ug/L		
BLA01	Q1477967		FLUOROBENZENE					93.8	
BLA01	Q1477967		CHLOROFLUOROBENZENE					93.4	
			Date and time of analysis	16-MAR-03	12:27:00				
CCVD	Q1477968		BENZENE	20		20.0	ug/L		0
CCVD	Q1477968		ETHYL BENZENE	20		20.4	ug/L		2
CCVD	Q1477968		M/P-XYLENE	40		41.6	ug/L		4
CCVD	Q1477968		O-XYLENE	20		19.9	ug/L		.5
CCVD	Q1477968		TOLUENE	20		20.2	ug/L		1
CCVD	Q1477968		XYLENES (O/M/P-XYLENE)	60		61.5	ug/L		2.5

Comments

Q1477621 The calibration meets the mean RSD requirement for acceptable calibration, however those analytes with an initial calibration RSD > 20% will lead to greater uncertainty. Mean RSD =4.85

SEMI-VOLATILE PRIORITY POLLUTANTS (BASE/NEUTRAL FRA EPA 625 O507.3

Prep: SEMI-VOLATILE EXTRACTION (BASE/NEUTRAL FRACTIONS) EPA 625

Run: R448753 Analyst.: P SIMS Run Date...: 25-FEB-03
PREP Reviewer: L SMITH Review Date: 26-FEB-03

QC Type	Lab ID	Source	Anal Run
BLA02	Q1471928	EMS	R448836
LCS	Q1471929	EMS	R448836
SPI02	Q1471930	A620611	R448836
DPS02	Q1471931	A620611	R448836
SAMPLE	A619767	Rep: 1	R448836
SAMPLE	A619767	Rep: 0	R448836

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Run: R448836 Analyst.: L CALLAHAN Run Date...: 26-FEB-03 Instrument: GC/MS SVOA
ANALYTICAL Reviewer: L SMITH Review Date: 03-MAR-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
			Date and time of analysis	26-FEB-03	13:17:00				
CAL01	Q1472489		2,4-DINITROTOLUENE	0.3928					5.2
CAL01	Q1472489		BIS(2-ETHYLHEXYL)PHTHALATE	1.1124					8.4
CAL01	Q1472489		BENZYLBUTYLPHTHALATE (BUTYLBENZY	0.8357					7.9
CAL01	Q1472489		DIETHYLPHTHALATE	1.1837					18.2
CAL01	Q1472489		DIMETHYLPHTHALATE	1.1789					18.3
CAL01	Q1472489		PYRENE	1.6370					8.9
CAL01	Q1472489		NITROBENZENE-D5	0.3227					6.8
CAL01	Q1472489		2-FLUOROBIPHENYL	1.2920					15
CAL01	Q1472489		TERPHENYL-D14	0.7785					7.7
			Date and time of analysis	26-FEB-03	23:48:00				
BLA02	Q1471928	EMS	2,4-DINITROTOLUENE			BDL 10.	ug/L		
BLA02	Q1471928	EMS	BIS(2-ETHYLHEXYL)PHTHALATE			BDL 10.	ug/L		
BLA02	Q1471928	EMS	BENZYLBUTYLPHTHALATE (BUTYLBENZY			BDL 10.	ug/L		
BLA02	Q1471928	EMS	DIETHYLPHTHALATE			BDL 10.	ug/L		
BLA02	Q1471928	EMS	DIMETHYLPHTHALATE			BDL 10.	ug/L		
BLA02	Q1471928	EMS	PYRENE			BDL 10.	ug/L		
BLA02	Q1471928	EMS	NITROBENZENE-D5					83	
BLA02	Q1471928	EMS	2-FLUOROBIPHENYL					80	
BLA02	Q1471928	EMS	TERPHENYL-D14					56	
			Date and time of analysis	27-FEB-03	00:30:00				
LCS	Q1471929	EMS	2,4-DINITROTOLUENE	100		86.2	ug/L	86.2	
LCS	Q1471929	EMS	BIS(2-ETHYLHEXYL)PHTHALATE	100		84.7	ug/L	84.7	
LCS	Q1471929	EMS	BENZYLBUTYLPHTHALATE (BUTYLBENZY	100		83.7	ug/L	83.7	
LCS	Q1471929	EMS	DIETHYLPHTHALATE	100		81.1	ug/L	81.1	
[illegible]	Q1471929	EMS	DIMETHYLPHTHALATE	100		82.8	ug/L	82.8	
[illegible]	Q1471929	EMS	PYRENE	100		85.9	ug/L	85.9	
			Date and time of analysis	27-FEB-03	04:00:00				
SPI02	Q1471930	A620611	2,4-DINITROTOLUENE	0	100	98.5	ug/L	98.5	
SPI02	Q1471930	A620611	BIS(2-ETHYLHEXYL)PHTHALATE	0	100	94	ug/L	94	
SPI02	Q1471930	A620611	BENZYLBUTYLPHTHALATE (BUTYLBENZY	0	100	91.7	ug/L	91.7	
SPI02	Q1471930	A620611	DIETHYLPHTHALATE	0	100	87.6	ug/L	87.6	
SPI02	Q1471930	A620611	DIMETHYLPHTHALATE	0	100	73.2	ug/L	73.2	
SPI02	Q1471930	A620611	PYRENE	0	100	93.6	ug/L	93.6	
			Date and time of analysis	27-FEB-03	04:42:00				
DPS02	Q1471931	A620611	2,4-DINITROTOLUENE	0	100	92	ug/L	92	6.8
DPS02	Q1471931	A620611	BIS(2-ETHYLHEXYL)PHTHALATE	0	100	90.7	ug/L	90.7	3.6
DPS02	Q1471931	A620611	BENZYLBUTYLPHTHALATE (BUTYLBENZY	0	100	87.4	ug/L	87.4	4.8
DPS02	Q1471931	A620611	DIETHYLPHTHALATE	0	100	82.9	ug/L	82.9	5.5
DPS02	Q1471931	A620611	DIMETHYLPHTHALATE	0	100	73.2	ug/L	73.2	0
DPS02	Q1471931	A620611	PYRENE	0	100	84.9	ug/L	84.9	9.7
			Date and time of analysis	27-FEB-03	03:18:00				
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						
SAMPLE	A619767		See Cert. of Analysis, Rep: 1						

Comments

Q1472489 The calibration meets the mean RSD requirement for acceptable calibration, however those analytes with an initial calibration RSD > 15% will lead to greater uncertainty. Mean RSD = 10.95.
Calibration Check Compounds (CCC) meet 30% RSD requirement.

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PURGEABLE AROMATICS BY GC/MS (BTEX) SW846-8260B — O560.3

Run: R449501 Analyst.: H WILLIAMS Run Date...: 10-MAR-03 Instrument: GC/MS VOA
NALYTICAL Reviewer: L SMITH Review Date: 12-MAR-03

QC Type	Lab ID	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
			Date and time of analysis	10-MAR-03	02:56:00				
CCVN	Q1476721		BENZENE	20		21.			
CCVN	Q1476721		ETHYL BENZENE	20		20.5			
CCVN	Q1476721		M/P-XYLENE	40		42.9			
CCVN	Q1476721		O-XYLENE	20		20.9			
CCVN	Q1476721		TOLUENE	20		20.7			
CCVN	Q1476721		XYLENES (O/M/P-XYLENE)	40		42.9			
CCVN	Q1476721		DICHLOROETHANE-D4					107	
CCVN	Q1476721		TOLUENE-D8					105	
CCVN	Q1476721		4-BROMOFLUOROBENZENE					107	
			Date and time of analysis	10-MAR-03	03:40:00				
BLA01	Q1476722		BENZENE			BDL 5.0	ug/L		
BLA01	Q1476722		ETHYL BENZENE			BDL 5.0	ug/L		
BLA01	Q1476722		M/P-XYLENE			BDL 5.0	ug/L		
BLA01	Q1476722		O-XYLENE			BDL 5.0	ug/L		
BLA01	Q1476722		TOLUENE			BDL 5.0	ug/L		
BLA01	Q1476722		XYLENES (O/M/P-XYLENE)			BDL 5.0	ug/L		
BLA01	Q1476722		DICHLOROETHANE-D4					105	
BLA01	Q1476722		TOLUENE-D8					104	
BLA01	Q1476722		4-BROMOFLUOROBENZENE					105	
			Date and time of analysis	10-MAR-03	04:24:00				
LCS01	Q1476723	SUPELCO	BENZENE	20		18.1	ug/L	90.5	
LCS01	Q1476723	SUPELCO	ETHYL BENZENE	20		17.8	ug/L	89	
^01	Q1476723	SUPELCO	TOLUENE	20		17.7	ug/L	88.5	
			Date and time of analysis	10-MAR-03	05:29:00				
SAMPLE	A619767		See Cert. of Analysis, Rep: 0						

QC Sample Comments

< Less Than Lower Detection Limit
BDL Below Detection Limit

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Approved by: G A Busch, QAO

FORM 1

DATE _____

LOCATION _____

AUDITOR _____

GENERAL INFORMATION

		YES	NO	COMMENTS
1)	Does the laboratory have copies of SOPs/methods manuals and QA Plans available to all personnel?			
2)	Are training records maintained and up to date? Is training by group leader or above?			
3)	Is a Sample Custodian designated?			
4)	Are written Standard Operating Procedures (SOPs) developed for receipt and storage of samples?			
5)	Are samples stored in such a way that their preservation is maintained?			
6)	Are refrigerator/freezer logs maintained, checked daily and up to date?			
7)	Are excursions in cooler temperature noted and appropriate actions taken as required?			
8)	Are volatiles stored separately from semi-vols?			
9)	Does someone responsible review and initial the sample log and log sheets daily?			
10)	Are contamination free areas provided for trace level analytical work?			
11)	Does the facility appear clean and safe?			
12)	Are toxics handled in fume hoods? Are fume hoods checked & documented quarterly?			
13)	Are the toxic chemical handling areas either a stainless steel bench or an impervious material covered with absorbent material?			

PAGE 2 OF FORM 1

		YES	NO	COMMENTS
14)	Is there documented "trace-free" water available for preparing standards and blanks?			
15)	Is the conductivity of "trace-free" water routinely checked and recorded?			
16)	Is (Are) the analytical balance(s) correctly located (free from drafts and rapid temperature changes) and checked semi-annually by a certified technician and documented?			
17)	Are the balances checked with class S weights and documented at least weekly?			
18)	Are solvent storage cabinets properly vented in order to prevent possible laboratory contamination?			
19)	Are reagent grade (or higher purity) chemicals used to prepare standards and reagents?			
20)	Are reagents dated upon receipt and upon opening? Is First-in, First-out method used?			
21)	Are reagents standardized before use?			
22)	Generally, are reference materials properly labeled with concentrations, preparation date, solvent, preservative expiration date and name of person preparing?			
23)	Are spike/calibration stock standards preparation and tracking logbook(s) maintained?			
24)	Are the primary standards approved by the EMS QAP?			
25)	Are bench sheets filed so that they are readily accessible?			
26)	Are standards and samples (& extracts) stored separately?			
27)	Are samples checked for proper preservation upon arrival? Is this noted within LIMS?			
28)	Are logs maintained for all ovens and incubators?			
29)	Is an NBS thermometer available?			

PAGE 3 OF FORM 1

		YES	NO	COMMENTS
30)	Are copies of EPA - PEs and others such as APG on file?			
31)	Is the distilled/deionized water system functioning properly? Is it checked daily and noted in a logbook?			
32)	Are samples requiring chain of custody documentation properly checked before signing chain of custody papers?			
33)	What is done with lab waste? _____ _____ _____			
34)	Are chemical waste disposal policies/procedures adequate?			
35)	Are blind samples introduced into the lab by the QAO?			
36)	Are corrections on bench sheets, lab books, etc. made in such a way that initial entries are legible?			
37)	Are such corrections initialed and dated?			

FORM 2

DATE_____

SERVICE GROUP _____ AUDITOR _____

LOCATION _____ ANALYST _____

	TEST	YES	NO	COMMENTS
1)	Are methods manuals & QAP's available to the analysts?			
2)	Is the SOP for glassware washing posted at the cleaning stations?			
3)	Are the types and numbers of required Blanks being checked? Bla 01? Bla 02? Cal 00?			
4)	Are blank data logged to the QA sheet and transferred to LIMS?			
4a)	Does blank data appear to be "in control"?			
4b)	Do original instrument outputs agree with what was reported?			
5)	Are calibration curves maintained for all analytes?			
6)	Are calibrations verified (1 point) or performed (5 points) prior to the analysis of samples CAL01 + CAL00? Comment: _____			
7)	Is an EPA, NIST or other approved external reference used to check and verify concentrations of CAL standards and is the result recorded on the QA sheet?			
7a)	Are the results recorded in LIMS?			
8)	Do the analysts record bench data in a neat and accurate manner?			

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PAGE 2 OF FORM 2

		YES	NO	COMMENTS
8a)	Is all quality assurance data correctly transferred from the Bench/QA sheets into LIMS?			
9)	Is a calibration verification performed at the correct frequency?			
9a)	Documented to LIMS?			
10)	Is a prepped performance check (LCS) analyzed once per run or as required by the QAP? (eg one per set of 10)			
11)	Is a prepped sample spike (SPI02) analyzed with each run or as required by the QAP? (eg one per set of 10)			
12)	Is a prepped sample replicate analyzed (or a duplicate spike?) at the appropriate frequency according to the QAP? (eg one per set of 10)			
13)	If any problems occur, has corrective action been taken and documented?			
	Comments: _____			
14)	Is a calibration verification solution analyzed at the end of each run?			
15)	Is the method of internal standards used for GC/MS?			
16)	List internal standards used for VOA. (Attach copy of report)			
	Are these correct for the method?			
17)	List internal standards used for SVOA's. (attach copy of report)			
	Are these correct for the method?			
18)	Are surrogates properly analyzed and reported? Are surrogates within CLP acceptance ranges?			

PAGE 3 OF FORM 2

		YES	NO	COMMENTS
19)	Are standard recoveries correctly calculated? Are spike recoveries correctly calculated? Are duplicate recoveries correctly calculated? Are they all documented in LIMS?			
20)	Does a manual recalculation agree with concentrations otherwise calculated and/or reported? (ie verify electronic integrator performing and correct peaks were chosen for GC, GC/MS)			
21)	For GC/MS, are unknowns (non-target compounds) correctly searched in the NBS library and documented as present with an estimated concentration?			
22)	For ICP, are interelement interference check solutions properly analyzed and documented prior to each run?			
23)	Have detection limits been empirically determined according to 40CFR136 for the analytes determined?			
24)	Are standards correctly Labelled? Logged & documented?			
25)	Are instrument operating manuals readily available?			
26)	Are data acceptance criteria developed and used for Blanks? Duplicates? Verification standards? Spikes?			
27)	Are instrument maintenance logs in place and maintained?			
28)	Is the mercury analyzer operational and well maintained (i.e. properly vented)?			
29)	Is preventive maintenance applied and documented?			
30)	Are data calculations spot-checked by a second person? Does this person initial these checked calculations?			

PAGE 4 OF FORM 2

		YES	NO	COMMENTS
31)	Do supervisory personnel review bench sheets and initial them?			
32)	Do records indicate that corrective action was taken as necessary?			
33)	Has a cooperative attitude been displayed?			
34)	Has corrective action indicated during previous visits been implemented?			
35)	Are extractions/digestion performed within holding times?			
36)	Are analyses performed within holding times?			
37)	Are sample preparation methods correct?			
38)	Is a background corrector properly used? (AA, GFAA, ICP)			
39)	Is an approved methodology used for the runs being examined?			
40)	Have acceptance criteria for start-up QC been met?			
41)	Do instrument outputs (strip charts, print-outs, bench sheets, etc.) agree with what is in the final report?			
42)	Are labs data validation procedures adequate?			
43)	Based upon blank, standard, spike and duplicate data, are goals of data accuracy and precision being met?			
44)	Is the method of standard additions being used correctly for HGA analyses?			
45)	Is analytical sensitivity adequate?			
46)	Are instrument guidelines and/or acceptance criteria used at the bench and at data review which determine the acceptability and reportability of data?			
47)	Are Blanks carried through entire process?			
48)	Are desiccants changed and documented?			

PAGE 5 OF FORM 2

		YES	NO	COMMENTS
49)	Are TOC, TOX and BTU instrument logs current?			

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50) Are normalities of titrants routinely checked?

51) Are sufficient cyanide distillation apparatus available to routinely analyze all samples within the required holding period?

FORM 3

LAB _____

DATE _____

AUDITOR _____

METALS GROUPS

		YES	NO	COMMENTS
1)	Are samples for mercury analysis collected in glass and preserved with HNO_3 and Permanganate?			
2)	Are mercury determinations performed within 28 days of sample collection?			
3)	Are proper sample digestion techniques used and documented?			
4)	Is background correction used a) For all HGA work? b) As required for flame AA work?			
5)	Are correct matrix modifiers used for HGA?			
6)	Is an ionization suppressor used as needed for flame AA?			
7)	For ICP are interelement corrections checked?			
8)	Do prep sets of 10 include proper QA and acceptance criteria?			
9)	Are wavelengths used recorded on bench sheets?			
10)	Are flame/furnace/ICP programs adequate? a) Integration times adequate? b) Furnace temperature programs correct? c) Sample aliquot or deposition times adequate?			
11)	Are sensitivity guidelines available at instruments?			

FORM 4

LAB _____

DATE _____

AUDITOR _____

GAS CHROMATOGRAPHY

		YES	NO	COMMENTS
1)	Are samples collected in amber glass bottle with teflon-lined lids?			
2)	Are samples kept at 4°C			
3)	Are samples extracted within 7 days?			
3a)	Analyzed within 40 days?			
4)	Are standards properly documented?			
5)	Are standards prepared fresh regularly?			
6)	Is there a well maintained log, documenting stability of all detectors?			
7)	Are Arochlor 1221 and 1232 standards run at the proper frequency and the data maintained for on-site inspection?			

FORM 5

LAB _____

DATE _____

AUDITOR _____

GC/MS

		YES	NO	COMMENTS
1)	Are samples extracted and/or analyzed within all required holding times?			
2)	Are control limits established and used for CCC and SPCC samples?			
3)	Is QA data properly transferred to LIMS?			
4)	Are Blanks, Spikes and Standards analyzed at the appropriate frequency?			
5)	Is Spike/spike duplicate data being generated?			
6)	Are surrogates properly analyzed with all samples?			
7)	Are surrogate results tabulated?			
8)	Are both 5 and 25 ml purge vessels available and properly used?			
9)	Are correct internal standards being used?			
10)	Is data reviewed prior to issuing final report?			
11)	Has QAO reviewed 2-5% of the runs?			
12)	Are reviewed bench sheets initialed?			
13)	Are all tuning criteria met?			
14)	Is the trap for the purge and trap filled with the proper adsorbent?			

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PAGE 2 OF FORM 5	YES	NO	COMMENTS
15) Is raw data being archived and documented properly (i.e magnetic tape)?			
16) Is a split/splitless capillary injector in place?			