QUALITY MANUAL

For

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SECTION 3
INTRODUCTION AND SCOPE

The purpose of this *Quality Manual* is to outline the management system for Belmont Labs. The *Quality Manual* defines the policies, procedures, and documentation that assure analytical services continually meet a defined standard of quality that is designed to provide clients with data of known and documented quality and, where applicable, demonstrate regulatory compliance. This Quality Manual meets the requirements of NELAC, LELAC and EPA regulatory guidelines.

The *Quality Manual* sets the standard under which all laboratory operations are performed, including the laboratory's organization, objectives, and operating philosophy. The *Quality Manual* has been prepared to assure compliance with the 2009 TNI Environmental Laboratory Sector Standard – Volume 1 **–** Management and Technical Requirements for Laboratories Performing Environmental Analysis (EL-V1-M1 through M7-ISO-2009). This Standard is consistent with ISO/IEC 17025:2005 requirements that are relevant to the scope of environmental testing services and thus, the laboratory operates a quality system in conformance with ISO/IEC 17025:2005(E). In addition, the policies and procedures outlined are compliant with the various accreditation and certification programs listed in Appendix E.

3.1 Scope of Testing

The laboratory scope of analytical testing services includes those listed in Appendix1.

3.2 Table of Contents, References and Appendices

The table of contents is in Section 2 of this Manual. This *Quality Manual* uses the references included in Modules 1-7 in the 2009 TNI Environmental Laboratory Sector Standard – Volume 1 – Management and Technical Requirements for Laboratories Performing Environmental Analysis and all Ohio EPA regulatory guidelines.

3.3 Glossary (Definitions) and Acronyms Used

Quality control terms are generally defined within the section that describes the activity.

3.3.1 Glossary

The *Terms and Definitions* Section of Modules 1-7 in the 2009 TNI Environmental Laboratory Sector Standard – Volume 1 – Management and Technical Requirements for Laboratories Performing Environmental Analysis.

3.3.1.1 **The TNI Standard:** Modules 1-7 in the 2009 TNI Environmental Laboratory Sector Standard – Volume 1 – Management and Technical Requirements for Laboratories Performing Environmental Analysis (EL-V1, M1 through M7, ISO-2009).

Any definitions not included in the NELAC Standard are included in the specific SOP's.

Acronyms

A list of acronyms used in this document and their definitions are:

AA	–	Accrediting Authority
ANSI	–	American National Standards Institute
ASQC	–	American Society for Quality Control
ASTM	–	American Society for Testing and Materials
BDL	-	Below Detection Limit
Blk	–	Blank, Method Blank
BS	–	Blank Spike, Same as LCS
BS	–	Blank Spike Duplicate, Same as LCSD
°C	–	degrees Celsius
cal	–	calibration
CAS	–	Chemical Abstract Service
CCV	–	Continuing Calibration Verification
CCB	–	Continuing Calibration Blank
CDOC	–	Continuing Demonstration of Capability
CEO	–	Chief Executive Officer
CFO	–	Company Financial Officer
COC	–	Chain of Custody
DI	–	De-ionized Water
DO	–	Dissolved Oxygen
DoC	–	Demonstration of Capability
DoD	-	Department of Defense
DOC	–	Dissolved Organic Carbon
EPA	–	Environmental Protection Agency
EQL	–	Estimated Quantitation Limit
g/L	–	grams per liter
GC/MS	–	gas chromatography/mass spectrometry
ICB	–	Initial Calibration Blank
ICP-MS	–	inductively coupled plasma-mass spectrometry
ICV	–	Initial Calibration Verification
IDOC	–	Initial Demonstration of Capability
ISO/IEC	–	International Organization for Standardization/International Electrochemical Commission
lb/in2	–	pound per square inch
LCS	–	Laboratory control sample, Same as BS
LCSD	–	Laboratory control sample duplicate, Same as BSD
LFB	–	Laboratory fortified blank
LOD	–	Limit of Detection
LOQ	–	Limit of Quantitation
LQL	–	Lower Quantitation Limit
MDL	–	method detection limit
mg/Kg	–	milligrams per kilogram
mg/L	–	milligrams per liter
MS	–	matrix spike
MSD	–	matrix spike duplicate
NELAC	–	National Environmental Laboratory Accreditation Conference
NELAP	–	National Environmental Laboratory Accreditation Program
NIST	–	National Institute of Standards and Technology
OEPA	–	Ohio Environmental Protection Agency
PQL	–	Practical Quantitation Limit
PT	–	Proficiency Test(ing)
PTOB	–	Proficiency Testing Oversight Body
PTPA	–	Proficiency Testing Provider Accreditor
PQL	–	Practical Quantitation Limit

QA	–	Quality Assurance
QC	–	Quality Control
QAM	–	Quality Assurance Manual
RL	–	Reporting level
RLC	–	Reporting Limit Check
RPD	–	Relative percent difference
RSD	–	Relative standard deviation
SOPs	–	Standard operating procedures
spk	–	spike
std	–	standard
TNI	–	The NELAC institute
ug/L	–	micrograms per liter
UQL	–	Upper Quantitation Limit
UV	–	Ultraviolet
VAP	–	Voluntary Action Program
VOC	–	Volatile organic compound
WET	–	Whole effluent toxicity
WP	–	Water Pollution PT Study
WS	–	Water Supply PT Study

3.4 Management of the *Quality Manual*

The Quality Manager is responsible for maintaining the currency of the *Quality Manual*.

The *Quality Manual* is reviewed annually by the Quality Manager and laboratory personnel to ensure it still reflects current practices and meets the requirements of any applicable regulations or client specifications. Sections of the manual are updated by making a change to the Section and then increasing the revision number by one. The cover sheet of the *Quality Manual* (Section 1) must be re-signed and the Table of Contents (Section 2) is updated whenever a Section is updated.

The *Quality Manual* is considered confidential within Belmont Labs and may not be altered in anyway except by approval of the Laboratory Director and Quality Manager. If it is distributed to external users, it is for the purpose of reviewing Belmont lab's management system and may not be used for any other purpose without written permission.

SECTION 4

ORGANIZATIONAL ROLES AND RESPONSIBILITIES

POLICY
The laboratory is a legally identifiable organization. The laboratory is responsible for carrying out testing activities that meet the requirements of the TNI Standard, the ISO/EIC 17025 Standard, EPA guidelines and that meet the needs of the client. Through application of the policies and procedures outlined in this Section and throughout the *Quality Manual*:

- The laboratory assures that it is impartial and that personnel are free from undue commercial, financial, or other undue pressures that might influence their technical judgment.

- Management and technical personnel have the authority and resources to carry out their duties and have procedures to identify and correct departures from the laboratory's management system.

- Personnel understand the relevance and importance of their duties as related to the maintenance of the laboratory's management system.

- Ethics and data integrity procedures (see Appendix A, Section 5 – "Management" and Section 19 – "Data Integrity Investigations") ensure personnel do not engage in activities that diminish confidence in the laboratory's capabilities.

- Confidentiality is maintained.

4.1 Laboratory Organizational Structure

The organizational structure indicated minimizes the potential for conflicting or undue interests that might influence the technical judgment of analytical personnel.

The laboratory is a commercial laboratory. The tax ID or certification numbers are available upon request, if applicable.

The laboratory operates in Englewood, Ohio.

The laboratory's organization chart can be found in Appendix 2. Additional information regarding responsibilities, authority and interrelationship of personnel who manage, perform or verify testing is included in Section 5 –"Management" and Section 20 – "Personnel". These Sections also include information on supervision, training, technical management, job descriptions, quality personnel, and appointment of deputies for key managerial personnel.

The laboratory has the resources and authority to operate a management system that is capable of identifying departures from that system and from procedures during testing, and initiates actions to minimize or prevent departures.

4.2 Conflict of Interest and Undue Pressure

The organizational structure indicated above minimizes the potential for conflicting or undue interests that might influence the technical judgment of analytical personnel. In addition, procedures are in place to prevent outside pressures or involvement in activities that may affect competence, impartiality, judgment, operational integrity, or the quality of the work performed at the laboratory.

4.2.1 Awareness of Company Finances

Technical Staff are not allowed access to any financial information beyond a brief overview of profitability given quarterly. This is to prevent any undue financial pressure on the employee.

4.2.2 Use of Data Qualifiers and Case Narratives

The analyst is to qualify any data that does not meet the requirements in the Quality Assurance Manual or specific SOP. This relieves pressure from the analyst, allowing them to qualify data that is required by the client, but may not meet all of the requirements of the Quality Assurance Manual or specific SOP. A case narrative may also be added by the Analyst or Management in the event that a data qualifier is insufficient.

4.2.3 Stop Work Authority

All analysts are granted Stop Work Authority, allowing the analyst to stop work on a given analysis if they feel that the integrity of the data has been compromised. Additional information on Stop Work may be found in section 12.3

Section 5

MANAGEMENT

The laboratory maintains a management system that is appropriate to the scope of its activities.

5.1 Management Requirements

Top management includes the President, Laboratory Director, Technical Directors, Department Supervisors, Business Development Manager and the Quality Manager.

Management's commitment to good professional practice and to the quality of its products is defined in the Quality Policy statement, Section 5.3.

Management has overall responsibility for the technical operations and the authority needed to generate the required quality of laboratory operations. Management ensures communication within the organization to maintain an effective management system and to communicate the importance of meeting customer, statutory, and regulatory requirements. Management assures that the system documentation is known and available so that appropriate personnel can implement their part. When changes to the management system occur or are planned, managers ensure that the integrity of the system is maintained.

Management is responsible for carrying out testing activities that meet the requirements of the TNI Standard, the ISO/IEC 17025 Standard, and that meet the needs of the client.

Managers implement, maintain, and improve the management system, and identify noncompliance with the management system of procedures. Managers initiate actions to prevent or minimize noncompliance.

Management ensures technical competence of personnel operating equipment, performing tests, evaluating results, or signing reports, and limits authority to perform laboratory functions to those appropriately trained and/or supervised.

Management is responsible for defining the minimal level of education, qualifications, experience, and skills necessary for all positions in the laboratory and assuring that technical staff have demonstrated capabilities in their tasks.

Training is kept up to date as described in Section 20 – "Personnel" by periodic review of training records and through employee performance review.

Management bears specific responsibility for maintenance of the management system. This includes defining roles and responsibilities to personnel, approving documents, providing required training, providing a procedure for confidential reporting of data integrity issues, and periodically reviewing data, procedures, and documentation. The assignment of responsibilities, authorities, and interrelationships of the personnel who manage, perform, or verify work affecting the quality of environmental tests is documented in Section 17 of the Quality Manual.
Management ensures that audit findings and corrective actions are completed within required time frames.

Designated deputies are appointed by management during the absence of the Laboratory Manager, Technical Manager or the Quality Manager, and always if the absence is more than 15 days.

5.2 Management Roles and Responsibilities

5.2.1 President

The President has ultimate responsibility for the performance of the laboratory and the quality of the data generated in the laboratory.

5.2.2 Laboratory Director

The Laboratory Director is responsible for the overall quality, technical, human resource and service performance of the laboratory. The Laboratory Director provides the resources necessary to implement and maintain an effective quality and data integrity program.

5.2.2.1 Responsibilities

a) Responsible for day to day operations of the laboratory.

b) Director plans and manage laboratory resources to ensure that equipment and environmental conditions are appropriate for testing. The Director must ensure that the test methodologies used in the lab provide the quality and accuracy of results required for TNI/ISO 17025 and EPA guidelines. The Director can also put in place verification procedures to evaluate the accuracy and precision of test methods. Where necessary, they select, evaluate and validate new tests to improve the quality or accuracy of results. Directors must ensure that the laboratory provides a safe environment for testing by protecting staff against hazards.

c) Ensuring that appropriate corrective actions are taken to address analyses identified as requiring such actions by internal and external performance or procedural audits. Procedures that do not meet the standards set forth in the Quality Manual, laboratory SOPs or laboratory policies may be temporarily suspended by the Laboratory Director.

d) Reviews and approves all SOPs and policies prior to their implementation and ensures all approved SOPs and policies are provided to laboratory personnel and are adhered to.

e) The lab must have a sufficient number of employees qualified to carry out tests. Lab directors are responsible for recruiting ensuring staff is adequately trained, and monitoring their performance. The Director checks that employees have the appropriate qualifications and experience to carry out tests, and they provide job specifications that set out the employee’s job responsibilities. Where

necessary, they develop training programs to improve performance or prepare for new tests.

5.2.3 Quality Assurance Manager

The Quality Assurance Manager (or designee) is responsible for the oversight and review of quality control data, but is independent from laboratory operations. The Quality Assurance Manager's training and proof of experience in QA/QC procedures, knowledge of analytical methods, and the laboratory's management system are available upon request.

5.2.3.1 Responsibilities

The Quality Manager is responsible for:

a. serving as a focal point for QA/QC;
b. arranging or conducting annual internal audits without outside (e.g., managerial) influence;
c. notifying management of deficiencies, and monitoring corrective actions;
d. oversight and review of quality control data;
e. arranging or conducting internal audits annually;
f. monitoring corrective actions;
g. ensuring that the management system related to quality is implemented and followed at all times;
h. monitoring and maintaining laboratory certifications; and
i. Keeping this *Quality Manual* current.
j. Ensuring SOPs have been update/reviewed.
k. Ensure the ancillary equipment is verified/calibrated per regulatory requirements.
l. Ordering, logging in and reporting PT samples.
m. Responding to missed PTs with regulatory agency.
n. Providing clients with MDLs and SOP/QAM information
o. Ensure that all analysts maintain IDCs and CDOCs.
p. Ensuring the lab performs MDL studies
q. Maintain test codes in the LIMS system.

5.2.4 Technical Director

The Technical Director (or designee) is a laboratory staff member and supervises laboratory operations and data reporting. The Technical Director's proof of experience in the fields of accreditation may be found in their training folder.

If the Technical Director is absent for fifteen (15) calendar days or more, a deputy (see Table 5-1 below) with appropriate qualifications will perform the Technical Director's duties. Beyond a thirty-five (35) calendar day absence, management will notify the primary accreditation body in writing of the absence of the Technical Manager and the appointment of the deputy.

The Technical Manager is not the technical manager of more than one accredited environmental laboratory.

5.2.4.1 Responsibilities

The Technical Manager is responsible for:

a. meeting the general and education requirements and qualifications found in Sections 4.1.7.2 and 5.2.6.1 of the TNI Standard - EL-V1M2-2009;
b. monitoring performance data and the validity of the analyses for the laboratory;
c. Approving personnel have appropriate education and technical background to perform the tests for which the laboratory is accredited.
d. Reviewing SOPs for Technical Accuracy and adherence to the Method

5.2.5 Department Supervisors

The Department Supervisors is a full time staff member and supervises their respective department's day to day activities and performs data review.

5.2.5.1 Responsibilities

The Department supervisor is responsible for:

a) Keeps equipment operating by following operating instructions; troubleshooting breakdowns; maintaining supplies; performing preventive maintenance; calling for repairs.

b) Ensure that analysts maintain daily logs and equipment records

c) Processing data accurately and entering/reviewing data in the LIMS system

d) Resolves problems by examining and evaluating data; selecting corrective steps. Helping QA and Lab Director implement corrective action

e) Help facilitate effective communication in the lab.

f) Coordinate staff to ensure all areas of the department are properly staffed.

g) Maintain chemical/consumable inventory; ensure that proper levels are maintained.

h) Address any employee issues or concerns; provide annual performance reviews.

i) Ensuring those analysts are trained appropriately and qualified to perform analysis.

j) Ensuring that all SOPs are being followed, and reviewing SOP revisions prior to release to for feasibility.

5.2.6 Business Development Manager

The Business Development Manager is a full time staff member and supervises their respective department's day to day activities and performs data review.

5.2.6.1 Responsibilities

The Business Development Manager is responsible for:

a) Developing and maintaining business
b) creating proposals
c) generating management reports
d) Working closely with Project Managers and assisting with new Project Managers in their training
e) Helping to resolve client complaints
f) Facilitate the transition for the client to the project manager.

5.2.6 Laboratory Key Personnel Deputies

The following table defines who assumes the responsibilities of key personnel in their absence:

Table 5-1 Key Personnel Deputies

Key Personnel	Deputy	Comment
Laboratory Director	QA Manager	
QA Manager	Laboratory Director	
Technical Manager	Laboratory Director	

5.3 Quality Policy

A Quality Policy statement, including objectives and commitments by top management is required in the Quality Manual. The quality policy is signed and dated, and is issued under the authority of the highest level of laboratory management, which demonstrates management's commitment to integrity, ethics, the quality system and associated standards.

Quality Policy Statement

The objective of the quality system and the commitment of management is to consistently provide our customers with data of known and documented quality that meets their requirements. Our policy is to use good professional practices, to maintain quality, to uphold the highest quality of service, and to comply with the NELAC Standard and the most current regulations. The laboratory ensures that personnel are free from any commercial, financial, and other undue pressures, which might adversely affect the quality of work. This policy is implemented and enforced through the unequivocal commitment of management, at all levels, to the Quality Assurance (QA) principles and practices outlined in this manual. However, the primary responsibility for quality rests with each individual within the laboratory organization. Every laboratory employee must ensure that the generation and reporting of quality analytical data is a fundamental priority. Every laboratory employee is required to familiarize themselves with the quality documentation and to implement the policies and procedures in their work. All employees are trained annually on ethical principles and procedures surrounding the data that is generated. The laboratory maintains a strict policy of client confidentiality.

Approval of Implementation

_____ _____

Sam Elam, President Date

5.4 Ethics and Data Integrity System

The laboratory has an Ethics and Data Integrity policy that is included in Appendix 11. The laboratory's Ethics and Data Integrity program, training and investigations are discussed in Section 19 – "Data Integrity Investigations".

5.5 Documentation of Management/Quality System

The management system is defined through the policies and procedures provided in this *Quality Manual* and written laboratory Standard Operating Procedures (SOPs) and policies.

5.5.1 Quality Manual

The *Quality Manual* contains the following required items:

5.5.1.1 document title;

5.5.1.2 laboratory's full name and address;

5.5.1.3 name, address (if different from above), and telephone number of individual(s) responsible for the laboratory;

5.5.1.4 identification of all major organizational units which are to be covered by this quality manual and the effective date of the version;

5.5.1.5 identification of the laboratory's approved signatories;

5.5.1.6 the signed and dated concurrence (with appropriate names and titles), of all responsible parties including the quality manager(s), technical manager(s), and the agent who is in charge of all laboratory activities, such as the laboratory director or laboratory manager;

5.5.1.7 The objectives of the management system and contain or reference the laboratory's policies and procedures;

5.5.1.8 The laboratory's official quality policy statement, which shall include management system objectives and management's commitment to ethical laboratory practices and to upholding the requirements of this Standard; and

5.5.1.9 A table of contents, and applicable lists of references, glossaries and appendices.

This *Quality Manual* contains or references all required elements as defined by the TNI Standard - V1:M2, Section 4.2.8.4.

5.5.2 Standard Operating Procedures (SOPs)

Standard operating procedures (SOPs) represent all phases of current laboratory operations (they include an effective date, revision number, and signature of appropriate lab personnel and are available to all personnel. They contain sufficient detail such that someone with similar qualifications could perform the procedures. There are two types of SOPs used in the laboratory: 1) test method SOPs, which have specific requirements as outlined below, and 2) general use SOPs which document general procedures.

Each accredited analyte or method has an SOP. Sometimes an SOP is a copy of a method, and any additions are clearly described. The laboratory's test method SOPs include the following topics, where applicable:

a) identification of the test method;
b) applicable matrix or matrices;
c) detection limit;
d) scope and application, including components to be analyzed;
e) summary of the test method;
f) definitions;
g) interferences;
h) safety;
i) equipment and supplies;
j) reagents and standards;
k) sample collection, preservation, shipment and storage;
l) quality control, including acceptance criteria;
m) calibration and standardization;
n) procedure;
o) data analysis and calculations;
p) method performance;
q) pollution prevention;
r) data assessment and acceptance criteria for quality control measures;
s) corrective actions for out-of-control ;

t) contingencies for handling out-of-control or unacceptable data;
u) waste management;
v) references; and,
w) any tables, diagrams, flowcharts and validation data.

5.5.3 Order of Precedence

In the event of a conflict or discrepancy between policies, the order of precedence is as follows unless otherwise noted:

- Quality Manual
- SOPs and Policies

Section 6

DOCUMENT CONTROL
(TNI V1:M2 – Section 4.3)

This Section describes how the laboratory establishes and maintains a process for document management. Procedures for document management include controlling, distributing, reviewing, and accepting modifications. The purpose of document management is to preclude the use of invalid and/or obsolete documents.

Documents can be SOPs, policy statements, specifications, calibration tables, charts, textbooks, posters, notices, memoranda, software, drawings, plans, etc. These may be on various media, whether hard copy or electronic, and they may be digital, analog, photographic or written.

The laboratory manages three types of documents: 1) controlled, 2) approved, and 3) obsolete.

A controlled document is one that is uniquely identified, issued, tracked, and kept current as part of the management system. Controlled documents may be internal documents or external documents.

An approved document means it has been reviewed, and either signed and dated, or acknowledged in writing or by secure electronic means by the issuing authority(ies).

Obsolete documents are documents that have been superseded by more recent versions or are no longer needed.

6.1 Controlled Documents

Documents will be reviewed and approved for use by Quality Assurance Manager prior to issue.

Documents are reviewed every two years to ensure their contents are suitable and in compliance with the current management systems requirements, and accurately describe current operations. Reviews and revisions could take place earlier of the there is a change in regulatory requirements.

Approved copies of documents are available to staff at all locations where operations are essential to the effective functions of the laboratory.

All SOPs will be distributed electronically. Analysts are able to view SOPs and other controlled document on the Belmont Labs Intranet, accessed via the Google Mail account. These documents are in PDF format and all computers have access to the Intranet.

Analyst may not print or make copies of the SOPs without the Quality Assurance Manager's consent. All SOPs shall contain the following control of documents statement:

> This document shall only be considered a controlled document if being viewed via the Element LIMS or the Belmont Labs Intranet. All other copies, digital or print shall be

considered uncontrolled. It is the intention of QA that only controlled documents are referenced for the performance of Lab Procedures and Analyses. It is the responsibility of the analyst to verify the materials of any uncontrolled document with the controlled copy if an uncontrolled document is referenced.

Controlled internal documents are uniquely identified with 1) a unique name or number identification 2)date of issue, 3) revision identification, 4) page number, 5) the total number of pages (or a mark to indicate the end of the document), and 6) the signatures of the issuing authority.

A master list of controlled internal documents is maintained that includes distribution, location, and revision dates. A master list of controlled external documents is also maintained that includes title, author, copyright date, and date of publication, and location. The controlled document list is maintained by the Quality Assurance Manager. The controlled document list is updated every two years.

6.1.1 Document Changes to Controlled Documents

6.1.1.1 Paper Document Changes

Document changes are approved by the Quality Assurance Manager or the Laboratory Director. If a controlled document needs to be changed a written request is submitted to the Quality Assurance manager.

All document modifications are approved. Changes that are not process modifications but clarifications may be performed without revision. Approval is required. The modified document is then copied, distributed, and obsolete documents are removed according to the master list of controlled documents.

Amendments/modifications to documents are incorporated into a new revision and reissued when the document is reviewed and updated on or before its scheduled review cycle.

A reason for the modification or change is provided as historical information in the revised document. This information will be located in method performance section of the SOP.

6.1.1.2 Electronic Document Changes

Suggested revisions to electronic documents are presented to the Quality Assurance officerfor review and approval. Changes to electronic documents are submitted to the Quality Assurance Manager in writing.

Where practical, the altered text or new text in the draft is identified during the revision or review process to provide for easy identification of the modifications.

6.2 Obsolete Documents

All invalid or obsolete documents are removed from general distribution, or otherwise prevented from unintended use.

Obsolete documents retained for legal use or historical knowledge preservation are appropriately marked and retained. Obsolete documents are identified as being obsolete by management. All copies of the obsolete document are collected from employees according to the master distribution list, and each obsolete document is clearly marked Superseded on the front cover or destroyed. At least one copy of any obsolete document is kept on the internal network for a period of 10 years.

Section 7

REVIEW OF REQUESTS, TENDERS AND CONTRACTS
(TNI V1:M2 – Section 4.4)

The review of all new work assures that oversight is provided so that requirements are clearly defined, the laboratory has adequate resources and capability, and the test method is applicable to the customer's needs. This process assures that all work will be given adequate attention without shortcuts that may compromise data quality.

Contracts for new work may be formal bids, signed documents, verbal, or electronic. The client's requirements, including the methods to be used, must be clearly defined, documented and understood. Requirements might include target analyte lists, project specific reporting limits (if any), project specific quality control requirements (if any), turnaround time, and requirements for data deliverables. The review must also cover any work that will be subcontracted by the laboratory.

7.1 Procedure for the Review of Work Requests

The Laboratory Director, Quality Assurance Manager, Department Supervisors and Business Development Manager determines if the laboratory has the necessary accreditations, resources, including schedule, equipment, deliverables, and personnel to meet the work request. These reviews are done via e-mail.

The Business Development Manager or a Project Manager informs the client of the results of the review if it indicates any potential conflict, deficiency, lack of accreditation, or inability of the lab to the complete the work satisfactorily.

The client is informed of any deviation from the contract including the test method or sample handling processes. All differences between the request and the final contract are resolved and recordedbefore any work begins. It is necessary that the contract be acceptable to both the laboratory and the client. This information is recorded through several different tools, email, LIMS and the software program ACT.

The review process is repeated when there are amendments to the original contract by the client. The participating personnel are given copiesof the amendments. The amendments are maintained electronically on the internal network.

Note: For repetitive routine tasks, the review may be made only at the initial inquiry stage or on granting of a contract for on-going routine work performed under a general agreement with the client, provided the client's requirements don't change. The complete procedure is outline in the SOP BPL01-RTCS

7.2 Documentation of Review

Records are maintained for every contract or work request, when appropriate. This includes pertinent discussions with a client relating to the client's requirements or the results of the work during the period of execution of the contract. This information is recorded in the LIMS, e-mail, and the software program ACT. Records of all project-related communication with the client (including e-mails, fax,

telephone conversation etc) are kept in LIMS, internal network and the software program ACT.

Section 8

SUBCONTRACTING OF ENVIRONMENTAL TESTS
(TNI V1:M2 – Section 4.5)

A subcontract laboratory is defined as a laboratory external to this laboratory, or at a different location than the address indicated on the front cover of this manual, that performs analyses for this laboratory.

When subcontracting analytical services, the laboratory assures work requiring accreditation is placed with an appropriately accredited laboratory or one that meets applicable statutory and regulatory requirements for performing the tests.

8.1 Procedure

The LIMS maintains a list of subcontractors.

A copy of the certificate and analyte list from subcontractors is maintained as evidence of compliance. This information is maintained by Quality Assurance Manager and is kept electronically in the LIMS.

The certificate and analyte list are reviewed by Quality Assurance Manager to ensure the subcontracting laboratory has the appropriate accreditation to do the work.

Project Managers notify the client of the intent to subcontract the work in writing. When possible, the laboratory gains the approval of the client to subcontract their work prior to implementation, preferably in writing.

The laboratory performing the subcontracted work is identified in the final report. The laboratory assumes responsibility to the client for the subcontractor's work, except in the case where a client or a regulating authority specified which subcontractor is to be used. The procedure for approval of the subcontract laboratories is kept in the SOP: BPL01 – RTCS.

Section 9

PURCHASING SERVICES AND SUPPLIES
(TNI V1:M2 – Section 4.6)

The laboratory ensures that purchased supplies and services that affect the quality of environmental tests are of the required or specified quality, by using approved suppliers and products.

The laboratory has procedures for purchasing, receiving, and storage of supplies that affect the quality of environmental tests.

9.1 Procedure

Laboratory manager reviews and approves the supplier of services and supplies and approves technical content of purchasing documents prior to ordering.

Evaluation of suppliers is accomplished by ensuring the supplier ships the product or material ordered and that the material is of the appropriate quality by signing packing slips or other supply receipt documents. The purchasing documents contain the data that adequately describes the services and supplies ordered. The description may include type, class, grade, identification, specifications or other technical information.

The supplies received are inspected for breakage, leaks or any other damage. The supplies and chemicals are checked for Date of manufacture, expiration date, concentration, grade, storage conditions, etc. The supplies received are stored according to manufacturer's recommendations, laboratory SOPs or test method specifications.

Any documents received with the supplies and services including specifications, certificates of analyses, warranties, maintenance records, calibration records etc are kept on the internal network by the receiving personnel.

The purchased supplies and reagents that affect the quality of the tests are not used until they are inspected or otherwise verified as complying with requirements defined in the test method. See SOP BPL01-Purchasing for additional information regarding the procedure.

9.2 Approval of Suppliers

The Chief Financial Officer maintains a list of approved suppliers. Evaluation and selection of suppliers and vendors is performed, in part, on the basis of the quality of their products, their ability to meet the demand for their products, the overall quality of their services, their past history and competitive pricing. This is achieved through evaluation of objective evidence of quality furnished by the supplier, which can include certificates of analysis, recommendations, and proof of historical compliance with similar programs for other clients. To ensure that quality critical consumables and equipment conform to specified requirements, all purchases from specific

vendors are approved by a member of the management staff. Evaluation of suppliers is accomplished by ensuring the supplier ships the product or material ordered and that the material is of the appropriate quality. This is documented by signing off on the packing slips or other supply receipt documents. The purchasing documents contain the data that adequately describes the services and supplies ordered.

Section 10
SERVICE TO THE CLIENT
(TNI V1:M2 – Section 4.7)

The laboratory collaborates with clients and/or their representatives in clarifying their requests and in monitoring laboratory performance related to their work. Each request is reviewed to determine the nature of the request and the laboratory's ability to comply with the request within the confines of prevailing statutes and/or regulations without risk to the confidentiality of other clients.

10.1 Client Confidentiality

The laboratory confidentiality policy is to not divulge or release any information to a third party without proper authorization. Third party requests for data and information are referred to the client. Data and records identified as proprietary, privileged, or confidential are exempt from disclosure.

All electronic data (storage or transmissions) are kept confidential, based on technology and laboratory limitations, as required by client or regulation.

During the initial training procedure, all employees are required to sign a confidentiality agreement.

Within the laboratory, any documentation that contains the client's name and work order number is shredded after use to break the chain between the client and their analytical results.

Any information that is e-mailed or faxed to clients contains a confidentially statement similar to the following: "CONFIDENTIALITY NOTICE: This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender by reply e-mail and destroy all copies of the original message."

10.2 Client Support

Communication with the client, or their representative, is maintained to provide proper instruction and modification for testing. Technical staff is available to discuss any technical questions or concerns the client may have.

The client, or their representative, may be provided reasonable access to laboratory areas for witnessing testing.

Delays or major deviations to the testing are communicated to the client immediately. Project Managers are relied upon to communicate all information regarding analysis, turnaround time or any project specific problem.

The laboratory will provide the client with all requested information pertaining to the analysis of their samples. An additional charge may apply for additional data/information that was not requested prior to the time of sample analysis or previously agreed upon.

10.3 Client Feedback

The laboratory seeks both negative and positive feedback following the completion of projects and periodically for ongoing projects. Feedback provides acknowledgement, corrective actions where necessary, and opportunities for continuous improvement.

Negative customer feedback is documented as a customer complaint (see Section 11 – "Complaints").

Client feedback is documented in the LIMS system and the software program ACT.

Section 11

COMPLAINTS
(TNI V1:M2 – Section 4.8)

The purpose of this Section is to assure that customer complaints are addressed and corrected. This includes requests to verify results or analytical data. Complaints provide the laboratory an opportunity to improve laboratory operation and client satisfaction.

Complaints by customers or other parties are reviewed by management and an appropriate action is determined. All customer complaints are documented by the person receiving the complaint and addressed to the responsible manager.

If it is determined that the complaint has merit, the procedures outlined in Section 14 – Corrective Action are utilized. If it is determined that a complaint is without merit, it is documented, and the client is contacted by the Project Manager

A complaint such as a concern that data is repeatedly late should be reviewed for preventive action (see Section 15 – "Preventive Action") to minimize a future occurrence.

Section 12

CONTROL OF NON-CONFORMING ENVIRONMENTAL TESTING WORK
(TNI V1:M2 – Section 4.9)

Non-conforming work is work that does not meet acceptance criteria or requirements. Nonconformances can include departures from standard operating procedures or test methods or unacceptable quality control results. Identification of non-conforming work can come through customer complaints, quality control, instrument calibration, evaluating consumable materials, staff observation, final report review, management reviews and internal and external audits.

12.1 Exceptionally Permitting Departures from Documented Policies and Procedures

Requests for departures from laboratory procedures are approved by the Quality Assurance Manager or the Laboratory Director and documented. All departures from the SOP are recorded as case narrative on the analytical report and nonconformance material report is initiated by the analyst. Planned departures from procedures or policies do not require audits or investigations. If a client requests a departure from laboratory procedures, the laboratory does not have to consider that departure as a nonconformance that requires corrective action. However, that nonconformance must be documented as a nonconformance that was approved by management.

12.2 Non-Conforming Work

The lab policy for control of non-conforming work is to identify the non-conformance, determine if it will be permitted, and take appropriate action. All employees have the authority to stop work on samples when any aspect of the process does not conform to laboratory requirements.

The responsibilities and authorities for the management of non-conforming work are detailed in SOP BPL01-NCMR. The procedure for investigating and taking appropriate corrective actions of non-conforming work are described in Section 14 – "Corrective Actions". Section 14.3 describes procedures for Technical Corrective Actions. Formal corrective action procedures must be followed for non-conforming work that could reoccur (beyond expected random QC failures) or where there is doubt about the laboratory's compliance to its own policies and procedures.

The investigation and associated corrective actions of non-conforming work involving alleged violations of the company's Ethics and Data Integrity policies must follow the procedures outlined in Section 19 – "Data Integrity Investigations".

The laboratory evaluates the significance of the non-conforming work, and takes corrective action immediately. The customer is notified if their data has been impacted. The laboratory allows the release of non-conforming data only with approval by Quality Assurance Manager or Laboratory Director or Technical Director. on a case-by-case basis. Non-conforming data is clearly identified in the final report (see Section 28 – "Reporting the Results").

The discovery of a nonconformance for results that have already been reported to the customer must be immediately evaluated for significance of the nonconformance, its acceptability to the customer, and determination of the appropriate corrective action. Corrective action for routine, non-recurring exceedances can be documented on raw data worksheets, logbooks, e-mail, a database or other documents. More serious corrective actions will require a more formal corrective action process that usually includes the use of a corrective action report.

12.3 Stop Work Procedures

Resumption of work after work has been stopped is authorized by Quality Assurance manager or the Laboratory Director. Personnel notify the appropriate Department Supervisor of any non-routine nonconformance. The Department Supervisor reviews the significance of the nonconformance and develops a course of action. If dataare questionable, the Quality Manager may be involved in the review and clients are notified. When an investigation of nonconformance indicates that the cause of the nonconformance requires that a method be restricted or not used until modifications are implemented, the Laboratory Director and Department Supervisor will immediately notify all personnel of the suspension/restriction. The lab will hold all relevant reports to clients pending review. The Quality Manager must be involved in the resolution of the issue and must verify that the issue is resolved before work may resume. Personnel are notified by the Technical Manager when resumption of work is authorized. The Technical Manager and Quality Manager will document the issue, root cause and resolution using the corrective action procedures described in Section 14 – "Corrective Action".

The reporting of non-conforming work involving alleged violations of the company's Ethics and Data Integrity policies must be reported to the Quality Manager. Procedures described in Section 19 – "Data Integrity Investigations" are followed

Section 13

IMPROVEMENT
(TNI V1:M2 – Section 4.10)

Improvement in the overall effectiveness of the laboratory management system is a result of the implementation of the various aspects of the laboratory's management system: quality policy and objectives Section 5 – "Management"; internal auditing practices (Section 17 – "Internal Audits"); the review and analysis of data (Section 27 – "Quality Assurance for Environmental Testing"); the corrective action (Section 14 – "Corrective Action") and preventive action (Section 15 – "Preventive Action") process; and the annual management review of the quality management system (Section 18 – "Management Reviews") where the various aspects of the management/quality system are summarized, and evaluated and plans for improvement are developed.

Various areas in the management system are monitored, such as On Time Delivery, PT performance, re-issuing reports, numbers and types of corrective actions, Audit performance, complaints, control charting, customer feedback, etc. Include a description of any monitoring activity and how the information is used.

Section 14

CORRECTIVE ACTION
(TNI V1:M2 – Section 4.11)

Corrective action is the action taken to eliminate the causes of an existing non-conformity, defect, or other undesirable situation in order to prevent recurrence.

Deficiencies cited in external assessments, internal quality audits, data reviews, customer feedback/complaints, control of nonconforming work or managerial reviews are documented and require corrective action. Corrective actions taken are appropriate for the magnitude of the problem and the degree of risk.

14.1 General Procedure

The laboratory uses a database to document and track corrective actions. SOP BPL01-NCMR provide a detailed procedure of the corrective action system.

All personnel is responsible for initiating corrective action on routine data reviews where a nonconformance is found that could reoccur (beyond expected random QC failures) or where there is doubt about the compliance of the laboratory to its own policies and procedures. The Lab Manager is responsible for monitoring and recording the corrective action

All deficiencies are investigated and a corrective action plan is developed and implemented if determined necessary. The implementation is monitored for effectiveness.

14.1.1 Cause Analysis

When failures due to systematic errors have been identified, the first step of the corrective action process starts with the initial investigation and determination of root cause(s) of the problem. Records are maintained in a database of nonconformances requiring corrective action to show that the root cause(s) was investigated, and includes the results of the investigation.

Where there may be non-systematic errors and as such the initial cause is readily identifiable or expected random failures (e.g. failed quality control), a formal root cause analysis is not performed and the process begins with selection and implementation of corrective action (also see Section 14.3 “Technical Corrective Actions”).

14.1.2 Selection and Implementation of Corrective Actions

Where uncertainty arises regarding the best approach for analysis of the cause of exceedances that require corrective action, appropriate personnel will recommend corrective actions that are appropriate to the magnitude and risk of the problem and that will most likely eliminate the problem and prevent recurrence

The Laboratory Manager ensures that corrective actions are discharged within the agreed upon time frame.

14.1.3 Monitoring of Corrective Action

The Department Supervisor and QA Manager will monitor implementation and documentation of the corrective action to assure that the corrective actions were effective. The internal auditing process is used for follow-up monitoring of corrective actions and their effectiveness.

14.2 Additional Audits

Where the identification of nonconformances or departures from normal lab procedures cast doubt on the laboratory's compliance with its own policies and procedures, or on its compliance with the TNI Standard, the laboratory ensures that the appropriate areas of activity are audited in accordance with Section 17 – "Internal Audits" as soon as possible.

In many cases, the additional audits are follow-ups after the corrective action has been implemented to ensure it is effective. These are done when a serious issue or risk to the laboratory have been identified.

14.3 Technical Corrective Action

Sample data associated with a failed quality control are evaluated for the need to be reanalyzed or qualified. Unacceptable quality control results are documented, and if the evaluation requires cause analysis, the cause and solution are recorded (also see Section 12 – "Control of Nonconforming Environmental Testing Work"*).* Analysts routinely implement corrective actions for data with unacceptable QC measures. First level correction may include re-analysis without further assessment. If the test method SOP addresses the specific actions to take, they are followed. Otherwise, corrective actions start with assessment of the cause of the problem.

Corrective action for non-systematic errors or expected random failures is documented in a database. See BPL01-NCMR for further detail. Corrective actions for nonconformances that may reoccur (beyond expected random QC failures) or where there is concern that the laboratory is not in compliance with its own policies and procedures require that a nonconformance report be completed.

Lab Manager and Department Supervisors review non-conformance report and suggest improvements, alternative approaches, and procedures where needed.

If the data reported are affected adversely by the nonconformance, the affected data is clearly identified in the report and the customer is notified by Project Management.

Section 15

PREVENTIVE ACTION
(TNI V1:M2 – Section 4.12)

Preventive action is a pro-active process to identify opportunities for improvement rather than a reaction to the identification of problems or complaints.

Preventive action includes, but is not limited to: review of QC data to identify quality trends, regularly scheduled staff quality meetings to ensure staff is knowledgeable in quality procedures, review of client feedback to look for improvement opportunities, review of proficiency testing data to look for analytes that were nearly missed, annual managerial reviews, scheduled instrument maintenance, and other actions taken to prevent problems.

When improvement opportunities are identified or if preventive action is required, action plans are developed, implemented and monitored to reduce the likelihood of the occurrence of nonconformities.

Procedures for preventive actions include the initiation of such actions and subsequent monitoring to ensure that they are effective.

All personnel have the authority to offer suggestions for improvements and to recommend preventive actions, however management is responsible for implementing preventive action.

Section 16

CONTROL OF RECORDS
(TNI V1:M2 – Section 4.13)

Records are a subset of documents, usually data recordings that include annotations, such as daily refrigerator temperatures posted to a laboratory form, lists, spreadsheets, or analyst notes on a chromatogram. Records may be on any form of media, including electronic and hard copy. Records allow for the historical reconstruction of laboratory activities related to sample-handling and analysis.

The laboratory maintains a record system appropriate to its needs, records all laboratory activities, and complies with applicable standards or regulations as required. Records of original observations and derived data are retained to establish an audit trail. Records help establish factors affecting the uncertainty of the test and enable test repeatability under conditions as close as possible to the original.

16.1 Records Maintained

Records of all procedures to which a sample is subjected while in the possession of the laboratory are kept. The laboratory retains all original observations, calculations and derived data (with sufficient information to produce an audit trail), calibration records, personnel records and a copy of the test report for a minimum of five years from generation of the last entry in the records. At a minimum, the following records are maintained by the laboratory to provide the information needed for historical reconstruction:

i) all raw data, whether hard copy or electronic, for calibrations, samples and quality control measures, including analysts' worksheets and data output records (chromatograms, strip charts, and other instrument response readout records);

ii) a written description or reference to the specific method(s) used, which includes a description of the specific computational steps used to translate parametric observations into a reportable analytical value (a copy of all pertinent Standard Operating Procedures);

iii) laboratory sample ID code;

iv) date of analysis;

v) time of analysis is required if the holding time is seventy-two (72) hours or less, or when time critical steps are included in the analysis (e.g., extractions and incubations);

vi) instrumentation identification and instrument operating conditions/parameters (or reference to such data);

vii) all manual calculations (including manual integrations);

viii) analyst's or operator's initials/signature or electronic identification;

ix) sample preparation, including cleanup, separation protocols, incubation periods or subculture, ID codes, volumes, weights, instrument printouts, meter readings, calculations, reagents;

x) test results (including a copy of the final report);

xi) standard and reagent origin, receipt, preparation, and use;

xii) calibration criteria, frequency and acceptance criteria;

xiii) data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions;

xiv) quality control protocols and assessment;

xv) electronic data security, software documentation and verification, software and hardware audits, backups, and records of any changes to automated data entries;

xvi) method performance criteria including expected quality control requirements;

xvii) proficiency test results;

xviii) records of demonstration of capability for each analyst;

xix) a record of names, initials, and signatures for all individuals who are responsible for signing or initialing any laboratory record;

xx) correspondence relating to laboratory activities for a specific project;

xxi) corrective action reports;

xxii) preventive action records;

xxiii) copies of internal and external audits including audit responses;

xxiv) copies of all current and historical laboratory SOPs, policies and *Quality Manuals*;

xxv) sample receiving records (including information on any interlaboratory transfers);

xxvi) sample storage records;

xxvii) data review and verification records;

xxviii) personnel qualification, experience and training records;

xxviv) archive records; and

xxviv) management reviews.

16.2 Records Management and Storage

The laboratory maintains a record management system for control of laboratory notebooks, instrument logbooks, standards logbooks, and records for data reduction, validation, storage, and reporting. Data is recorded immediately and legibly in permanent ink (data generated by automated data collections systems is recorded electronically.) Corrections are initialed and dated with the reason noted for corrections other than transcription errors. A single line strikeout is used to make corrections so that the original record is not obliterated. The original record is not obliterated.

Records, including electronic records, are easy to retrieve, legible, and protected from deterioration or damage; held secure and in confidence; and are available to accrediting bodies for a minimum of ten years or as required by regulation or contract. Records that are stored only on electronic media are supported by the hardware and software necessary for their retrieval. Access to protected records is limited to the President, Laboratory Manager or the Quality Assurance Manager to prevent unauthorized access or amendment.

Additional information regarding control of data is included in Section 22.5 – "Control of Data".

Procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of quality and technical records are found in SOP BPLO1 Data Archive and Disposal. Quality records shall include reports from internal audits and management reviews as well as records of corrective and preventive actions.

16.2.1 Google Documents

Some of the labs documents that require the ability to be edited and shared by multiple employees are maintained as Google Documents. Google maintains an audit trail of all accounts that have edited or the document, along with the date and time of the change. The audit trails are reviewed quarterly to ensure that the data is being entered and maintained appropriately. The documents are backed up to the cloud to prevent loss. Additionally, the document is archived at least every quarter, by copying the data into an Excel Spreadsheet and saved onto the secure Quality Assurance drive on the network, and labeled with the logbook name, and date range of the data. Once the data has been successfully stored, the information may be removed from the Google Document, to prevent the file from becoming excessively large. The Quality Assurance drive is backed up daily, and stored for a minimum of 10 years.

Archived information and access logs are protected against fire, theft, loss, environmental deterioration, vermin, and in the case of electronic records, electronic or magnetic sources. Archived records have limited access and are checked out through an access log. Records are kept on-site.

In the event that the laboratory transfers ownership or goes out of business, records are maintained or transferred according to client instructions. Appropriate regulatory and state legal requirements concerning laboratory records shall be followed.

16.3 Legal Chain of Custody Records

Evidentiary sample data are used as legal evidence.

When a client requests a legal chain of custody, all the proper steps must be followed. The samples must be received in a cooler that has an unbroken security seal. Once the samples have been logged-in, an internal chain of custody will be included with the samples. Every time the samples move from the cooler to the lab for analysis, the internal chain of custody is signed by the analyst. The chain is also signed when the samples are returned to the cooler. Once all of the analyses have been completed, the archive location is placed on the internal chain of custody. After 30 days from date the samples were received, 45 days for metal analysis, the samples will be disposed. The analyst doing the disposal will sign the internal chain of custody stating the samples were disposed. The internal chain of custody will then be put with the original chain of custody and the final report.

The samples will be kept in a secure, locked location with limited access from the time the samples are received until the time of disposal.

Section 17

AUDITS
(TNI V1:M2 – Section 4.14)

Audits measure laboratory performance and verify compliance with accreditation/ certification and project requirements. Audits specifically provide management with an on-going assessment of the management system. They are also instrumental in identifying areas where improvement in the management/quality system will increase the reliability of data. Audits are of four main types: internal, external, performance, and system. Section 17.5 discusses the handling of audit findings.

17.1 Internal Audits

Annually, the laboratory prepares a schedule of internal audits to be performed during the year. These audits verify compliance with the requirements of the management/quality system, including analytical methods, SOPs, the *Quality Manual*, ethics policies, data integrity, other laboratory policies, and the TNI Standard.

It is the responsibility of the Quality Manager to plan and organize audits as required by the schedule and requested by management. These audits are carried out by trained and qualified personnel who are, wherever resources permit, independent of the activity to be audited.

In addition to the scheduled internal audits, it may sometimes be necessary to conduct special audits as a follow-up to corrective actions, PT results, complaints, regulatory audits or alleged data integrity issues. These audits address specific issues.

The area audited, the audit findings, and corrective actions are recorded in a database. Audits are reviewed after completion to assure that corrective actions were implemented and effective.

This review may occur during the next scheduled audit unless findings are observed that cast doubt on the validity of data. Corrective actions that warrant sooner review cannot wait for the next scheduled audit.

17.2 External Audits

It is the laboratory's policy to cooperate and assist with all external audits, whether performed by clients or an accrediting body. Management ensures that all areas of the laboratory are accessible to auditors as applicable and that appropriate personnel are available to assist in conducting the audit.

17.2.1 Confidential Business Information (CBI) Considerations

During on-site audits, on-site auditors may come into possession of information claimed as business confidential. A business confidentiality claim is defined as "a

claim or allegation that business information is entitled to confidential treatment for reasons of business confidentiality or a request for a determination that such information is entitled to such treatment." When information is claimed as business confidential, the laboratory must place on (or attach to) the information at the time it is submitted to the auditor, a cover sheet, stamped or typed legend or other suitable form of notice, employing language such as "trade secret", "proprietary" or "company confidential". Confidential portions of documents otherwise non-confidential must be clearly identified. CBI may be purged of references to client identity by the responsible laboratory official at the time of removal from the laboratory. However, sample identifiers may not be obscured from the information.

17.3 Performance Audits

Performance audits may be Proficiency Test Samples, internal single-blind samples, double-blind samples through a provider or client, or anything that tests the performance of the analyst and method.

Proficiency Test Samples are discussed in Section 27 – "Quality Assurance for Environmental Testing".

17.4 System Audits

The Laboratory's management system is audited though annual management reviews. Refer to Section 18 – "Management Reviews" for further discussion of management reviews.

17.5 Handling Audit Findings

Internal or external audit findings are responded to within the time frame agreed to at the time of the audit. The response may include action plans that could not be completed within the response time frame. A completion date is established by management for each action item and included in the response.

The responsibility for developing and implementing corrective actions to findings is the responsibility of Management. Corrective actions are documented through the corrective action process described in SOP BPL01 NCMR.

Audit findings that cast doubt on the effectiveness of the laboratory operation to produce data of known and documented quality or that question the correctness or validity of sample results must be investigated. Corrective action procedures described in Section 14 – "Corrective Action" must be followed. Clients must be notified in writing if the investigation shows the laboratory results have been negatively affected and the clients requirements have not been met. The client must be notified within thirty days after the laboratory discovers the issue. Laboratory management will ensure that this notification is carried out within the specified time frame.

All investigations that result in findings of inappropriate activity are documented and include any disciplinary actions involved, corrective actions taken, and all

appropriate notifications of clients. See Section 19 (Data Integrity Investigation) for additional procedures for handling inappropriate activity

Section 18

MANAGEMENT REVIEWS
(TNI V1:M2 – Section 4.15)

Top management reviews the management system on an annual basis and maintains records of review findings and actions.

18.1 Management Review Topics

The following are reviewed to ensure their suitability and effectiveness:

- the suitability of policies and procedures;
- reports from managerial and supervisory personnel;
- the outcome of recent internal audits;
- corrective and preventive actions;
- assessments by external bodies;
- the results of interlaboratory comparisons or proficiency tests;
- changes in the volume and type of the work;
- customer feedback;
- complaints;
- recommendations for improvement;
- other relevant factors, such as quality control activities, resources, and staff training.
- Resources
- Staffing resources

18.2 Procedure

Management Reviews are held annually and include the owner, all department heads, the Laboratory Manager, the Quality Assurance Manager, and the sales staff.

An agenda is set prior to the Management Review, and each department forwards a document outlining the above topics and gives an overview of the productivity and quality systems for their department. These documents are reviewed by the Quality Assurance Manager, Laboratory Manager, and Owner prior to the meeting, and are used to structure the meeting. Special attention much be given to any items that are repeat issues from the previous year.

Any deficiencies resulting from the review should be addressed through the corrective action program.

Section 19

DATA INTEGRITY INVESTIGATIONS
(TNI V1:M2 – Section 4.16)

In addition to covering data integrity investigations, this Section covers all topics related to ethics and data integrity policies, procedures and training.

Belmont Labs is committed to ensuring the integrity of its data and providing valid data of known and documented quality to its clients. The elements in Belmont Lab's Ethics and Data Integrity program include:

- Documented data integrity procedures signed and dated by top management.
- An Ethics and Data Integrity Policy signed by all management and staff when hired and reviewed annually (see Appendix 11). This policy is signed, dated and distributed by the top managers
- Annual data integrity training.
- Procedures for confidential reporting of alleged data integrity issues.
- An audit program that monitors data integrity (see Section 17 – "Audits") and procedures for handling data integrity investigations and client notifications.

19.1 Ethics and Data Integrity Procedures

The Ethics and Data Integrity Policy provides an over view of the program. Written procedures that are considered part of the Ethics and Data Integrity program include: Ethics and Data Integrity Policy (see Appendix A),Manual integration procedures (SOP BPL01- Manual_ Integration_Rev 1 update 002),Corrective action procedures (SOP BPL01-NCMR Rev 0)

Management reviews data integrity procedures yearly and updates these procedures as needed.

19.2 Training

Data integrity training is provided as a formal part of new employee orientation and a refresher is given quarterly for all employees. Employees are required to understand that any infractions of the laboratory data integrity procedures shall result in a detailed investigation that could lead to very serious consequences including immediate termination, debarment or civil/criminal prosecution. This is discussed in the Ethics and Data Integrity Policy that every employee is required to sign annually. Attendance for required training is monitored through a signature attendance sheet.

An agenda is provided to each trainee prior to the training class. Data integrity training emphasizes 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 following topics and activities are covered:

Quarter 1:

1. Discuss the ramifications and critical need for honesty, full disclosure, and a high level of ethical integrity at all times.

2. Outline different categories of ethical issues giving specific examples of each including, but not limited to:
    a. Fabricating Data
    b. Misrepresentation of QC samples
    c. Improper Calibration
    d. Modifying Samples to Alter Characteristics
    e. Manipulating Analytical Results
    f. Substituting Samples, Files, or Data
    g. Falsifying Records of Analytical Equipment Readings

3. Discuss decision making when data ethics and integrity may be called into question, specifically addressing resources available for determining the appropriate course of action.

4. Emphasize the critical importance of appropriate documentation any time a deviation from the SOP occurs.

5. Review the proper channels to report data ethics and integrity issues including reporting to the Quality Assurance Manager, Laboratory Director, or anonymous reporting via email.

Quarter 2

1. Review of Quarter 1

2. Outline particular areas of weakness for the lab, including but not limited to: Serial Training, Method Interpretation, and High Turnover.

3. Discuss common root causes of ethical and data integrity issues, giving specific examples of each.

Quarter 3

1. Review of Quarter 1 and 2

2. Technical Ethics Training for Laboratory Personnel, including but not limited to:
    a. Manual Integration
    b. Obliteration of Data
    c. Quality Control Requirements
    d. Calibration Requirements
    e. Computer Systems

3. Technical Ethics Training for Administrative Staff, including but not limited to:
    a. Issuing of Revised Reports
    b. Client Requests

Quarter 4

1. Review of Quarter 1, 2 and 3, re-emphasizing all points and supplying supplemental examples.

When contracted technical or support personnel are used, Quality Assurance Manager is responsible for ensuring that they are trained to the laboratory's management system and data integrity procedures, competent to perform the assigned tasks, and appropriately supervised.

19.3 Confidential Reporting of Ethics and Data Integrity Issues

Confidential reporting of data integrity issues is assured through the following procedures: the mechanism for confidential reporting of ethics and data integrity issues is (1) unrestricted access to senior management, (2) an assurance that personnel will not be treated unfairly for reporting instances of ethics and data integrity breaches, and (3) anonymous reporting.

19.4 Investigations

All investigations resulting from data integrity issues are conducted confidentially. They are documented and notifications are made to clients who received any negatively affected data that did not meet the client's data quality requirements.

Any determination from detailed investigation of data integrity issues must be communicated to senior management. Allegations are investigated and remain confidential to the extent necessary.

Documentation for all investigations that result in findings of inappropriate activity include any disciplinary actions involved, corrective actions taken, and all appropriate notifications of clients.

Data integrity procedures are reviewed annually and are periodically monitored through in-depth data review, records review, or other thorough check processes.

See the Data Integrity and Ethics Policy for more detailed information.

Section 20

PERSONNEL
(TNI V1:M2 – Section 5.2)

Belmont Labs employs competent personnel based on education, training, experience and demonstrated skills as required. The laboratory's organization chart can be found in Appendix B.

20.1 Overview

All personnel are responsible for complying with all quality and data integrity policies and procedures that are relevant to their area of responsibility.

All personnel who are involved in activities related to sample analysis, evaluation of results or who sign test reports, must demonstrate competence in their area of responsibility. Appropriate supervision is given to any personnel in training and the trainer is accountable for the quality of the trainees work. Personnel are qualified to perform the tasks they are responsible for based on education, training, experience and demonstrated skills as required for their area of responsibility.

The laboratory provides goals with respect to education, training and skills of laboratory staff. These goals are outlined in the job descriptions located internal network. Training needs are identified at the time of employment and when personnel are moved to a new position or new responsibilities are added to their job responsibilities. Ongoing training, as needed, is also provided to personnel in their current jobs. The effectiveness of the training must be evaluated before the training is considered complete.

Contracted personnel, when used, must meet the same competency standards and follow the same policies and procedures that laboratory employees must meet.

20.2 Job Descriptions

Job descriptions are available for all positions that manage, perform, or verify work affecting data quality, and are located on the internal network. Overviews of top management's responsibilities are included in Section 5 – "Management".

Job descriptions include the specific tasks, minimum education and qualifications, skills, and experience required for each position

20.3 Training

All personnel are appropriately trained and competent in their assigned tasks before they contribute to functions that can affect data quality. It is management's responsibility to assure personnel are trained. Training records are used to document management's approval of personnel competency. The date on which authorization and/or competence is confirmed is included.

Training records are maintained by Quality Assurance Manager and includes, IDOC, CDOC, Data Ethics and Integrity signed sheets, Safety training, SOP/QAM training sheets and Technical Training forms.

20.3.1 Training for New Staff

New staff members are given the following training:

All new staff members are given introductory training and orientation upon arrival. The training is documented on a training attendance sheet that outlines what was covered during the training. The new employee also receives Data Integrity training and must sign-off on the Ethics and Data Integrity Policy.

The initial training for a new task contains the following steps:

All documentation involved with a new and unfamiliar task is read and understood by the trainee. Training is under the direct supervision of a qualified senior analyst. During the time the analyst is in training, the trainee may sign laboratory notebooks, logbooks, worksheets, etc… but they must be co-signed by the trainer who is responsible for the data generated. The trainee demonstrates competency in the new task before they can operate independently. The competency for a test method is accomplished by a demonstration of capability as defined in Section 22 – "Environmental Methods and Method Validation". Approval of competency is noted by the date and initials or signature of the Technical Manager on a training form. Each step of the training process is documented. The documentation is maintained in the employees training record.

20.3.2 Ongoing Training

Staff members are given the following ongoing training:

All staff members are given refresher data integrity training and are required to sign off on the Ethics and Data Integrity Policy. The training is documented on a training attendance sheet that outlines what was covered during the training.

Ongoing training consists of:

The employee attests, through signature, that they have read, understood, and agree to perform the latest version of the Quality Manual and any SOPs or policies that the analyst is responsible for following. Annually, the analyst shows continued proficiency in each method they perform by continuing demonstrations of capability or pass a proficiency test sample. Attending training related to job function as applicable.

Section 21

ACCOMODATIONS AND ENVIRONMENTAL CONDITIONS
(TNI V1:M2 – Section 5.3)

21.1 Environmental

The laboratory facility is designed and organized to facilitate testing of environmental samples. Environmental conditions are monitored to ensure that conditions do not invalidate results or adversely affect the required quality of any measurement. Such environmental conditions include temperature, humidity, and voltage.

If the laboratory environment is required to be controlled by a method or regulation, the adherence is recorded.

Environmental tests are stopped when the environmental conditions jeopardize the results.

21.2 Work Areas

Work areas may include access and entryways to the laboratory, sample receipt area, sample storage area, sample process area, instrumental analysis area, chemical and waste storage area and data handling and storage area.

Access to, and use of, areas affecting the quality of the environmental tests is controlled by restriction of areas to authorized personnel only. See Section 21.4 below.

The laboratory work spaces are adequate for their use, and appropriately clean to support environmental testing and ensure an unencumbered work area.

Laboratory space is arranged to minimize cross-contamination between incompatible areas of the laboratory. For example the Volatiles analysis is in a room with a separate air system from the rest of the lab. Electronic balances are located away from drafts and doorways, and mounted on marble slabs in areas where their use is not affected by vibration.

The laboratory procedure for good housekeeping includes such measures as A contracted janitorial service either, periodic dedicated clean-up days, and, each employee is responsible for straightening up their work area at the end of the day. Good housekeeping measures are employed to avoid possible contamination. Smoking is prohibited in the laboratory. Live plants and animals are prohibited in the laboratory area.

All equipment and reference materials required for the accredited tests are available in the laboratory. Records are maintained for all equipment, reference measurement materials, and services used by the laboratory.

Reference materials traceable to national standards of measurement or to national standard reference materials are stored away from heavy use areas or major equipment that may affect the proper operation of the materials. Certificates of Traceability are available for the reference thermometer and the Class 1 weights. The reference materials are used only for calibration to maintain the validity of performance.

21.3 Floor Plan

A floor plan can be found in Appendix 4.

21.4 Building Security

The laboratory is kept secure during off hours with alarm system.

A Visitor's Logbook is maintained for every visitor to sign in and out of secure areas. Visitors must be accompanied by laboratory personnel when in secure areas.

Signs are used to designate secure areas.

Section 22

ENVIRONMENTAL METHODS AND METHOD VALIDATION
(TNI V1:M2 – Section 5.4 and Sections 1.4, 1.5 and 1.6 of Technical Modules TNI V1:M 3-7)

Methods and/or procedures are available for all activities associated with the analysis of the sample including preparation and testing. For purposes of this Section, "method" refers to both the sample preparation and determinative methods

Before being put into use, a test method is confirmed by a demonstration of capability or method validation process. See section 22.3 for additional information on method validation

All methods are published or documented. Deviations from the methods are allowed only if the deviation is documented, technically justified, authorized by management and accepted by the customer

22.1 Method Selection

A reference method is a method issued by an organization generally recognized as competent to do so. (When ISO refers to a standard method, that term is equivalent to reference method.) When the laboratory is required to analyze a parameter by a specified method due to a regulatory requirement, the parameter/method combination is recognized as a reference method.

The laboratory will use methods that meet the needs of the customer. Such methods will be based on the latest edition of the method unless it does not meet the needs of the customer.

The laboratory selects methods that are appropriate to the customer needs. When the regulatory authority mandates or promulgates methods for a specific purpose, only those methods will be used.

If a method proposed by a customer is considered to be inappropriate or out-of-date, the customer is informed and the issue resolved before proceeding with analysis of any samples (see Section 7 – Review of Requests, Tenders and Contracts).

If a method is not specified by the customer, an appropriate method will be selected using the process outlined below. The customer will be informed of the selected method and must approve its use before being used to report data.

All communications between the laboratory and the customer are documented.

If the data are to be submitted to a regulatory authority, the method(s) specified by the regulatory authority will be used.
For drinking water compliance a method will be selected from those specified in 40 CFR Part 141, or the applicable state regulations.
For NPDES permits, the method will be selected from those specified in 40 CFR Part 136.

If the end use of the data is not regulatory or if the regulatory authority does not specify a method, the laboratory will determine the customer needs in terms of reporting level (e.g., LOD, LOQ), bias (e.g., screening versus quantitative) and the laboratory capabilities and capacity. Based on these criteria, the laboratory will select an appropriate method based on the following hierarchy:

- Resources from published in regional, national or international standards
- Methods published by other technical organizations such as ASTM, Standard Methods or AOAC
- Methods develop by the instrument manufacturer
- Laboratory –developed methods.

22.2 Laboratory-Developed Methods

If the laboratory develops a method, the process of designing and validating the method is carefully planned and documented. All personnel involved in the method design, development and implementation will be in constant communication during all stages of development.

22.3 Method Validation

Validation is the confirmation, by examination and objective evidence, that the particular requirements for a specific intended use are fulfilled.

At a minimum, reference methods are validated by performing an initial demonstration of capability. Additional requirements are discussed for each technology.

All methods that are not reference methods are validated before use. The validation is designed so that the laboratory can demonstrate that the method is appropriate for its intended use. All records (e.g., planning, method procedure, raw data and data analysis) shall be retained while the method is in use. Based on the validation process, the laboratory will make a statement in the SOP of the intended use requirements and whether or not the validated method meets the use requirements.

22.3.1 Demonstration of Capability

Prior to an analyst being authorized to prepare or analyze analytical samples or data, the analyst must complete an Initial Demonstration of Capability (IDC). This consists of 4 replicates of a standard analyzed within the working range of the instrument calibration, normally at the concentration the Laboratory Control Sample is analyzed. The Average Percent Recovery (%R) and the Percent Relative Standard Deviation (%RSD) must be within the Laboratory Control Sample control Limits.

In a multi-component analysis, the IDC may be reanalyzed for compounds that fall outside of the control limits. Should the compounds fail again, then the entire IDC must be reanalyzed

In instances where it is impossible, impractical, or improper to analyze four replicates of standard, the method for determining the IDC is outlined in the associated SOP.

Once completed, the above procedure is performed annually, as a Continuing Demonstration of Capability (CDOC).

22.3.2 Method Detection Limit Studies

The MDL is a statistically derived value which indicates the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The Method Detection Limit is determined per analyte/matrix/instrument combination at least annually. Seven replicates of standard at or below the reporting limit are analyzed and are used to calculate the MDL. If one or more points are determined to be an outlier, then these points may be reanalyzed, or remade/re-extracted and reanalyzed. If a point is determined to be an outlier, it must be excluded for all compounds if a multi-compound mixture is being analyzed.

Once completed, the replicates are entered into the LIMS, which records the date/time analyzed, the spike level, and the absolute and percent recovery. These results are then placed into a spreadsheet which will flag any point or result which fails to meet the MDL criteria.

Each replicate of the study must have a percent recovery between 50-150% of the true value. The Percent Relative Standard Deviation must be ≤ 20%. The MDL calculated must be greater than or equal to one tenth the spike level and less than the spike level (spike level/10 ≤ MDL ≤ spike level). Additionally, the MDL must be less than or equal to half the RL.

Any analyte that does not have an MDL may be reported as a non detect as low as the PQL, but it shall not be generated below the PQL.

22.4 Estimation of Analytical Uncertainty

Estimation of uncertainty consists of the sum (combining the components) of the uncertainties of the numerous steps of the analytical process, including, but not limited to, sample plan variability, spatial and temporal sample variation, sample heterogeneity, calibration/calibration check variability, extraction variability, and weighing variability.

The laboratory estimates uncertainty using the standard deviation calculated from routine quality control samples.

22.5 Control of Data

To ensure that data are protected from inadvertent changes or unintentional destruction, the laboratory uses procedures to check calculations and data transfers (both manual and automated).

22.5.1 Computer and Electronic Data Requirements

The laboratory assures that computers, user-developed computer software, automated equipment, or microprocessors used for the acquisition, processing, recording, reporting, storage, or retrieval of environmental test data are:

- documented in sufficient detail and validated as being adequate for use;
- protected for integrity and confidentiality of data entry or collection, data storage, data transmission and data processing;
- maintained to ensure proper functioning and are provided with the environmental and operating conditions necessary to maintain the integrity of environmental test data; and
- held secure including the prevention of unauthorized access to, and the unauthorized amendment of, computer records. Data archive security is addressed in Section 16 – "Control of Records" and building security is addressed in Section 21- "Accommodations and Environmental Conditions".

The laboratory assures that computers and software are protected, maintained, and secure through measures such as documentation, locked access, and control of the laboratory environment.

This procedure is detailed in Procedure for the Modification_Backup_Storage of Software.

The laboratory procedure to insure that reported data are free from transcription and calculation errors is found in Procedure for the Modification_Backup_Storage of Software.

The laboratory procedure that all quality control measures are reviewed and evaluated before data are reported is found in the specific SOPs.

The laboratory procedure to address manual calculations, including manual integrations is found the specific SOPs and in the manual integration SOP.

To minimize the amount of transcription errors, the following procedures are in place:

All data is data downloaded from the instruments if possible.

Where possible, information is placed into spreadsheets and all calculations are done within the spreadsheet. The spreadsheet is then downloaded into the LIMS.

When a spreadsheet is used, the spreadsheet is verified by QA, and the verification is kept on file on the network.

The review process that all data goes through is a three step process. The analyst first checks their data for any errors. A second review is then conducted by the supervisor of that department or the laboratory manager. The final check is conducted by the project manager prior to the report being sent to the client.

Manual integrations are checked by either the Laboratory Manager, Quality Assurance Manager, Department Head, or Technical Director before the data is approved.

All of this information is detailed in the specific SOPs.

The laboratory assures that computers, user-developed computer software, automated equipment, or microprocessors used for the acquisition, processing, recording, reporting, storage, or retrieval of environmental test data are:

a) documented in sufficient detail and validated as being adequate for use;
b) protected for integrity and confidentiality of data entry or collection, data storage, data transmission and data processing;
c) maintained to ensure proper functioning and are provided with the environmental and operating conditions necessary to maintain the integrity of environmental test data; and
d) held secure including the prevention of unauthorized access to, and the unauthorized amendment of, computer records.

22.5.2 Data Reduction

As a part of the management system, the laboratory ensures that all manual calculations are checked by another individual (when possible) at a rate of ≥50% of all calculations. In addition ≥25% of all data transfers (data entry, transcribing raw or calculated data, etc.) will be checked for accuracy. If any of the checked values are found to be incorrect, the laboratory will recheck all entries associated with that data set. In addition, if the errors are attributed to one individual, 100% of the work done by the individual will be checked until all of the work is error-free.

The analyst calculates final results from raw data or appropriate computer programs provide the results in a reportable format. The test methods provide required concentration units, calculation formulas and any other information required to obtain final analytical results.

The laboratory has manual integration procedures that must be followed when integrating peaks during data reduction. The procedure is outlines in SOP BPL01 Manual Integration

All raw data must be retained either electronically or in hard copy form and it is maintained as described in Section 16 – "Control of Records".

22.5.3 Data Review Procedure

Data review procedures are located in Section 23.4 – "Data Review"

Section 23

CALIBRATION REQUIREMENTS
(TNI V1:M2 – Sect 5.5 and Section 1.7 of Technical Modules TNI V1:M 3-7)

23.1 General Equipment Requirements

The laboratory provides all the necessary equipment required for the correct performance of the scope of environmental testing performed by the laboratory.

All equipment and software used for testing and sampling are capable of achieving the accuracy required for complying with the specifications of the environmental test methods as specified in the laboratory SOPs.

Equipment is operated only by authorized and trained personnel (see Section 20 – "Personnel"*)*.

The laboratory has procedures for the use, maintenance, handling and storage of equipment and they are readily available to laboratory personnel. Manuals provided by the manufacturer of the equipment provide information on use, maintenance, handling and storage of the equipment. The laboratory maintains an equipment Table located in appendix 5 that includes additional information on storage location. The laboratory also has a Table 23-2 to summarize planned equipment maintenance. These procedures ensure proper functioning of the equipment and prevent contamination or deterioration.

All equipment is calibrated or verified before being placed in use to ensure that it meets laboratory specifications and relevant standard specifications. This information is maintained in the LIMS system.

Test equipment, including hardware and software, are safeguarded from adjustments that would invalidate the test result measurements by limiting access to the equipment and using password protection where possible (see Section 22.5 – "Control of Data"*)*.

Equipment that has been subject to overloading, mishandling, given suspect results, or shown to be defective or outside specifications is taken out of service. The equipment is isolated to prevent its use or clearly labeled as being out of service until it has been shown to function properly. If it is shown that previous tests are affected, then procedures for nonconforming work are followed and results are documented (see Section 12 – "Control of Nonconforming Environmental Testing Work", Section 14 – "Corrective Action", and SOP- BPL01 Lockout Tagout).

When equipment is needed for a test that is outside of permanent control of the laboratory, the lab ensures the equipment meets the requirements of this manual prior to its use by inspecting or otherwise testing it.

Each item of equipment and software used for testing and significant to the results is uniquely identified. Records of equipment and software are maintained. This information includes the following:

a) identity of the equipment and its software;
b) manufacturer's name, type identification, serial number or other unique identifier;
c) checks that equipment complies with specifications of applicable tests;
d) current location;
e) manufacturer's instructions, if available, or a reference to their location;
f) dates, results and copies of reports and certificates of all calibrations, adjustments, acceptance criteria, and the due date of next calibration;
g) maintenance plan where appropriate, and maintenance carried out to date; documentation on all routine and non-routine maintenance activities and reference material verifications;
h) any damage, malfunction, modification or repair to the equipment;

23.2 Support Equipment

Support Equipment includes, but is not limited to: balances, ovens, refrigerators, freezers, incubators, water baths, and temperature measuring devices, volumetric dispensing devices, and rapid vaps systems.

All support equipment is maintained in proper working order. Records are kept for all repair and maintenance activities, including service calls in the LIMS system.

All raw data records are retained to document equipment performance. These records include logbooks, data sheets, or equipment computer files.

23.2.1 Support Equipment Maintenance

Regular maintenance of support equipment, such as balances and fume hoods is conducted at least annually.

Maintenance on other support equipment, such as ovens, refrigerators, and thermometers is conducted on an as needed basis.

Records of maintenance to support equipment are documented in Instrument Maintenance Logs. Each piece of support equipment does not necessarily have its *own* logbook but must be documented. Maintenance logbooks may be shared with equipment that is housed in the same laboratory area.

Table 23-2 Summary of Support Equipment Calibration And Maintenance

Instrument	Activity	Frequency	Documentation

Table 23-2 Summary of Support Equipment Calibration And Maintenance			
Instrument	**Activity**	**Frequency**	**Documentation**
Balance	1. Clean 2. Check alignment 3. Service Contract	1. Before use 2. Before use 3. Annually	Worksheet/log book Post annual service date on balance
ASTM Class 1Weights	1. Only use for the intended purpose 2. Use plastic forceps to handle 3. Keep in case 4. Re-calibrate	1. Every year if weight is used for daily checks. 2. Every 5 years if weight is used only to check working standard weights which are then used for the daily checks.	Keep certificate
Working Standard Weights	1. Used to check balances before their use.	Every 6 months.	Worksheet / logbook
NIST Traceable Thermometer	Accuracy determined by A2LA-accredited weights and measurement laboratory.	Every 5 years.	Keep certificate
Thermometers: 1. Glass and electronic 2. Dial thermometers 3. IR thermometer	Check at the temperature used, against a reference NIST certified thermometer	1. Annually for glass and electronic 2. Quarterly for dial and IR thermometers	Calibration factor and date of calibration on thermometer and worksheet/log book
pH electrometers	Calibration: 1. pH buffer aliquot are used only once 2. Buffers used for calibration will bracket the pH of the media, reagent, or sample tested.	Before use	Worksheet/log book
pH probe	Maintenance: Use manufacturer's specifications	As needed	Worksheet/log book
photometer	1. Keep cells clean 2. Service contract. Check wavelength settings with color standards	Annually	Post service date on balance
Automatic or digital type pipettes	Calibrate for accuracy and precision using reagent water and analytical balance	Quarterly	Worksheet/logbook

Table 23-2 Summary of Support Equipment Calibration And Maintenance			
Instrument	**Activity**	**Frequency**	**Documentation**
Refrigerators, Freezers, and BOD incubators	1. Thermometers are immersed in liquid to the appropriate immersion line 2. The thermometers are graduated in increments of 1°C or less	Temperatures are recorded each day in use	Worksheet/log book
Traceable Clock	Accuracy determined by A2LA-accredited weights and measurement laboratory.		Certificate of Analysis
Sterilizer	1. Use a maximum-temperature-registering thermometer or a continuous recording device. 2. Use spore strips or ampoules. 3. In house maintenance of autoclave or service contract. 4. Hot air ovens must maintain a stable temperature of 170°C - 180°C for at least two hours	1. Each cycle 2. One sterilizing cycle per month. 3. Once per year	Worksheet/log book
Microbiological incubators, and water baths	1. Thermometers in each unit are immersed in liquid to the appropriate immersion line 2. The thermometers will be graduated in increments of 0.5°C (0.2°C increments for tests which are incubated at 44.5°C) or less	Temperature of incubators and water baths will be recorded twice a day for each day in use with readings separated by at least four hours	Worksheet/log book
DO electrometer	Calibrate as specified in SOP	Before use	Worksheet/log book
DO probe	Maintenance as specified by manufacturer	As needed	Worksheet/log book

23.2.2 Support Equipment Calibration

All support equipment is calibrated or verified annually over the entire range of use using NIST traceable references where available. The results the calibration of support equipment is within specifications or (1) the equipment is removed from service until repaired, or (2) records are maintained of correction factors to correct all measurements. If correction factors are used this information is clearly marked on or near the equipment.

Support equipment such as balances, ovens, refrigerators, freezers, and water baths are verified with a NIST traceable reference if available, each day prior to use, to ensure operation is within the expected range for the application for which the equipment is to be used.

Volumetric dispensing devices (except Class A glassware and Glass microliter syringes) are checked for accuracy on a quarterly basis.

For microbiology analyses records for autoclaves used in the laboratory are required for the following:

- initial performance of the autoclave functional properties (supplied by the installer);
- temperature demonstration of sterilization continuous monitoring device or maximum registering temperature;
- for every cycle, record date, contents, maximum temperature reached, pressure, time in sterilization mode, total run time, and analysts initials;
- quarterly check of autoclave timing device against a stopwatch; and

Table 23-3 Calibration Acceptance Criteria for Support Equipment

Equipment	Type of Calibration/ Number of Standards	Frequency	Acceptance Limits	Corrective Action
Analytical Balance	Accuracy determined using A2LA-accredited NIST weights. Minimum of 2 standards bracketing the weight of interest. Inspected and calibrated by A2LA accredited person annually. A second annual inspection and calibration by same firm.	Daily	± 0.2%	Clean, check level, insure lack of drafts, and that unit is warmed up, recheck. If fails, call service.
Thermometer	Against NIST-traceable thermometer	Yearly at appropriate temperature range for intended use	± 2.0°C	Replace
Minimum-Maximum Thermometers	Against NIST-traceable thermometer	Yearly	± 1.5°C	Replace
InfraRed Temperature Guns	Against NIST-traceable thermometer	Quarterly at appropriate temperature range for intended use	± 1.5°C	Repair/replace

Table 23-3 Calibration Acceptance Criteria for Support Equipment				
Equipment	**Type of Calibration/ Number of Standards**	**Frequency**	**Acceptance Limits**	**Corrective Action**
Volumetric Dispensing Devices (Eppendorf ® pipette, automatic dilutor or dispensing devices)	One delivery by weight. Using DI water, dispense into tared vessel. Record weight with device ID number.	Quarterly	± 2% Calculate accuracy by dividing weight by stated volume times 100 for percent.	Adjust. Replace.

23.3 Analytical Equipment

23.3.1 Maintenance for Analytical Equipment

All equipment is properly maintained, inspected, and cleaned.

Maintenance of analytical instruments and other equipment may include regularly scheduled preventive maintenance or maintenance on an as-needed basis. Instrument malfunction is documented in the LIMS, which become part of the laboratory's permanent records. A description of what was done to repair the malfunction and proof of return to control are also documented in the log.

If the equipment was repaired by an outside source, a copy of the repair bill may be placed in the logbook if it has sufficient detail to explain what was done. Proof of return to control can be a statement that a QC sample was run and it passed criteria.

Table 23-5 Analytical Equipment Maintenance		
Instrument	**Procedure**	**Frequency**
AA (Graphite Furnace)	Clean lens and furnace head Replace windows Change graphite tube/platform Empty waste container Check sample introduction probe Replace contacts	As required As required As required Daily Daily As required
Cetac Mercury Analyzer	Check tubing for wear Fill rinse tank with 10% HCl Fill reductant bottle with 10% Stannous Chloride	Daily Daily Daily
ICP	Check pump tubing Check liquid argon supply Check fluid level in waste container Check filters Clean or replace filters Check torch & align Check sample spray chamber for debris Clean nebulizer Check entrance slit for debris Replace pump tubing	Daily Daily Daily Weekly As required Daily – align with new torch Monthly As required Monthly As required
Gas Chromatograph / Flame Ionization	Check temp. of detector, inlet, column oven Septum replacement	Daily As required

Table 23-5 Analytical Equipment Maintenance

Instrument	Procedure	Frequency
Detector (FID)	Replace liners Compare standard response to previous day or since last initial calibration Check carrier gas flow rate in column Check for loose/fray wires and insulation Bake injector/column Change/replace column(s) Detector cleaning	As required Daily Daily via use of known compound retention Monthly As required As required As required
Gas Chromatograph / Electron Capture Detector (ECD)	Check temp. of detector, inlet, column oven Septum replacement Replace liners Compare standard response to previous day or since last initial calibration Check carrier gas flow rate in column Check for loose/fray wires and insulation Bake injector/column Change/replace column(s) Detector wipe test (Ni-63)	Daily As required As required Daily Daily via use of known compound retention Monthly As required As required Semi-annually
Gas Chromatograph/ Photoionization Detector (PID) / Flame Ionization Detector (FID)	Check temp. of detector, inlet, column oven Compare standard response to previous day or since last initial calibration Check carrier gas flow rate in column Check for loose/fray wires and insulation Change/replace column(s) Detector cleaning Change O-rings Clean lamp window	Daily Daily Daily via use of known compound retention Monthly As required As required As required As required
Purge & Trap	Change Trap Check Flow Rate	As required Weekly
Archon	Check rinse water Check surrogate / Internal bulbs Empty Waste Container	Daily Daily Daily
Hewlett Packard GC/MS	Septum replacement Replace liners Pump oil-level check Pump oil changing Analyzer bake-out Analyzer cleaning Resolution adjustment	As required As required Monthly Semi-annually As required As required As required
Water Baths	Temperature monitoring Water replaced (50:50 DI/Tap)	Daily Daily or as needed
Sonicators	Clean Tips Tune	Daily Daily
RapidVaps	Check Temperature Check Gas Flow	Daily Daily
Mechanical Shaker	Grease Fittings	Semi-annually
Hand Shaker	Check for Loose Holders	Daily
Conductivity Meter	KCl calibration Conductivity cell cleaning	When used As required
Turbidimeter	Check light bulb	When used

Table 23-5 Analytical Equipment Maintenance

Instrument	Procedure	Frequency
	Check Air Reading	When Used
pH/Specific Ion Meter	Calibration/check slope Clean electrode	Daily As required
Spectrophotometer	Clean ambient flow cell	As required
Flow Injection Analyzer	Check Tubing Check Flow Check Manual for Maintenance	Daily Daily
Segmented Flow Analyzer	Check Tubing Check Flow Check Manual for Maintenance	Daily Daily
Midi Distillers	Check Glassware Check Water Flow	Daily Daily
TOC Analyzer	Check Flow Check Manual for Maintenance	Daily
BOD Incubator	Temperature monitoring Coil and incubator cleaning	Daily Monthly
Fecal Incubator	Temperature monitoring	Daily
Autoclave	Preventive Maintenance by outside vendor	Every six months
Tray Sealer	Check seals on trays	With every use
Balances	Class "S" traceable weight check Clean pan and check if level Field service	Daily, when used Daily At least annually
Deionized/Distilled Water	Check conductivity Check deionizer light Replace cartridge & large mixed bed resins	Daily Daily As required
Drying Ovens	Temperature monitoring Temperature adjustments Clean oven interior	Daily As required As required
Refrigerators/ Freezers	Temperature monitoring Temperature adjustment Defrosting/cleaning	Daily As required As required
Vacuum Pumps/ Air Compressor	Drained Belts checked Lubricated Add oil Clean holding cups	Weekly Monthly Semi-annually As needed As needed
Centrifuge	Check brushes and bearings	Every 6 months or as needed
Computer System and Printer	Cooling fan cleaning	As required

23.3.2 Instrument Calibration

Information on instrument calibration can be found Appendix H (Chemistry), Appendix I (Microbiology).

Initial instrument calibration and continuing instrument calibration verification are an important part of ensuring data of known and documented quality. If more stringent calibration requirements are included in a mandated method or by

regulation, those calibration requirements override any requirements outlined here or in laboratory SOPs. Generally, procedures and criteria regarding instrument calibrations are provided in SOPs.

Section 24

MEASUREMENT TRACEABILITY
(TNI V1:M2 – Section 5.6)

Measurement quality assurance comes in part from traceability of standards to certified materials.

All equipment used affecting the quality of test results are calibrated prior to being put into service and on a continuing basis (see Section 23 – "Calibration Requirements"). These calibrations are traceable to national standards of measurement where available.

If traceability of measurements to SI units is not possible or not relevant, evidence for correlation of results through interlaboratory comparisons, proficiency testing, or independent analysis is provided.

24.1 Reference Standards

Reference standards are standards of the highest quality available at a given location, from which measurements are derived.

Reference Standards, such as ASTM Class 1 weights, are used for calibration only and for no other purpose.

Reference standards, such as ASTM Class 1 weights, are calibrated by an entity that can provide traceability to national or international standards. The following reference standards are sent out to be calibrated to a national standard as indicated in Section 23 – "Calibration Requirements

- Class 1 weights.
- NIST traceable reference thermometers.
- Traceable clocks.

24.2 Reference Materials

Reference materials are substances that have concentrations that are sufficiently well established to use for calibration or as a frame of reference.

Reference materials, where commercially available, are traceable to national standards of measurement, or to Certified Reference Materials, usually by a Certificate of Analysis.

Purchased reference materials require a Certificate of Analysis where available. If a reference material cannot be purchased with a Certificate of Analysis, it is verified by analysis and comparison to a certified reference material and/or demonstration of capability for characterization.

Internal reference materials, such as working standards or intermediate stock solutions, are checked as far as is technically and economically practical.

Working standards or intermediate stock solutions are checked against a second source at first time of use. When a second source is not available, a vendor certified different lot is accepted as a second source. In most cases, the analysis of an Initial Calibration Verification (ICV) standard or a Laboratory Control Sample (LCS) can be used as a second source confirmation. Working standards and intermediate stock solutions are given expiration dates when they are prepared based on method or regulatory requirements. These standards are used up or disposed of by the expiration date. Additional working standards such as working class weights or internal thermometers are checked using the frequency summarized in <Table 23-3 in Section 23 – "Calibration Requirements".

24.3 Transport and Storage of Reference Standards and Materials

The laboratory handles and transports reference standards and materials in a manner that protects the integrity of the materials. Reference standard and material integrity is protected by separation from incompatible materials and/or minimizing exposure to degrading environments or materials.

Reference standards and materials are stored according to manufacturer's recommendations, method SOP requirements and separately from samples. Storage conditions are outlined in each individual SOP.

24.4 Labeling of Reference Standards, Reagents, and Reference Materials

The laboratory has procedures for purchase, receipt and storage of standards, reagents and reference materials. Purchase procedures are described in Section 9 – "Purchasing Services and Supplies".

Expiration dates can be extended if the reference standard or material's integrity is verified. The extended date may not be beyond the expiration date of the referenced standards used to re-verify the material's integrity.

24.4.1 Stock Standards, Reagents, Reference Materials and Media

Records for all standards, reagents, reference materials, and media include:

- the manufacturer/vendor name (or traceability to purchased stocks or neat compounds)
- the manufacturer's Certificate of Analysis or purity (if supplied)
- the date of receipt
- recommended storage conditions

If the original container does not have an expiration date provided by the manufacturer or vendor it is not required to be labeled with an expiration date. If an expiration date is provided, it must be labeled with the expiration date.

In methods where the purity of reagents is not specified, analytical reagent grade is used. If the purity is specified, that is the minimum acceptable grade. Purity is verified and documented according to Section 9 – "Purchasing Services and Supplies".

24.4.2 Prepared Standards, Reagents, Reference Materials and Media

Records for standards, reagents, reference materials, and media preparation include:

- traceability to purchased stock or neat compounds
- reference to the method of preparation
- date of preparation
- an expiration date after which the material shall not be used (unless its reliability is verified by the laboratory)
- preparer's initials (if prepared)

All containers of prepared standards, reagents, or materials are labeled with a unique ID and an expiration date. The unique ID is determined by LIMS system

Make sure that each CONTAINER is uniquely identified, even if it is the same reagent or standard in each container.
Prepared reagents are verified to meet the requirements of the test method through the analysis of a reagent blank.

Section 25

COLLECTION OF SAMPLES
(TNI V1:M2 – Section 5.7)

Belmont Labs provides sampling services. Sampling procedures are described in the following SOPs:

- BPL01_ Sampling

25.1 Sampling Containers

The laboratory offers clean sampling containers for use by clients.

25.1.1 Preparing Container Orders

Containers (containing any required preservatives) are provided to the client upon request.

A request form is completed and e-mailed to the shipping department.

25.1.2 Sampling Containers, Preservation Requirements, Holding Times

Sampling container, preservation and holding time requirements can be found in Appendix 8.

If preservation or holding time requirements are not met, the procedures in Section 12 – "Control of Nonconforming Environmental Testing Work" are followed.

25.2 Sampling Plan

The laboratory uses sampling plans provided by clients or prepared in consultation with the client. The plan must include any factors that must be controlled to ensure the validity of the test. Sampling plans and written sampling procedures are used for sampling substances, materials or products for testing. The plan and procedures are made available at the sampling location.

The laboratory's procedures for dealing with nonconformances are used when the client requests any deviations from the sampling plan or sampling procedures. The requests are documented and included in the final test report.

25.3 Sampling Records

The following relevant sampling data are recorded: sampling procedure used, the date and time of sampling, the identification of the sampler, environmental conditions (if relevant), the sampling location, and the statistics upon which the sampling procedures are based

Section 26

HANDLING SAMPLES AND TEST ITEMS
(TNI V1:M2 – Section 5.8 and Section 1.7 of Technical Modules TNI V1:M 3-7)

26.1 Sample Receipt

When samples are received at the laboratory, chain-of-custody is reviewed, condition is documented, samples are given unique identifiers, and they are logged into the sample tracking system.

26.1.1 Chain of Custody

The chain of custody or sample submission sheets from the field are reviewed. This documentation is completed in the field and provides a written record of the handling of the samples from the time of collection until they are received at the laboratory. Section 25 – "Collection of Samples" outlines what information is needed on this record. The chain of custody form also provides information on what type of testing is being requested and can act as an order for laboratory services in the absence of a formal contract. An example chain of custody form can be found in Figure 26-1. Chain of custody and any additional records received at the time of sample submission are maintained by the laboratory by scanning them into the LIMS as PDF documents.

26.1.1.1 Legal Chain of Custody

The laboratory has procedures for legal chain of custody services. If samples are noted as being used for legal/evidentiary purposes, special chain of custody procedures are put into place by the laboratory. Custody seals are sent by the lab if the sampling containers are ordered from the laboratory, shipping records are maintained with the chain of custody, internal chain of custody is initiated that provides additional documentation of internal handling by analysts and a disposal record is provided.

26.2 Sample Acceptance

Procedures for opening shipping containers and examining samples are provided in SOP BL001 –SC-Login-Rev0

The laboratory has a sample acceptance policy that is made available to sample collection personnel. It emphasizes the need for use of water resistant ink, providing proper documentation (to include sample ID, location, date and time of collection, collector's name, preservation type, sample type and any special remarks about the sample), labeling of sample containers to include a unique sample ID, use of appropriate containers, adherence to holding times, and sample volume requirements. In addition the laboratory has nonconformance/corrective action procedures to handle samples that don't meet the requirements above or show signs of damage, contamination or inadequate preservation. Data will be

appropriately qualified where samples are reported that do not meet sample acceptance requirements.

The laboratory checks samples for the conditions above, where appropriate, to evaluate sample acceptance. Criteria regarding preservation, holding time and sample volume requirements can be found in Appendix 8. If these conditions are not met, the client is contacted prior to any further processing, then 1) the sample is rejected as agreed with the client, 2) the decision to proceed is documented and agreed upon with the client, 3) the condition is noted on the Chain of Custody form and/or lab receipt documents, and 4) the data are qualified in the report.

26.2.1 Preservation Checks

The following preservation checks are performed and documented upon receipt:

26.2.1.1 *Thermal preservation:*

a) For temperature preservation, the temperature must be within ± 2°C of the required temperature unless otherwise stated, for samples that require preservation at 4°C, the acceptable range is "from just above freezing to 6°C".
b) Samples that are delivered to the lab the same day as they are collected are likely not to have reached a fully chilled temperature. This is acceptable if the samples were received on ice and the chilling process has begun.
c) Record on the receipt form if ice is present and the temperature.

26.3 Sample Identification

Samples, including subsamples, extracts and digestates, are uniquely identified in a permanent chronological record in the LIMS system to prevent mix-up and to document receipt of all sample containers.

Samples are assigned sequential numbers that reference more detailed information kept in the LIMS system. See SOP BL001-SC-Login Rev 0

The following information is included in the LIMS system:

- Client or project name
- Date and time of receipt at lab
- Unique laboratory identification number
- Signature or initials of person making the entries

In addition, the following information is maintained and linked to the log-in record:

- Date and time of sampling linked to the date and time of laboratory receipt.

- Unique field identification number linked to the laboratory sample ID
- Analyses requested (including applicable approved method numbers) linked to the laboratory sample ID.
- Comments regarding rejection (if any).

All documentation received regarding the sample, such as memos or chain of custody, are retained in the LIMS system in PDF format.

26.4 Sample Aliquots / Subsampling

In order for analysis results to be representative of the sample collected in the field, the laboratory has subsampling procedures. Refer to BL001-SC-Login Rev0

26.5 Sample Storage

Storage conditions are monitored for any required criteria, verified, and the verification recorded in logbooks.

Samples that require thermal preservation are stored under refrigeration that is +/-2°C of the specified preservation temperature unless regulatory or method specific criteria require something different. For samples with a specified storage temperature of 4°C, storage at a temperature above the freezing point of water to 6°C is acceptable.

Samples are held secure, as required. Samples are accessible only to laboratory personnel.

Samples are stored apart from standards, reagents, food or potentially contaminating sources, and such that cross-contamination is minimized. All portions of samples, including extracts, digestates, leachates, or any product of the sample is maintained according to the required conditions.

26.6 Sample Disposal

Samples are retained a minimum of 30 days after the sample has been logged in unless other arrangements have been made with the client.

Samples are disposed of according to Federal, State and local regulations. Procedures are described in each specific SOP for the disposal of samples, digestates, leachates, and extracts.

26.7 Sample Transport

Samples that are transported under the responsibility of the laboratory, where necessary, are done so safely and according to storage conditions. This includes moving bottles within the laboratory. Specific safety operations are addressed outside of this document.

Section 27

QUALITY ASSURANCE FOR ENVIRONMENTAL TESTING

Belmont Labs has procedures for monitoring the validity of the testing it performs. The qualities of test results are recorded in such a way that trends are detectable, and where practicable, are statistically evaluated. To evaluate the quality of test results, the laboratory utilizes certified reference materials, control charting, proficiency testing samples, replicate or confirmation analyses comparison to historical data.

In addition to procedures for calibration, the laboratory monitors quality control measurements such as blanks, laboratory control samples (LCS), laboratory control sample duplicates (LCSD), matrix spikes (MS), matrix spike duplicates (MSD) duplicates (DUP), surrogates and internal standards to assess precision and accuracy. Proficiency Testing samples are also analyzed to assess laboratory performance.

Quality control data are analyzed and, when found to be outside pre-defined criteria, action is taken to correct the problem and to prevent incorrect results from being reported. Data associated with quality control data outside of criteria and still deemed reportable will be qualified so the end user of the data may make a determination of the usability of the data - see Section 28 – "Reporting of Results".

27.1 Essential Quality Control Procedures

The quality control procedures specified in test methods are followed by laboratory personnel. The most stringent of control procedures is used in cases where multiple controls are offered, typically when multiple methods are referenced. If it is not clear which is the most stringent, that mandated by test method or regulation is followed.

For test methods that do not provide acceptance criteria for an essential quality control element or where no regulatory criteria exist, in house acceptance criteria are developed. These limits can be found in the in the LIMS system.

Written procedures to monitor routine quality controls including acceptance criteria are located in the test method SOPs, except where noted, and include such procedures as:

- use of laboratory control samples and blanks to serve as positive and negative controls for chemistry methods;
- use of laboratory control sample duplicates to monitor test variability of laboratory results;
- use of calibrations, continuing calibrations, certified reference materials and/or PT samples to monitor accuracy of the test method;
- measures to monitor test method capability, such as limit of detection, limit of quantitation, and/or range of test applicability, such as the Coefficent of Determination;
- use of regression analysis, internal/external standards, or statistical analysis to reduce raw data to final results;

- use of reagents and standards of appropriate quality and use of second source materials as appropriate;
- procedures to ensure the selectivity of the test method for its intended use;
- measures to assure constant and consistent test conditions, such as temperature, humidity, rotation speed, etc., when required by test method;
- use of sterility checks for equipment, media and dilution water for microbiology; and
- use of positive and negative culture controls for microbiology.

27.2 Internal Quality Control Practices

Analytical data generated with QC samples that fall within all prescribed acceptance limits indicate the test method is deemed to be in control.

QC samples that fall outside QC limits indicate the test method are deemed to be out of control (nonconforming) and that corrective action is required and/or that the data are qualified (see Section 12 – "Control of Nonconforming Environmental Testing Work" and Section 14 - "Corrective Actions").

Detailed QC procedures and QC limits are included in test method standard operating procedures (SOPs), or where unspecified in the SOPs, are detailed in the LIMS system.

All QC measures are assessed and evaluated on an on-going basis, so that trends are detected.

27.2.1 General Controls

The following general controls are used:

27.2.1.1 Positive and Negative Controls such as:

a) Blanks (negative)
b) Laboratory control sample (positive)
c) Sterility checks and control cultures (positive and negative).

27.2.1.2 Selectivity is assured through:

a) absolute and relative retention times in chromatographic analyses;
b) two-column confirmation when using non-specific detectors;
c) use of acceptance criteria for mass-spectral tuning (found in test method SOPs);
d) use of the correct method according to its scope assessed during method validation; and
e) use of reference cultures (positive and negative) from a recognized manufacturer (where applicable).

27.2.1.3 Consistency, Variability, Repeatability, and Accuracy are assured through:

a) proper installation and operation of instruments according to manufacturer's recommendations or according to the processes used during method validation;

b) monitoring and controlling environmental conditions (temperature, access, proximity to potential contaminants);

c) selection and use of reagents and standards of appropriate quality; and

d) cleaning glassware appropriate to the level required by the analysis as demonstrated with method blanks SOP BPL Glassware.

e) For microbiology, glassware care includes use of borosilicate glassware, use of detergents designed for laboratory use, testing each day for alkaline or acid residue with a pH strip.

f) following SOPs and documenting any deviation, assessing for impact, and treating data appropriately;

g) testing to define the variability and/or repeatability of the laboratory results, such as replicates;

h) use of measures to assure the accuracy of the test method, including calibration and/or continuing calibrations, use of certified reference materials, proficiency test samples, or other measures; and

i) use of duplicate plate counts on positive samples (microbiology only).

27.2.1.4 Test Method Capability (also see Section 22 – "Environmental Methods and Method Validation") is assured through:

a) establishment of the limit of detection where appropriate;

b) establishment of the limit of quantitation or reporting level; and/or

c) establishment of the range of applicability such as Coefficent of Determination.

27.2.1.5 Data reduction is assured to be accurate by:

a) selection of appropriate formulae to reduce raw data to final results such as regression;

b) following specific procedures for data reduction such as manual integration procedures;

c) periodic review of data reduction processes to assure applicability;

d) microbiological calculations, data reduction, and statistical interpretations specified by each test method; and

27.2.1.6 Sample Specific controls are used to evaluate the effect of sample matrix on the performance of the selected analytical method (not a measure of laboratory performance):

Examples:

- Matrix Spike and Matrix Spike Duplicate (MS/MSD)
- Surrogate Spikes
- Sample Duplicates

27.2.1.7 The following tables summarize the key elements of a quality control system for a laboratory performing chemistry and microbiology testing.

Table 27-1 Essential Quality Control Elements for Chemistry

Item	Frequency	Acceptance Criteria	Corrective action
Negative Control (Method Blank)	1/batch	Method specific or reporting limit	Qualify data and take corrective action
Positive Control (Laboratory Control Sample)	1/batch	Method specific or determined by laboratory	Reprocess, reanalyze, or qualify data.
Matrix Spike; Matrix Spike Duplicates *Note : Samples are designed as data quality indicators for a specific sample using the designated method. These controls alone are not used to judge a laboratory's performance.*	Per method requirement	Method specific or determined by laboratory	Corrective action and/or qualify data.
Surrogate spikes *See note above.*	Per method requirement	Method specific or determined by laboratory	Corrective action and qualify data
Matrix Duplicates *See note above.*	Per method requirement	Method specific or determined by laboratory	Corrective action and qualify data
Continuing Calibration Verification	Per method requirement	Method specific or determined by the laboratory	Reanalyze standard immediately; Corrective action
Initial calibration Verification	Start of each analytical run	Method specific or determined by laboratory	Reanalyze standard immediately; Corrective action

Table 27-2 Essential Quality Control Requirements for Microbiology – All Methods			
Item	**Frequency**	**Acceptance Criteria**	**Corrective Action[2]**
Sterility check	Each lot of media prior to first use	No growth	Investigate cause
Sterility check containers	One container (bottle) for each lot or batch sterilized (NSGM)[3]	No growth	Investigate cause
Positive control[1]	pure culture of target organisms/ each lot or batch of medium (prior to first use of medium)	Positive reaction	Investigate cause If necessary reject the medium
Negative control[1]	Pure culture of non-target organisms/each lot or batch of medium (prior to first use of medium)	Negative reaction	Investigate cause If necessary reject the medium
1) Microorganisms may be single use preparations or cultures maintained by documented procedures that demonstrate the continued purity and viability of the organism. 2) Corrective Action may include the need to retrain. 3) NSGM: Non-selective growth media			

Table 27-3 Essential Quality Control Requirements for Microbiology – Filtration Methods Only			
Item	**Frequency**	**Acceptance Criteria**	**Corrective Action**
Sterility check	Each lot of media prior to first use. Also done on containers, reagents and materials prior to first use. Use NSGM for containers, reagents and materials.	No growth	Investigate cause
Method blank	Beg/end of each run Select one: - 1 for every 10 samples - UV sterilize after each sample filtration Done as part of the test, use method media.	No growth	Investigate cause Qualify data
Sterility check filters	One filter for each new lot of membrane filters (NSGM)	No growth	Investigate cause
Target organism verification (D.3.4.b)	Method specific	Confirmation of reaction	Investigate cause

27.2.2 Specific Controls

27.2.2.1 Method Blanks

Method blanks are processed along with and under the same conditions as the associated samples to include all steps in the method. A method

blank must be analyzed at a minimum of one per preparation batch. When no separate preparation method is used the batch is defined as the environmental samples that are analyzed with the same method and personnel, using the same lots of reagents, not to exceed the analysis of twenty environmental samples, not including method blanks, LCS, matrix spikes and matrix duplicates. The matrix of the method blank must be similar to the associated samples and be free from any analytes of interest. Method blanks are not required for some analyses such as pH, conductivity, flash point, paint filter.

Contaminated blanks are identified according to the acceptance limits in the test method SOPs or laboratory documentation.

The laboratory identifies a blank as contaminated when analyte results are greater than the reporting limit AND greater than 1/20 of that found in any sample, or where the contamination affects the sample results according to test method requirements or client objectives.

When a blank is determined to be contaminated, the cause must be investigated and measures taken to minimize or eliminate the problem.

Data that are unaffected by the blank contamination (non-detects or other analytes) need not be qualified.

Sample data that are suspect due to the presence of a contaminated blank are reanalyzed, qualified, or voided.

27.2.2.2 Laboratory Control Samples and Laboratory Control Sample Dupliates

Laboratory Control Samples (LCS) and Laboratory control sample duplicates (LCSD) are prepared from analyte free water or other clean matrix, and spiked with verified and known amounts of analytes for the purpose of establishing precision or bias measurements.

Laboratory control samples are analyzed at a frequency mandated by method, regulation, or client request, whichever is more stringent. The standard frequency of LCS preparation and analysis is one per analytical batch or as otherwise stated in a laboratory SOP. Exceptions would be for those analytes where no spiking solution is available, such as Total Volatile Solids, Total Solids, pH, color, dissolved oxygen, turbidity or TCLP. When no separate preparation method is used the batch is defined as the environmental samples that are analyzed with the same method and personnel, using the same lots of reagents, not to exceed the analysis of twenty environmental samples, not including method blanks, LCS, LCSD, matrix spikes, matrix spike duplicates, and matrix duplicates.

The analytes to be spiked in the LCS are specified in the test method SOP. In some cases a client may specify a list of analytes for spiking and the request is handled using the laboratory’s nonconformance procedures.

The results of laboratory control samples (LCS) are calculated in percent recovery or other appropriate statistical technique that allows comparison to established acceptance criteria. The laboratory documents the calculation in the test method SOP.

The individual LCS is compared to the acceptance criteria as published in the mandated test method, or where there are no established criteria, the laboratory established limits as described above.

27.2.2.3 Matrix Spikes and Matrix Spike Duplicates

Matrix Spikes and Matrix Spike Duplicates (MS/MSD) are environmental samples fortified with a known amount of analyte to help assess the effect of the matrix on method performance.

MS/MSD are preformed when the method warrants and when enough sample is provided by the client. With each set of bottles requested from a consultant, an extra set will be sent to be used as the MS/MSD. The client will be informed that this extra set is to be used as a MS/MSD; however, it will be the client's responsibility to return the sample containers to the laboratory. Belmont Labs makes every effort to provide the client with the proper bottles to insure enough sample is submitted to conduct MS/MSD's on a regular basis.

The laboratory procedure for MS/MSD includes spiking appropriate analytes at appropriate concentrations, calculating percent recoveries and relative percent difference (RPD), and evaluating and reporting the results. The procedure can be found in the method SOP.
Where there are no established criteria, the laboratory uses in-house generated limits (generally $\pm$ three standard deviations) as the control limits for MS/MSD.

For MS/MSD results outside established criteria corrective action is documented or the data are reported with appropriate data qualifying codes. Only the data from the spiked sample is qualified.

When a MS/MSD cannot be analyzed (due to lack of sample), a LCS/LCSD is analyzed instead.

27.2.2.4 Surrogate Spikes

Surrogate spikes are substances with chemical properties and behaviors similar to the analytes of interest used to assess method performance in individual samples. Surrogates are added to all samples (in test methods where surrogate use is appropriate) prior to sample preparation or extraction.

Surrogate recovery results are compared to the acceptance criteria as published in the mandated test method. Where there are no established criteria, the laboratory uses in-house generated limits (generally $\pm$ three standard deviations) as surrogate control limits.

For surrogate results outside established criteria, data are evaluated to determine the impact. Corrective actions are listed in the specific SOP.

27.3 Proficiency Test Samples or Interlaboratory Comparisons

27.3.1 Compliance to Accreditation Requirements

The laboratory analyzes at least two TNI-compliant PT samples per calendar year for each accreditation Fields of Proficiency Testing (FoPT) for which the laboratory is accredited. An exception is made for analytes where there is no PT available from any PTPA approved PT provider at least twice per year. In these cases the lab will run the PTs in the minimum time frame the PTs are available and not at all if they are not available.

The successive PTs are analyzed at least five months apart and no more than 7 months apart unless the PT is being used for corrective action to maintain or reinstate accreditation, in which case the dates of successive PT samples for the same accreditation FoPT is at least fifteen days apart.

27.3.2 PT Sample Handling, Analysis and Reporting

The laboratory does not share PT samples with other laboratories, does not communicate with other laboratories regarding current PT sample results, and does not attempt to obtain the assigned value of any PT sample from the PT provider.

Proficiency Testing (PT) samples are treated as typical samples in the normal production process where possible, including the same analysts, preparation, calibration, quality control and acceptance criteria, sequence of analytical steps, number of replicates, and sample log-in. PT samples are not analyzed multiple times unless routine environmental samples are analyzed multiple times. Where PT samples present special problems in the analysis process, they will be treated as laboratory samples where clients have special requests.

The type, composition, concentration and frequency of quality control samples analyzed with the PT samples are the same as with typical samples.

Prior to the closing date of a study, laboratory personnel do not:

- Subcontract analysis of a PT sample to another laboratory being run for accreditation purposes.
- Knowingly receive and analyze a PT for another laboratory being run for accreditation purposes.
- Communicate with an individual from another laboratory concerning the analysis of the PT sample.
- Attempt to find out the assigned value of a PT from the PT Provider.

The laboratory's procedure for handling low level PT samples is when a PT sample falls below the range of the routine method, the result is reported less than the RL or the PT providers RL.

PTs are logged into the LIMS under the Belmont Labs client. The PT samples are given a standard turnaround time, and are logged in for every method and matrix combination that they are to be reported for. PT results may either be hand entered into the PT provider's website, handwritten and mailed to the PT provider, or uploaded to the PT provider via an EDD.

The laboratory institutes corrective action procedures for failed PT samples following the guidelines in Section 14 – "Corrective Action".

Retention of PT records is similar to that maintained for regular environmental samples. In addition the lab maintains a copy of the online data entry summary when the PT results are submitted online.

27.4 Data Review

The laboratory reviews all data generated in the laboratory for compliance with method, laboratory and, where appropriate, client requirements. The specific review processes for each analysis are addressed more in depth in the respective SOP.

Section 28

REPORTING THE RESULTS
(TNI V1:M2 – Section 5.10)

The result of each test performed is reported accurately, clearly, unambiguously, and objectively and complies with all specific instructions contained in the test method.

Laboratory results are reported in a test report that includes all the information requested by the client and necessary for the interpretation of the test results and all information required by the method used.

Data are reported without qualification if they are greater than the lowest calibration standard, lower than the highest calibration standard, and without compromised sample or method integrity.

28.1 Test Reports

The report format has been designed to accommodate each type of test performed and to minimize the potential for misunderstanding or misuse.

Each test report generated contains the following information (unless not required by the client):

a) a title, such as Test Report or Test Results;
b) the name and address of the laboratory, the location of the laboratory if different from the address, and the phone number and name of a contact person;
c) unique identification of the test report, such as a serial number, on each page and a pagination system that ensures that each page is recognized as part of the test report and a clear identification of the end of the report, such as 3 of 10;
d) the name and address of the client if applicable;
e) the identification of the test method used;
f) an unambiguous identification of the sample(s), including the client identification code;
g) the date of sample receipt when it is critical to the validity and application of the results, date and time of sample collection, dates the tests were performed, the time of sample preparation and analysis if the required holding time for either activity is less than or equal to 72 hours;
h) reference to the sampling plan and procedures used by the laboratory where these are relevant to the validity or application of the results;
i) the test results with failures identified, units of measurement, an indication of whether results are calculated on a dry weight or wet weight basis, and for Whole Effluent Toxicity, an identification of the statistical package used;
j) the name, function, and signature or an equivalent electronic identification of the person authorizing the test report, and the date of issue;
k) a statement to the effect that the results relate only to the samples;
l) certification that the results are in compliance with the NELAC Standards if accredited to be in compliance or provide reasons and/or justification if they do not comply.

Appendix 11 contains a list of the data qualifier flags that is included with every report when the qualifier is used.

28.2 Supplemental Test Report Information

When necessary for interpretation of the results or when requested by the client, test reports include the following additional information:

a) deviations from, additions to, or exclusions from the test method, information on specific test conditions, such as environmental conditions, and any non-standard conditions that may have affected the quality of the results, and any information on the use and definitions of data qualifiers;

b) a statement of compliance/non-compliance when requirements of the management system are not met, including identification of test results that did not meet the laboratory and regulatory sample acceptance requirements, such as holding time, preservation, etc.;

c) where applicable and when requested by the client, a statement on the estimated uncertainty of the measurement;

d) where appropriate and needed, opinions and interpretations. When opinions and interpretations are included, the basis upon which the opinions and interpretations are documented. Opinions and interpretations are clearly marked as such in the test report.

e) additional information which may be required by specific methods or client;

f) qualification of results with values outside the calibration range as appropriate.

28.3 Environmental Testing Obtained from Subcontractors

Test results obtained from tests performed by subcontractors are clearly identified on the test report by subcontractor name and/or accreditation number.

The subcontractors report their results in writing or electronically. A copy of the subcontractors report is attached to the final Belmont Labs report, and is clearly labeled as a subcontractor report.

28.4 Electronic Transmission of Results

All test results transmitted by telephone, fax, telex, e-mail, or other electronic means comply with the requirements of the TNI Standard and associated procedures to protect the confidentiality and proprietary rights of the client (see Section 22- "Environmental Methods and Method Validation").

28.4.1 Electronic Data Deliverables

Electronic Data Deliverables (EDDs) are provided to clients upon request. Several generic formats are available, and can be generated via the LIMS during report generation. If a specific EDD is required, the specifications must be sent to the laboratory and the EDD developed prior to work being contracted. EDD formats are stored on the network.

28.5 Amendments to Test Reports

Material amendments to a test report after it has been issued are made only in the form of another document or data transfer. All supplemental reports meet all the requirements for the initial report and the requirements of this *Quality Manual*.

Reports may be re-issued either due to error on the part of the Lab, or on the part of the client. When the laboratory has made an error, the client is contacted and made aware of the issue. A Non-Conformance is started in addition to a Client Complaint if requested. The report is re-issued in a timely manner, accounting for the scope of the re-issue.

If the client has made an error and requires a revised report, the request is documented, and the report re-issued in a timely manner, depending upon the scope of the re-issue

Amended test reports include the statement "(REV X)", entered into the project number field, where X is the revision number; or an equivalent form of wording to assure they can be differentiated from other test reports.

When it is necessary to issue a complete new report, the new report is uniquely identified and contains a reference to the original that it replaces.

28.6 Exceptions

"Not Applicable"

Appendix 1

SpecificMethod	Analysis	Matrix	VAP	OEPA	NELAC
ASTM D3987	ASTM_LEACH	Soil			
EPA 1312	SPLP ZHE EPA 1312	Soil			
EPA 1312	SPLP ZHE EPA 1312	Water			
EPA 1311	TCLP Extraction (Metals)	Soil			x
EPA 1311	TCLP Extraction (Metals)	Water			x
EPA 1311	TCLP Extraction (SVOC)	Soil			x
EPA 1311	TCLP Extraction (SVOC)	Water			x
EPA 1311	TCLP ZHE Extraction	Soil			x
EPA 1311	TCLP ZHE Extraction	Water			x
SW3005A	Metals Digestion	Water			x
SW3510C	Separatory Funnel Extraction	Water			x
SW3550B	Ultrasonic Extraction	Soil			x
SW3580A	Waste Dilution	Soil			x
SW5030B	Purge and Trap Aqueous	Water			x
SW5035A-L	Closed System Purge & Trap	Soil			x
SW5035A-H	MeOH Extract Closed System P&T	Soil			x
SW3546	Microwave Extraction	Soil			

SpecificMethod	Analysis	Matrix	VAP	OEPA	NELAC
D1119	ASH	Water			
D1119	ASH	Soil			
D3987/SW 6010B	ASTM: Ag	Soil			
D3987/SW 7470	ASTM: Hg	Soil			
EPA 200.7/SW 6010B	ASTM: Na	Water			
SW 6010B	Calcium Carbonate	Soil			
EPA 200.7	Calcium Carbonate	Water			
EPA 200.7	Calcium Total	Drinking Water			
D4373-96	Carbonate	Soil			
EPA 200.7/SW 6010	Dissolved Silicon Dioxide	Water			
SM 3113B	Metals by Graphite Furnace	Water		x	
SW 7761	GFAA Ag	Water			
SW 7060A	GFAA As	Water			
SW 7091	GFAA Be	Water			
SW 7131A	GFAA Cd	Water			
SW 7201	GFAA Co	Water			
SW 7191	GFAA Cr	Water			
SW 7211	GFAA Cu	Water			
SW 7481	GFAA Mo	Water			
SW 7521	GFAA Ni	Water			
SW 7421	GFAA Pb	Water			
SW 7041	GFAA Sb	Water			
SW 7740	GFAA Se	Water			
SW 7841/EPA 279.2	GFAA Tl	Water			
EPA 200.9	GFAA Tl	Water		x	
SM2340B	Hardness as CaCO3	Water		x	
E200.7	Hardness as CaCO5	Soil			
SW 7470	Mercury	Water	x		x
EPA 245.1	Mercury	Water		x	
SW 7471	Mercury	Soil	x		x
EPA 245.1	Mercury	Water			
EPA 200.7	Metals by ICP	Soil			
EPA 200.7	Metals by ICP	Water		x	
SW6010B	Metals by ICP	Soil	x		
SW6010B	Metals by ICP	Water	x		
E200.7	Phosphate	Soil			
SW 6010	Phosphate	Soil			
E200.7	Phosphate	Water			
SM 2450G	Percent Solids	Sludge			
EPA 160.3	Percent Solids	Water			
SM 2540G	Percent Solids	Soil			
EPA 1312	SPLP Extraction EPA 1312	Soil			
EPA 1312	SPLP Extraction EPA 1312	Water			

SpecificMethod	Analysis	Matrix	VAP	OEPA	NELAC
SM 9223B	Bacteria Presence/Absence	Water		x	
OEPA DW Manual	Bacteria Bottle Sterility	Water			
IDEXX Quanti-Tray 2000	Bacteria Ecoli P/A	Water			
IDEXX Quanti-Tray 2000	Bacteria Ecoli Soil	Soil			
SM 9222D	Bacteria - Fecal	Water			
SM 9222D	Bacteria - Fecal	Soil			
IDEXX Quanti-Disc	Bacteria HPC	Water			
IDEXX Quanti-Disc	Bacteria HPC	Soil			
EPA 160.3	TS_Fecal	Soil			

SpecificMethod	Analysis	Matrix	VAP	OEPA	NELAC
EPA 504.1	EDB/DBCP	Water			
SW 8011	EDB/DBCP	Water			
EPA 552.2	Haloacetic Acids	Water		x	
EPA 615	Herbicides	Water			
SW 8151	Herbicides	Water			
SW 8151	Herbicides	Soil			
EPA 608	PCB/Pesticides	Soil			
EPA 608	PCB/Pesticides	Water			x
SW 8082	PCB	Water	x		
SW 8082	PCB	Soil	x		x
SW 8081	Pesticides	Soil	x		x
SW 8081	Pesticides	Water	x		
E1656	PROWL	Water			
SW 8015	DRO (Various Ranges)	Soil	x		x
SW 8015	DRO (Various Ranges)	Water	x		
SW8015 Modified	TPH_Fingerprint	Soil			
SW8015 Modified	TPH_Fingerprint	Water			
EPA 625	SVOC	Soil			
EPA 625	SVOC	Water			x
SW8270	SVOC	Water	x		
SW8270	SVOC	Soil	x		x

SpecificMethod	Analysis	Matrix	VAP	OEPA	NELAC
EPA 602	BTEX GC/FID	Water			x
SW 8021	BTEX GC/FID	Soil			x
SW 8021	BTEX GC/FID	Water			
8015 Modified	GLYCOLS	Water			
SW 8015B	GRO	Soil	x		x
SW 8015B	GRO	Water	x		
Dexsil Hydroclor-Q	TOX Screen	Water			
MSD	VSO	Water			
EPA 624	VOC	Soil			
EPA 624	VOC	Water			x
EPA 524.2	VOC	Water		x	x
SW 8260A/B	VOC	Water	x		
SW 8260A/B	VOC	Soil	x		x
VSO Cincinnati MSD	VSO Analysis	Water			

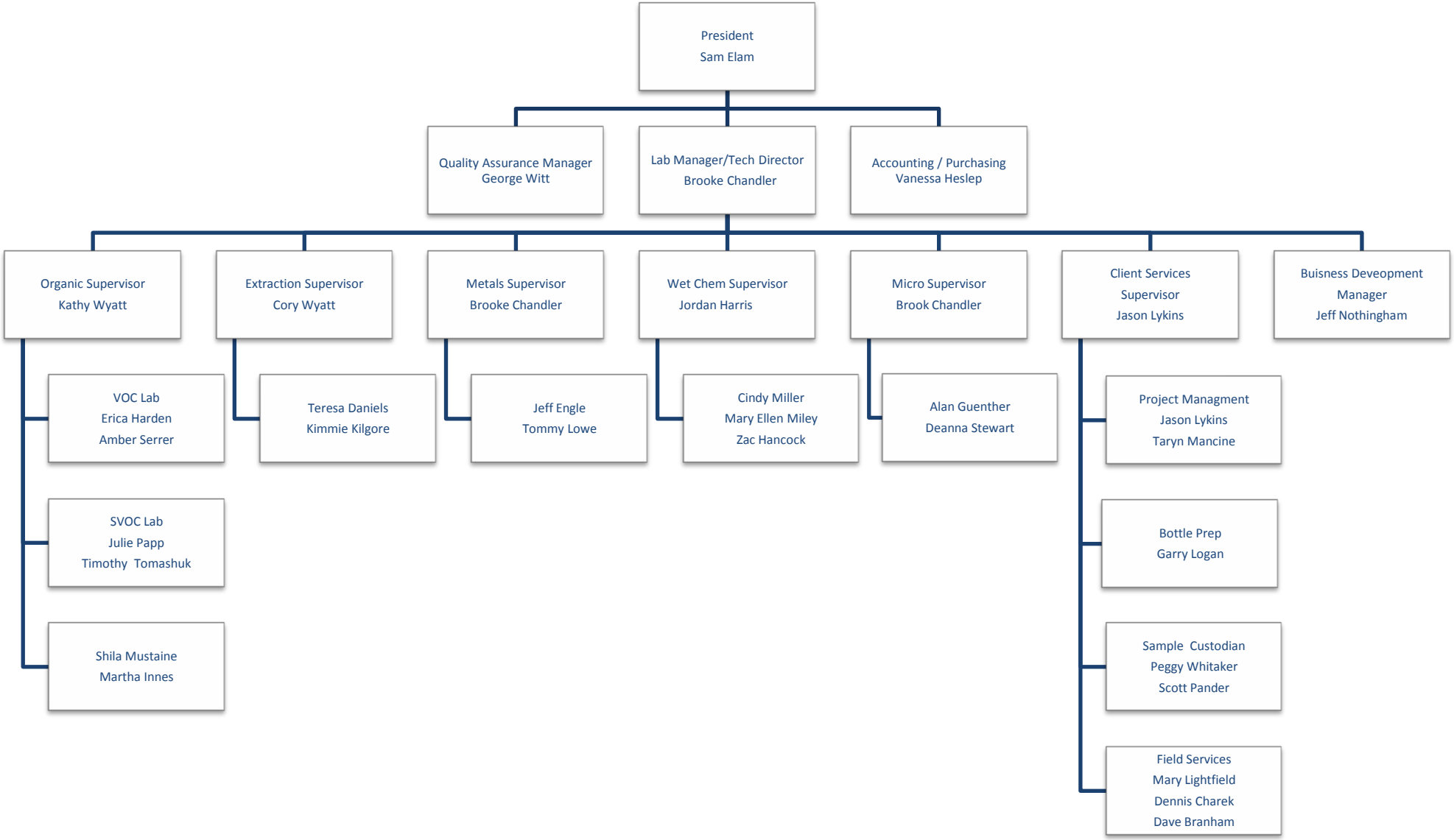
SpecificMethod	Analysis	Matrix	VAP	OEPA	NELAC
SM 2320B	Alkalinity as CaCO3	Water		x	x
SM 2320B	ACIDITY	Water			
SM 2320B	Acidity	Soil			
SM 2320B	Alkalinity	Water			
SM 2330B	Alkalinity Stability	Water		x	
SW 9034+9030 Modified	Sulfide	Soil			
SM 4500	AV_N	Water			
SM 4500	AV_N	Soil			
EPA 405.1	BOD	Sludge			
EPA 405.1/SM 5210	BOD	Water			
EPA 405.1	BOD Soluable	Water			
D 1120-83	Boiling Point	Water			
SM 4500-CL-E	Chloride	Water			x
SM 4500-CL-E	Chloride	Water		x	
SM 4500-CL-E	Chloride	Soil			
SM 4500-CL-G	Chlorine, Total Residual	Water		x	
SM 4500 CN-I	Cyanide, Ameniable	Water			
SM 4500 CN-I	Cyanide, Ameniable	Soil			
SW Chapter 7 Modified	Cyanide, Reactive	Water			
SW Chapter 7 Modified	Cyanide, Reactive	Soil			
EPA 335.4	Cyandie, Total	Water		x	x
EPA 335.4	Cyandie, Total	Soil			
EPA 335.4	Cyandie, Total	Sludge			
SM 4500-CO2-D	Carbon Dioxide, Free	Water			
EPA 410.4	COD	Water			x
EPA 410.4	COD	Sludge			
SM 2120B	Color	Water			x
SM 2510B	Conductivity	Water			
SW 9050	Conductivity	Soil			
SM 2510B	Conductivity, ASTM	Soil			
SW 9045B	Corrosivity	Water			x
SW 9045C	Corrosivity	Soil			
HACH 8023	Hexavailent Chromium	Water			
SW 3060A	Hexavailent Chromium	Soil			
EPA 360.1	Dissolved Oxygen	Water			x
SM 5310C	DOC, TOC	Water		x	x
SM 4500 F-C	Flouride	Water		x	x
SM 4500 F-C	Flouride	Soil			
D56-05	Flashpoint	Water			
D56-05	Flashpoint	Soil			
Walkley-Black	TOC	Soil			x
SM 4500-CO2-D	Bicarbonate	Soil			
SW1010A/D56-05	Ignitability	Water			x
SW1010A/D56-05	Ignitability	Soil			
EPA 425.1	MBAS	Water			

SpecificMethod	Analysis	Matrix	VAP	OEPA	NELAC
EPA 350.1	Ammonia	Water			x
EPA 350.1/SM 4500NH3	Ammonia	Soil			x
EPA 350.2	Ammonia, Low Level	Water			
SM 4500 NO3-F	NO2, NO3, NO2NO3	Water		x	x
SM 4500 NO3-F	NO2	Water		x	
SM 4500 NO3-F	NO2	Soil			
EPA 1664A	Oil & Grease	Sludge			
EPA 1664A	Oil & Grease	Water			
EPA 1664A	Oil & Grease	Soil			
D4981-95	Oxidizers ASTM D4981	Water			
D4981-95	Oxidizers ASTM D4981	Soil			
SM 4500 P-F	Phosphate	Water		x	
EPA 365.1	Orthophosphate	Water			x
EPA 365.1	Orthophosphate	Soil			
SW 9095	Paint Filter	Soil			
SM 4500 H+	pH	Water		x	x
SW 9045 C	pH	Soil			
SW 9045 C	pH	Sludge		x	
EPA 420.4	Phenolics	Water			x
EPA 420.4	Phenolics	Soil			
SM 5530B	Phenolics, Cleanup	Water			
D 2216	Percent Moisture	Soil			
D 2216	Percent Moisture	Sludge			
SM 4500-P F	Phosphate	Water			
EPA 377.1/SM 4500 S03B	Sulfite	Water			x
SW 9038	Sulfate	Soil			
SM 4500 SO4-D	Sulfate	Water		x	x
EPA 375.4 Modified	Sulfate, ASTM	Soil			
SM 2450G	Percent Solids	Sludge			
SM 2540G	Percent Solids	Soil			
EPA 160.3	Percent Solids	Water			
SM 2540F	SSOLIDS	Water			
EPA 376.1/SM 4500S2-F	Sulfide	Water			
EPA 376.2	Sulfide, Methyl Blue	Water			
SM 2540C	Total Dissolved Solids	Water		x	x
SM 2450C	Total Dissolved Solids, ASTM	Soil			
EPA 351.2	TKN	Water			x
SM-4500Norg D	TKN	Soil			x
EPA 351.2/SM 4500 NO3-F	Total Nitrogen	Water			
EPA 351.2/SM 4500 NO3-F	Total Nitrogen	Soil			
EPA 350.2-350.1	Total Organic Nitrogen	Soil			
EPA 350.2-350.1	Total Organic Nitrogen	Water			x
EPA 160.3	Total Solids	Soil			
EPA 160.3	Total Solids	Sludge			
EPA 160.2	Total Suspended Solids	Soil			

SpecificMethod	Analysis	Matrix	VAP	OEPA	NELAC
EPA 160.2	Total Suspended Solids	Sludge			
EPA 160.2/SM 2540D	Total Suspended Solids	Water			x
SM 2130B	Turbidity	Water		x	
EPA 180.1	Turbidity	Water			
EPA 160.4	Total Volatile Solids	Water			
EPA 160.4	Total Volatile Solids, Suspended	Sludge			
EPA 160.4	Total Volatile Solids, Suspended	Soil			

Appendix 3 32

Belmont Labs Organizational Chart



Appendix 3

Department	SOP Type	SOP Number	SOP Description	Revision Number	Update Number	Date Last Rev/Up
Client Services	General	BPL01-RTCS	Requests, Tenders, Contracts and Subcontractors	1	2	11/29/2011
Client Services	General	BPL01-Purchasing	Purchasing or Services and Supplies	2	0	12/1/2011
Client Services	General	BPL01-Internal Audits	Internal Audits	4	0	5/6/2011
Client Services	General	BPL01-Reporting	Reporting	1	0	1/4/2010
Client Services	General	BPL01-Data Archive&Disposal	Data Archive & Disposal	4	0	8/9/2011
Client Services	General	BPL001-SC-Login	Login	0	0	11/15/2012
Client Services	General	BPL01-Bottle Lables	Bottle Prep SOP	1	0	11/2/2004
Client Services	General	BPL01-Sampling	Field Services SOP	2	0	12/3/2009
Extractions	General	BPL0001-3550B	Ultrasonic Extraction By 3350	7	0	9/30/2013
Extractions	General	BPL-001-3580	Waste Dilution for Organic Analysis	1	0	9/30/2013
Extractions	General	BPL-001-3510C	Liquid Liquid Extraction	1	0	9/30/2013
Extractions	General	BPL-004-3546	Microwave Extraction	1	0	9/30/2013
Extractions	General	BPL01-PCBWIPE	PCB Wipe Extraction	2	0	10/21/2013
Metals	General	BPL01-M7471A	Mercury in Solids	5	0	5/6/2011
General	General	BPL01-Temp Gun	Temperature Gun Operation	0	2	1/12/2012
General	General	BPL01-SampleHomoginization	Homogenization of Solid Samples	1	1	8/9/2011
General	General	BPL01-Pipettor	Pipette Calibration	2	2	8/9/2011
General	General	BPL01-Lockout/Tagout	Lockout/Tagout of Equipment	0	2	8/10/2011
General	General	BPL01-Glassware	Glassware Cleaning	3	2	8/9/2011
Metals	General	BPL01-6010B	ICP-AES for GW Matrices	7	2	9/8/2011
Metals	General	BPL01-200.7	ICP-AES for water matrices	2	2	9/8/2011
Metals	General	BL002-MT-GFAA	GFAA Metals Analysis	0	0	12/29/2012
Metals	General	BL007-MT-3020	Digestion for GFAA Analysis	0	0	8/30/2013
Metals	General	BL008-MT-3050B	Metals ICP Solid Digestion	0	0	8/23/2013
Metals	General	BL-MT-009	3005 Metals ICP Water Digestion	0	0	8/22/2013
Metals	General	M7470A	Hg in Liquid Waste	8	0	5/6/2011
Metals	General	M7471A	Hg in Soil/Solid	5	0	5/6/2011
Metals	DW	BPL01-P-SM3113	Potable Metals by GFAA	4	0	5/10/2011
Metals	DW	BPL01-P-245.1HB	Potable Mercury in Liquid Waste	4	0	5/6/2011

Department	SOP Type	SOP Number	SOP Description	Revision Number	Update Number	Date Last Rev/Up
Metals	DW	BPL01-P-200.9	Potable Thallium GFAA	4	0	5/6/2011
Metals	DW	BPL01-P-2007.	Potable ICP	3	0	6/8/2009
Micro	General	BL-MIC-001	Fecal Coliform	0	0	4/29/2013
Micro	General	BPL01-HPC	Heterotrophic Plate Count	1	0	2/18/2011
Micro	General	BPL01-E.coli	Ecoli	2	0	2/1/2012
Micro	DW	BL-MIC-001DW	Potable Bacteria P/A	1	0	4/26/2013
Organics	General	BPL01-M8011	EDB and DBCP by GC/ECD	3	0	5/6/2011
Organics	General	BPL01-M8015D	DRO by GC/FID	7	2	10/5/2011
Organics	General	BPL01-M8015G	GRO by GC/FID	6	2	10/5/2011
Organics	General	BPL01-8021B	BTEX by GC/PID	5	0	8/20/2013
Organics	General	BPL01-8081A	Pesticides by GC/ECD	5	3	10/5/2011
Organics	General	BPL01-8082	PCBs by GC/ECD	5	3	10/5/2011
Organics	General	BPL01-VSO	Vapor Space Organics by GC/FID	2	2	10/12/2011
Extractions	General	BPL-01-TCLP	Toxicity Characteristic Leaching Procedure	4	0	5/6/2011
Organics	General	BPL01-M8270	SVOC by GC/MS	10	3	10/6/2011
Organics	General	BPL01-8260	VOC by GC/MS	0	2	10/12/2011
Organics	General	BPL01-M8151A	Herbicides by GC/ECD	3	1	5/6/2011
Organics	DW	BL-MS001DW	552.2 Haloacetic Acids by GC/ECD	1	0	8/15/2013
Organics	DW	BL-MS002DW	Potable VOC by GC/MS (524.2&THMs)	1	0	5/21/2012
Organics	VAP	BPL01-3546-3665A	Microwave Extraction (VAP)	0	0	7/22/2011
Organics	VAP	BPL01-3550B	Ultrasonic Extraction By 3550 (VAP)	6A	0	3/12/2007
Organics	VAP	BPL01-M8081A	Pesticides by GC/ECD VAP	5	0	2/7/2007
Organics	VAP	BPL01-M8015D	DRO by GC/FID VAP	6	0	3/19/2007
Organics	VAP	BPL01-M8270C	SVOC by GC/MS VAP	10	1	11/15/2006
Organics	VAP	BPL01-M8015B-GRO-VAP	GRO by GC/FID VAP	6	1	7/8/2011
Organics	VAP	BPL01-M8082	PCB by GC/ECD VAP	5	1	2/7/2007
Organics	VAP	BPL01-M8260	VOC by GC/MS VAP	0	0	1/10/2008
Organics	General	Glycol	Glycol By Modified	1	0	1/27/2011
Client Services	General	BPL01-RTCS	Requests, Tenders, Contracts and Subcontractors	1	2	11/29/2011
Client Services	General	BPL01-Purchasing	Purchasing or Services and Supplies	2	0	12/1/2011
Client Services	General	BPL01-Internal Audits	Internal Audits	4	0	5/6/2011
Client Services	General	BPL01-Reporting	Reporting	1	0	1/4/2010

Department	SOP Type	SOP Number	SOP Description	Revision Number	Update Number	Date Last Rev/Up
Client Services	General	BPL01-Data Archive&Disposal	Data Archive & Disposal	4	0	8/9/2011
Client Services	General	BPL001-SC-Login	Login	0	0	11/15/2012
Client Services	General	BPL01-Bottle Lables	Bottle Prep SOP	1	0	11/2/2004
Client Services	General	BPL01-Sampling	Field Services SOP	2	0	12/3/2009
Extractions	General	BPL0001-3550B	Ultrasonic Extraction By 3350	7	1	11/19/2013
Extractions	General	BL004-EX-8151	Extraction of Herbicides	1	0	11/19/2013
Extractions	General	BPL-001-3580	Waste Dilution for Organic Analysis	1	0	9/30/2013
Extractions	General	BPL-001-3510C	Liquid Liquid Extraction	1	0	9/30/2013
Extractions	General	BPL-004-3546	Microwave Extraction	1	0	9/30/2013
Extractions	General	BPL01-PCBWIPE	PCB Wipe Extraction	2	0	10/21/2013
Metals	General	BPL01-M7471A	Mercury in Solids	5	0	5/6/2011
General	General	BPL01-Temp Gun	Temperature Gun Operation	0	2	1/12/2012
General	General	BPL01-SampleHomoginization	Homogenization of Solid Samples	1	1	8/9/2011
General	General	BPL01-Pipettor	Pipette Calibration	2	2	8/9/2011
General	General	BPL01-Lockout/Tagout	Lockout/Tagout of Equipment	0	2	8/10/2011
General	General	BPL01-Glassware	Glassware Cleaning	3	2	8/9/2011
Metals	General	BPL01-6010B	ICP-AES for GW Matrices	7	2	9/8/2011
Metals	General	BPL01-200.7	ICP-AES for water matrices	2	2	9/8/2011
Metals	General	BL002-MT-GFAA	GFAA Metals Analysis	0	0	12/29/2012
Metals	General	BL007-MT-3020	Digestion for GFAA Analysis	0	0	8/30/2013
Metals	General	BL008-MT-3050B	Metals ICP Solid Digestion	0	0	8/23/2013
Metals	General	BL-MT-009	3005 Metals ICP Water Digestion	0	0	8/22/2013
Metals	General	M7470A	Hg in Liquid Waste	8	0	5/6/2011
Metals	General	M7471A	Hg in Soil/Solid	5	0	5/6/2011
Metals	DW	BPL01-P-SM3113	Potable Metals by GFAA	4	0	5/10/2011
Metals	DW	BPL01-P-245.1HB	Potable Mercury in Liquid Waste	4	0	5/6/2011
Metals	DW	BPL01-P-200.9	Potable Thallium GFAA	4	0	5/6/2011
Metals	DW	BPL01-P-2007.	Potable ICP	3	0	6/8/2009
Micro	General	BL-MIC-001	Fecal Coliform	0	0	4/29/2013
Micro	General	BPL01-HPC	Heterotrophic Plate Count	1	0	2/18/2011

Department	SOP Type	SOP Number	SOP Description	Revision Number	Update Number	Date Last Rev/Up
Micro	General	BPL01-E.coli	Ecoli	2	0	2/1/2012
Micro	DW	BL-MIC-001DW	Potable Bacteria P/A	1	0	4/26/2013
Organics	General	BPL01-M8011	EDB and DBCP by GC/ECD	3	0	5/6/2011
Organics	General	BPL01-M8015D	DRO by GC/FID	7	2	10/5/2011
Organics	General	BPL01-M8015G	GRO by GC/FID	7	0	11/14/2013
Organics	General	BPL01-8021B	BTEX by GC/PID	6	1	11/19/2013
Organics	General	BPL01-8081A	Pesticides by GC/ECD	5	3	10/5/2011
Organics	General	BPL01-8082	PCBs by GC/ECD	5	3	10/5/2011
Organics	General	BPL01-VSO	Vapor Space Organics by GC/FID	3	0	11/27/2013
Extractions	General	BPL-01-TCLP	Toxicity Characteristic Leaching Procedure	4	0	5/6/2011
Organics	General	BPL01-M8270	SVOC by GC/MS	10	3	10/6/2011
Organics	General	BPL01-8260	VOC by GC/MS	0	2	10/12/2011
Organics	General	BPL01-M8151A	Herbicides by GC/ECD	3	1	5/6/2011
Organics	DW	BL-MS001DW	552.2 Haloacetic Acids by GC/ECD	1	0	8/15/2013
Organics	DW	BL-MS002DW	Potable VOC by GC/MS (524.2&THMs)	1	0	5/21/2012
Organics	VAP	BPL01-3546-3665A	Microwave Extraction (VAP)	0	0	7/22/2011
Organics	VAP	BPL01-3550B	Ultrasonic Extraction By 3550 (VAP)	6A	0	3/12/2007
Organics	VAP	BPL01-M8081A	Pesticides by GC/ECD VAP	5	0	2/7/2007
Organics	VAP	BPL01-M8015D	DRO by GC/FID VAP	6	0	3/19/2007
Organics	VAP	BPL01-M8270C	SVOC by GC/MS VAP	10	1	11/15/2006
Organics	VAP	BPL01-M8015B-GRO-VAP	GRO by GC/FID VAP	6	1	7/8/2011
Organics	VAP	BPL01-M8082	PCB by GC/ECD VAP	5	1	2/7/2007
Organics	VAP	BPL01-M8260	VOC by GC/MS VAP	0	0	1/10/2008
Organics	General	Glycol	Glycol By Modified	2	0	11/27/2013
QA	General	BL-QA-001	Personnel Orientation and Training	0	0	3/6/2013
QA	General	BPL01-Manual Integration	Manual Integration	1	2	5/5/2011
QA	General	BPL01-NCMR	Non-Conformance SOP	0	0	5/21/2012
WetChem	General	BPL01-Turbidity	Turbidity	2	0	11/5/2013
WetChem	General	BL-WC-008	COD	0	0	11/12/2013
WetChem	General	BL-WC-006	Chlorine	0	0	12/16/2012
WetChem	General	BL-WC-005	Chloride	0	0	12/16/2013
WetChem	General	BL-WC-003	Hexavailent Chromium	0	0	3/4/2013

Department	SOP Type	SOP Number	SOP Description	Revision Number	Update Number	Date Last Rev/Up
WetChem	General	BL-WC-001	Alkalinity	0	0	3/24/2013
WetChem	General	BL-WC-009	Conductivity	4	0	11/4/2013
WetChem	General	BL-WC-013	Flouride	2	0	11/5/2013
WetChem	General	BL-WC-030	Sulfide	0	0	5/7/2013
WetChem	General	BPL01-BOD5	BOD 5 day incubation	6	1	5/16/2011
WetChem	General	BPL01-Bromide	Bromide	1	0	9/30/2010
WetChem	General	BPL01-C_Phosphorus	Phosphorus (all forms)	0	1	11/18/2013
WetChem	General	BPL01-Corrosivity and pH	Corrosivity and pH	5	1	11/12/2013
WetChem	General	BPL01_Cyanide	Cyanide (total, WAD, Aminable, Reactive)	4	2	10/24/2011
WetChem	General	BPL01-Flashpoint-TCT	Flashpoint and Ignitability	1	1	10/17/2011
WetChem	General	BPL01-MBAS	Methylene Blue Active Subances	3	1	11/7/2011
WetChem	General	BPL01-NH3N	Ammonia by SFA	3	1	11/7/2011
WetChem	General	BPL01_NO2NO3	Nitrate and Nitrite as Nitrogen	7	2	5/16/2011
WetChem	General	BPL01-O&G 1664	n-hexane Extractable Material HEM	5	1	5/20/2011
WetChem	General	BPL01-Phenolics	Phenolics by SFA	1	1	11/7/2011
WetChem	General	BPL01-Residue	Total Residue (pMoist)	4	2	11/22/2011
WetChem	General	BPL01-Settleable Solids	Settleable Solids	2	0	11/4/2013
WetChem	General	BPL01-Sulfate	Sulfate	3	1	11/21/2011
WetChem	General	BPL01-Sulfite	Sulfite	3	1	11/7/2011
WetChem	General	BPL01-TDS	Filterable Residue (TDS)	5	1	11/15/2011
WetChem	General	BPL01-TKN_L	Total Kjeldahl Nitrogen by FIA	3	1	11/15/2011
WetChem	General	BPL01-TOC	Total Organic Carbon by UV-ox	3	1	11/15/2011
WetChem	General	BPL01-TOCS	TOC by Walkley Black	1	0	11/21/2011
WetChem	General	BPL01-TSS	Non Filterable Residue (TSS)	4	0	11/4/2013
WetChem	DW	BL-WC-005DW	Chloride	1	0	7/15/2013
WetChem	DW	BL-WC-006DW	Chlorine	0	0	12/16/2012
WetChem	DW	BL-WC-013DW	Flouride	0	0	3/24/2013
WetChem	DW	BL-WC-001DW	Alkalinity	0	0	3/24/2013
WetChem	DW	BPL01-P-Phosphorus	Phosphorus (all forms)	5	1	5/26/2009
WetChem	DW	BPL01-P-Sulfate	Sulfate	4	2	11/7/2011
WetChem	DW	BPL01-P-pH	pH	4	1	11/7/2011
WetChem	DW	BPL01-TDS	Filterable Residue (TDS)	6	0	11/4/2013

Department	SOP Type	SOP Number	SOP Description	Revision Number	Update Number	Date Last Rev/Up
WetChem	DW	BPL01-P-TOC	Total Organic Carbon by UV-ox	2	1	11/15/2011
WetChem	DW	BPL01-P Turbidity	Turbidity	5	2	11/15/2011
WetChem	DW	BPL01-P-Cyanide	Total Cyanide	5	1	10/11/2011
WetChem	DW	BPL01-P-NO2NO3	Nitrate and Nitrite as Nitrogen	5	2	5/16/2011
WetChem	DW	BPL01-P-Alkalinity Stability	Alkalinity Stability	0	2	5/16/2011

Appendix 4

AUXILIARY CURRENT AND STANDBY BATTERY REQUIREMENTS
CALCULATIONS FOR 12VDC DEVICES

ALL CURRENTS ARE IN MILLIAMPERES (1 AMPERE = 1000 MILLIAMPERES)

MODEL NUMBER	QUAN USED	AC POWER ON NORMAL CURRENT EACH UNIT	A TOTAL	AC POWER OFF MAXIMUM CURRENT EACH UNIT	B TOTAL	IN ALARM MAXIMUM CURRENT EACH UNIT	C TOTAL
5192	1	250 x 1 =	250	256 x 1 =	256	505 x 1 =	505
5828	1	14 x QUAN. =	14	14 x QUAN. =	14	45 x QUAN. =	45
5258		124 x QUAN. =		126 x QUAN. =		256 x QUAN. =	
5257		124 x QUAN. =		126 x QUAN. =		256 x QUAN. =	
5825	1	48 x QUAN. =	48	48 x QUAN. =	48	48 x QUAN. =	48
5827U	22	0.5 x QUAN. =	11	0.5 x QUAN. =	11	0.8 x QUAN. =	18
5127		3 x QUAN. =		3 x QUAN. =		4 x QUAN. =	
5130		5 x QUAN. =		5 x QUAN. =		6 x QUAN. =	
5192A		24 x QUAN. =		29 x QUAN. =		54 x QUAN. =	
5193	2	20 x QUAN. =	40	18 x QUAN. =		36 x QUAN. =	
5129		25 x QUAN. =		25 x QUAN. =	50	83 x QUAN. =	246
5182	1	15 x QUAN. =	15	25 x QUAN. =		25 x QUAN. =	
5461		3 x QUAN. =		3 x QUAN. =	30	30 x QUAN. =	30
5829		20 x QUAN. =		20 x QUAN. =		4 x QUAN. =	
						20 x QUAN. =	481 x1
						x RELAYED =	

RATINGS OF OTHER 12 VOLT DEVICES (BELLS, HORNS, STROBES, SMOKE DETECTORS, AND HEAT DETECTORS) IN THE SYSTEM THAT ARE NOT SHOWN ABOVE:

MICRO-X	7	26 x QUAN. =	182	26 x QUAN. =	182	36 x QUAN. =	252
		16 x QUAN. =		16 x QUAN. =		16 x QUAN. =	
		x QUAN. =		x QUAN. =		x QUAN. =	
		x QUAN. =		x QUAN. =		x QUAN. =	
		TOTAL A =	664	TOTAL B =	675	TOTAL C =	1365

CURRENTS SHOWN IN MILLIAMPERES (1 AMPERE = 1000 MILLIAMPERES)
(2) IF TOTAL C EXCEEDS 1300mA, A 3830 IS REQUIRED TO PROVIDE AN ADDITIONAL 1400 mA.
YOU MAY ALSO USE
A UL LISTED EXTERNAL POWER SUPPLY FOR THIS PURPOSE.

AUXILIARY CURRENT AND STANDBY BATTERY REQUIREMENTS
CALCULATIONS FOR 24VDC DEVICES

ALL CURRENTS ARE IN MILLIAMPERES (1 AMPERE = 1000 MILLIAMPERES)

MODEL NUMBER	QUAN USED	AC POWER ON NORMAL CURRENT EACH UNIT (mA) x QUAN	A TOTAL	AC POWER OFF MAXIMUM CURRENT EACH UNIT (mA) x QUAN	B TOTAL	IN ALARM MAXIMUM CURRENT EACH UNIT (mA) x QUAN	C TOTAL
BSN	1	0 x QUAN. =	0	0 x QUAN. =	0	38 x QUAN. =	38
3300		x QUAN. =		x QUAN. =		x QUAN. =	
2400	21	19 x QUAN. =	399	19 x QUAN. =	399	39 x QUAN. =	819
AS241575	19	0 x QUAN. =	0	0 x QUAN. =	0	107 x QUAN. =	1216
RSS241575	2	0 x QUAN. =	0	0 x QUAN. =	0	68 x QUAN. =	136
5875S		0 x QUAN. =		0 x QUAN. =		208 x QUAN. =	
3099		0 x QUAN. =		0 x QUAN. =		15 x QUAN. =	
		TOTAL A =	25	TOTAL B =	25	TOTAL C =	1454

TOTAL C MUST NOT BE GREATER THAN 4 AMPS (4000 mA)

MAIN POWER SUPPLY
(INCLUDES CIRCUIT #1 AND CIRCUIT #2)

BATTERY CALCULATIONS FOR 24VDC CIRCUITS
CALCULATIONS FOR 24VDC CIRCUITS

ALL CURRENT S ARE IN MILLIAMPERES (1 AMPERE = 1000 MILLIAMPERES)

STAND-BY	409	X 24 =	9.8	AMP/HR.
ALARM	1.454	X 0833=	12	AMP/HR.
TOTAL	0.19	A/HR X 20% CONTIGENCY =	0.83	AMP/HR.

MAIN POWER SUPPLY

BATTERY CALCULATIONS FOR 12VDC CIRCUITS
CALCULATIONS FOR 12VDC CIRCUITS

ALL CURRENTS ARE IN MILLIAMPERES (1 AMPERE = 1000 MILLIAMPERES)

STAND-BY	675	X 24 =	16.20	AMP/HR.
ALARM	1.365	X 0833=	0.11	AMP/HR.
TOTAL	16.31	A/HR X 20% CONTIGENCY =	19.57	AMP/HR.

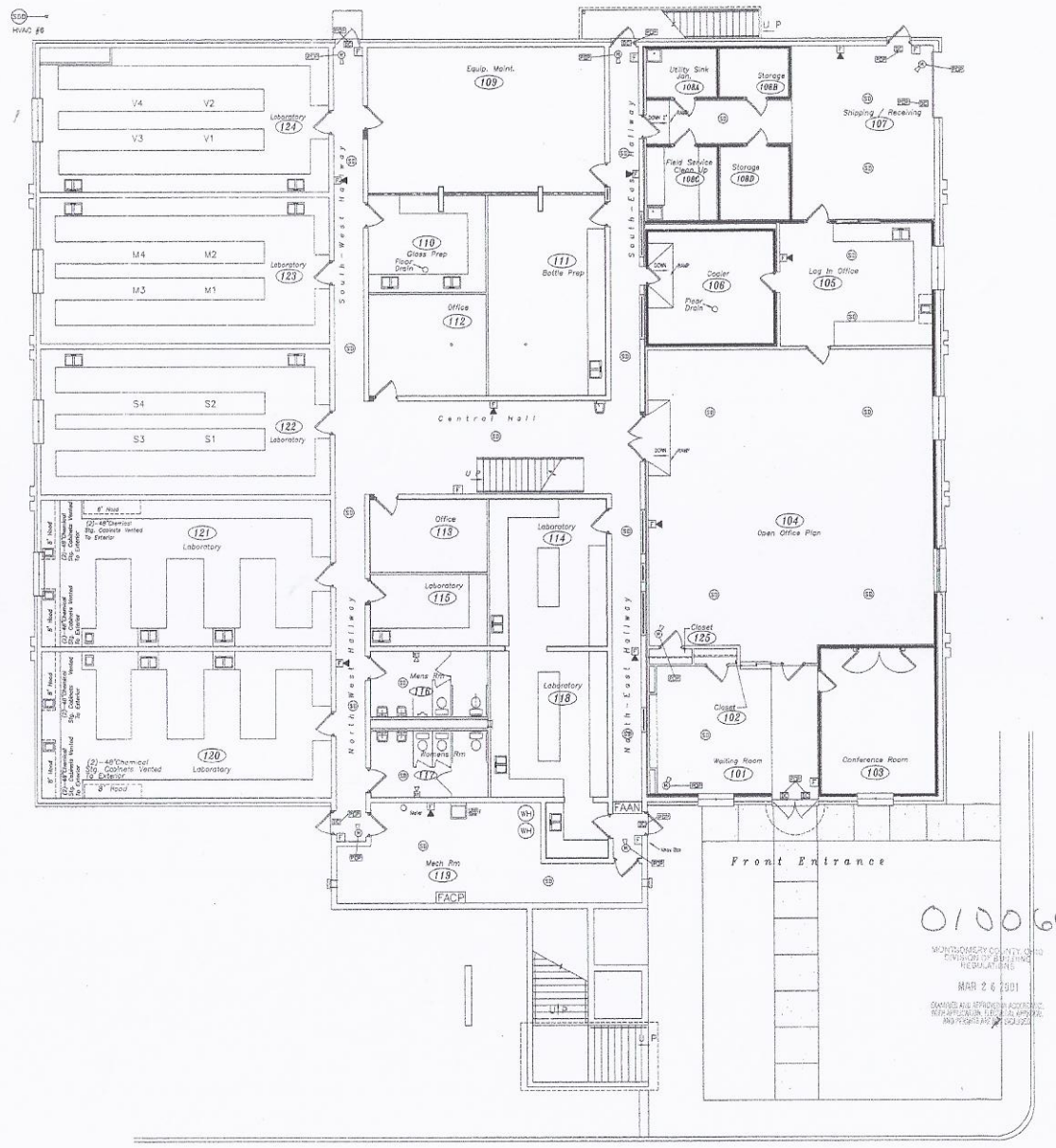
RECEIVED

MAR 23 2001

MONTGOMERY COUNTY
BUILDING REGULATIONS DIVISION

LEGEND

- FACP — Fire Alarm Combination Burglar and Fire Alarm Control Panel (Radionics Model D7212)
- FAAN — Fire Alarm Annunciator/Control (Radionics Model D1255)
- Photoelectric Smoke Detector (System Sensor model 2400)
- Manual Pull Station (Radionics Model D461)
- Horn/Strobe (Wheelock Model AS241575 15/75 Cd)
- Strobe (Wheelock Model RSS241575 15/75 Cd)
- PS — Auxilliary Power Supply (Radionics Model D9142F)
- Duct Smoke Detector (provided by others)
- Surface Mount Door Contact
- Short-range Motion Detector (Model Micro-X)
- Burglar Alarm Siren
- Pop it Point ID Module (Radionics Model D9127)



0100650

MONTGOMERY COUNTY, OHIO
DIVISION OF BUILDING REGULATIONS
MAR 26 2001
CHANGES AND REVISIONS ACCORDING REPRESENTATION, FEDERAL APPROVAL AND PERMITS ARE REQUIRED

First Floor Plan
Scale 1/8" = 1'-0"

3/26/01

NWDF
SCAN CHANGE TO PERMIT #0100650A
All previous code notes still apply except as specifically changed by this permit.
052601
CHANGES ONLY AS STATED IN

Drawn by: MLS

Belmonte Labs
25 Holiday Drive
Englewood, Ohio

D. STEVENS ELECTRIC
RESIDENTIAL COMMERICAL
PHONE (937) 276-5148
4248 N. MAIN STREET DAYTON, OHIO 45405

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1414 MEADOW WOOD
FAIRBORN, OHIO 45324
TEL. (937) 878-6079

Issue Date 03-22-01
Revisions
UPDATE-3-22

Project No. BL-01
Sheet No.
FA-1

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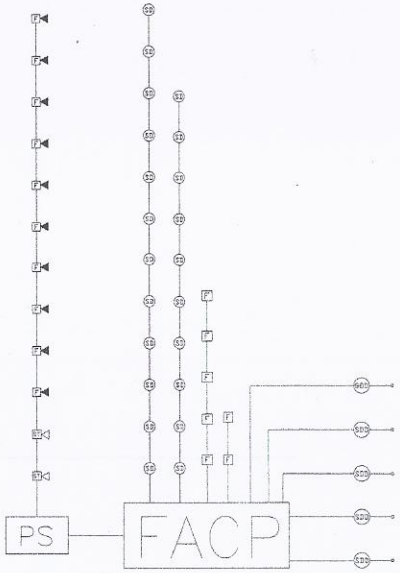
MAR 2 8 2001

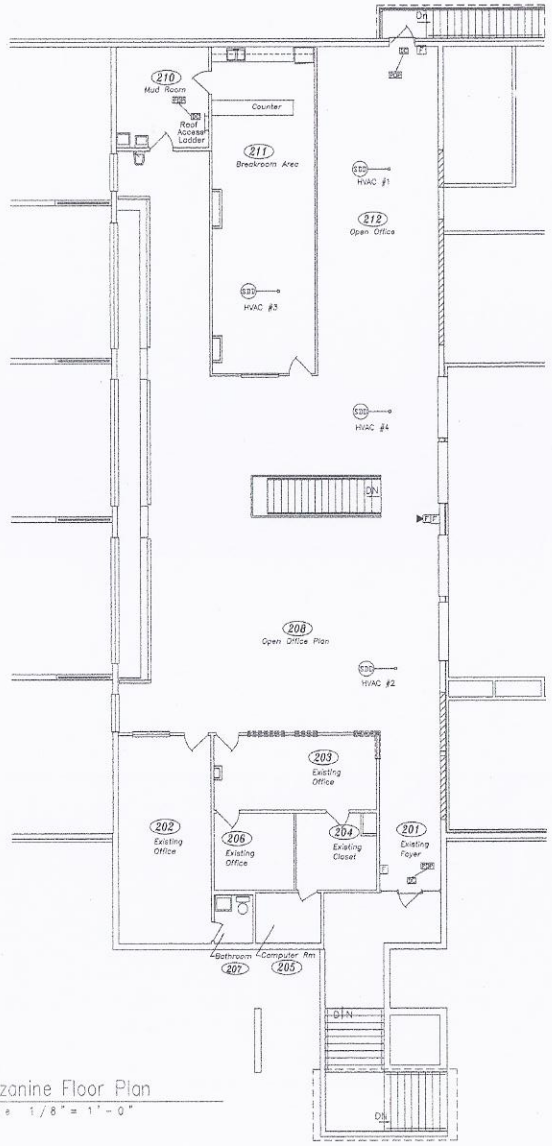
MONTGOMERY COUNTY
BUILDING REGULATIONS DIVISION

LEGEND

FACP	Fire Alarm Combination Burglar and Fire Alarm Control Panel (Radionics Model D7212)
FAAN	Fire Alarm Annunciator/Control (Radionics Model D1255)
	Photoelectric Smoke Detector (System Sensor model 2400)
F	Manual Pull Station (Radionics Model D461)
	Horn/Strobe (Wheelock Model AS241575 15/75 Cd)
	Strobe (Wheelock Model RSS241575 15/75 Cd)
PS	Auxilliary Power Supply (Radionics Model D9142F)
SD	Duct Smoke Detector (provided by others)
	Surface Mount Door Contact
	Short-range Motion Detector (Model Micro-X)
	Burglar Alarm Siren
PP	Popit Point ID Module (Radionics Model D9127)



RISER DIAGRAM



Mezzanine Floor Plan
Scale 1/8" = 1'-0"

0100652

MONTGOMERY COUNTY, OHIO
DIVISION OF BUILDING
REGULATIONS

MAR 2 8 2001

PLANNED AND APPROVED PLAN REVIEWED
WITH APPLICABLE ELECTRICAL APPROVAL
AND PERMITS ARE REQUIRED

Drawn by:
MLS

Belmonte Labs
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Issue Date 03-22-01
Revisions
UPDATE-3-22

Project No. BL-01
Sheet No.
FA-2

Room Number	Description	Room Number	Description
101	Lobby	201	Second Floor Entrance
102	Lobby closet	202	President's Office
103	Conference Room	203	Conference Room
104	Project Managers and Sales Offices	204	Marketing Office
105	Sample Log-in	205	Computer Room
106	Walk-In Cooler	206	Accounting Office
107	Supply and Sample Receiving	207	Bathroom
108A	Field Services Office	208	Open Area
108B	Janitors' Closet	209	
108C	Field Services Storage	210	Record Storage Room
108D	Gas Cylinder Storage Room	211	Lunch Room
109	Supply Storage Area	212	Open Area
110	TCLP Room		
111	Bottle Prep		
112	QA Managers Office		
113	Lab Managers Office		
114	Micro Lab		
115	Wet Chem Dishwashing Room		
116	Men's Bathroom		
117	Women's Bathroom		
118	Micro Lab		
119	Metals Archive Storage Area		
120	Extractions Lab		
121	Wet Chem Lab		
122	Semi-Volatile Lab		
123	Metals Lab		
124	VOC Lab		
125	Supply Closet		

Appendix 5

Instrument	Department	Description	InstType	SerialNumber	InService
Archon 1	VOCGCMS	Sampler Varian-Archon	GCMS-VOA	12756	1/1/2000
Archon 2	VOCGCMS	Sampler Varian-Archon	GCMS-VOA	13112	1/1/2001
Archon 3	VOCGCMS	Sampler Varian -Archon	GCMS-VOA	15295	1/1/2000
Archon 4	VOCGC	Sampler Varian-Archon	GC-FID/PID	12018	1/1/2000
Archon 5	VOCGCMS	Sampler Varian-Archon	GCMS-VOA	13986	1/1/2004
Archon 6	VOCGCMS	Sampler Varian-Archon	GCMS-VOA	14523	9/30/2005
Autoclave	MICRO	Electric Sterilmatic Sterilizer Market force indus	-	N/A	-
Balance 1	VOCGC	Mettler PM460	Auto	G52237	1/1/1995
Balance 2	VOCGC	Ohaus GA200D	Auto	4089	1/1/2002
Balance 3	Prep Lab	Ohaus AR5120	Prep Lab	F0191200440487	1/1/2001
Balance 4	METALS	Mettler Toledo AG 104	Auto	1119491996	1/1/2001
Balance 5	WETCHEM	Mettler AR5120	Auto	F06681200520154	1/1/2001
Balance 6	WETCHEM	Mettler XS205	Auto	1122411333	7/1/2007
Balance 7	Prep Lab	Ohaus AV412C	Prep Lab	8030471035	1/1/2010
Balance 8	MICRO	Mettler AE100-S	Auto	L07370	1/1/1995
Balance 9	MICRO	Ohaus AR5120	Auto	H1951203110282P	6/1/2005
BOD Incubator #1	MICRO	BOD Incubator Revco BOD 30-A14	WC	N/A	-
BOD Incubator #2	MICRO	BOD incubator Fisher Iso temp incubator 307C	WC	N/A	-
Centrifuge 1	Prep Lab	Fisher	Prep Lab	20500147	4/1/2013
COD Reactor #1	WETCHEM	HACH 45600-00	WC	970400015790	1/1/2000
COD Reactor #2	WETCHEM	HACH 45600-00	WC	920500007173	1/1/2000
Concentrator 1	VOCGCMS	P &T Tekmar 3000	GCMS-VOA	99343006	1/1/2000
Concentrator 2	VOCGCMS	P & T Tekmar 3000	GCMS-VOA	94012004	1/1/2001
Concentrator 3	VOCGCMS	P & T Tekmar 3100	GCMS-VOA	USO1141003	1/1/2000
Concentrator 4	VOCGC	Tekmar LSC 2000	GC-FID/PID	90080012	1/1/2000
Concentrator 5	VOCGCMS	P & T Tekmar 3100	GCMS-VOA	USO5241006	1/1/2004
Concentrator 6	VOCGCMS	P & T Tekmar 3000	GCMS-VOA	94115024	9/30/2005
Conductivity meter	WETCHEM	Orion Star Series meter Orion 3 star meter	WC	4416	10/1/2006
Dessicator Micro 1	METALS	Fisher	Auto	N/A	1/1/2001
Dessicator Micro 2	METALS	Fisher	Auto	N/A	1/1/2001
Dissolved O2 Meter	MICRO	Dissolved Oxygen Meter Orion 9708	Probe	N/A	-
Fecal Incubator 1	MICRO	Fisher	Auto	#1-5071	6/1/2005
Fecal Incubator 2	MICRO	Fisher	Auto	#2-5114	6/1/2005

Instrument	Department	Description	InstType	SerialNumber	InService
Fecal Incubator 3	MICRO	Fisher	Auto	#3&4-6504	6/1/2005
Fluoride Probe	WETCHEM	Thermo Orion 520A+	Probe	N/A	-
FP -1	WETCHEM	Koehler 14600	WC	R61140236	1/1/1998
GC/MS INS	VOCGCMS	GC/MS VOAs HP HP 5890 II Plus/5972	GCMS-VOA	3336A56681	1/1/2000
GC/MS1	VOCGCMS	GC/MS-Volatiles HP HP 5890 /5972MSD	GCMS-VOA	3140A39696/3251 A00068	1/1/2000
GC/MS2	VOCGCMS	GC/MS-Volatiles HP HP 5890 II/5972	GCMS-VOA	3336A56935/3609 A03554	1/1/2001
GC/MS5	VOCGCMS	GC/MS-Volatiles Drinking Water HP 5890/5972 MS	GCMS-VOA	3336A58999/3524 A02934	1/1/2004
GC/MS6	VOCGCMS	GC/MS-Volatiles Hewlett Packard 5890/5971	GCMS-VOA	2950A27974/3050 A01946	9/30/2005
GC/MS7SV	SVOCGCMS	Agilent 7890 GC/7975 MS	GCMS-Semi	CN10231144/US1 0227306	7/15/2010
GC/MS8SV	SVOCGCMS	Agilent 7890 GC/7975 MS	GCMS-Semi	CN10261063/US1 0247403	8/16/2010
GC_1	SVOCGC	GC ECD Hewlett Packard 5890 II	GC-ECD	3323A43450	1/1/2001
GC_2	SVOCGC	GC ECD Hewlett Packard 5890 II	GC-ECD	3108A34222	1/1/2000
GC_4	VOCGC	GC FID/PID Hewlett Packard 5890 series II	GC-FID/PID	2919A22633	1/1/2000
GC_5	VOCGC	GC FID Hewlett Packard 5890	GC-FID	2843A21028	1/1/2001
GC_6	SVOCGC	GC ECD Hewlett Packard 5890 II	GC-ECD	3033A30389	1/1/2004
GC_7	SVOCGC	GC FID Hewlett Packard 5890 series II	GC-FID	2938A28177	1/1/2005
GC_8	SVOCGC	HP 7890A	GC-ECD	CN12021114	-
GCMS3 Refrigerator	Prep Lab	Danby	Prep Lab	105110100128	1/1/2001
Genesys Spec	WETCHEM	Fisher 400 1/4	WC	3SGM064002	3/10/2008
GFAA_3	METALS	Varian Model 220 Zeeman	GFAA	EL99073517	-
GFAAS_1	METALS	Graphite Furnace Varian Spectra AA 400	GFAA	94071393/940714 99	1/7/2004
GFAAS_2	METALS	Graphite furnace Varian 220G	GFAA	EL03107299/EL03 107572/EL031077 61	11/1/2003
Hach BOD probe	MICRO	Hach LDO Probe Hach HQ20	WC	511000003749	6/1/2005
HG Analyzer 2 pump	METALS	Cetac-Peripump	CVAA	050303PMP	7/1/2003

Instrument	Department	Description	InstType	SerialNumber	InService
HG Analyzer_2	METALS	QuickTrace Hg Analyser CETAC M6100	CVAA	050302QT6	7/1/2003
HG ASX-400	METALS	Cetac	CVAA	040302ASX-4	7/1/2003
Hot Block 1	Prep Lab	Environmental Express	Prep Lab	111541403	6/1/2005
Hot Block 2	Prep Lab	Environmental Express	Prep Lab	C1959120633069	7/1/2013
Hot Block 3	METALS	Environmental Express SC154	Auto	2484CEC1309	1/1/2000
Hot Block 4	METALS	Environmental Express SC154	Auto	424CEC0656	1/1/2000
Hot Block 5	METALS	Environmental Express SC154	Auto	6366CDCW2949	1/1/2007
Hot Plate 1	Prep Lab	Thermolyne	TCLP	847021281201	1/1/2001
ICP_2	METALS	Digital ICP Varian MPX	ICP	EL02066402	5/1/2003
ICP_3	METALS	Digital ICP Varian 720	ICP	EL07114054	11/27/2007
LACHAT 2	WETCHEM	LACHAT	Flow Injec	130900001590	10/8/2013
Micro Oven	MICRO	Fisher Precision 51221126	WC	603041163	6/1/2005
Microscope	MICRO	Fisher Stereomater	WC	E1303-0804-0011	6/1/2005
Microwave 1	Prep Lab	CEM Mars 5	Prep Lab	MD4582	6/2/2011
MPX-SPS5	METALS	Varian	ICP	EL01023711	5/1/2003
Muffle Oven 1	WETCHEM	Fisher 550-14	Prep Lab	110N0109	1/1/2001
O & G Oven	Prep Lab	VWR	Prep Lab	1055908	5/1/2008
ph Meter	WETCHEM	Metter Toledo pH meter Mettler Toledo Seven Easy p	Probe	1226406153	7/1/2007
pH Meter 1	Prep Lab	Mettler Toledo	TCLP	1227445472	7/1/2007
Pmoist Oven	WETCHEM	VWR 1320	WC	300200	1/1/2001
Precision Incubator	MICRO	Low temp micro incubator Precision 815	WC	N/A	-
Quant-Tray Sealer	MICRO	IDEXX 89-10894-02	WC	4914	6/1/2005
Racer	SVOCGC	HP 7673	GC-FID	31236	1/1/2005
Rapid VAP 1	Prep Lab	Labconco 7910000	Prep Lab	04041865F	4/8/2004
Rapid VAP 2	Prep Lab	Labconco 7910000	Prep Lab	040418766F	4/8/2004
Re-Pippetor 1	Prep Lab	VWR	Prep Lab	330512081	1/1/2001
Re-Pippetor 2	Prep Lab	Fisher	Prep Lab	AD1651	1/1/2013
Sampler Tray 1	SVOCGC	HP 18596B	GC-ECD	3233A29548	1/1/2001
Segmented Flow Analy	WETCHEM	Astoria Pacifica 311	Flow Injec	200109	10/1/2007
Shaker 1	Prep Lab	Glas-Col	Prep Lab	388031	3/1/2004
Shaker 2	Prep Lab	Glas-Col	Prep Lab	388954	3/1/2004
Shaker 3	Prep Lab	VWR DS-500 E	Prep Lab	70523011	3/1/2004
Shaker 4	Prep Lab	Fisher Thermolyne M49125	Prep Lab	720001182040	1/1/1999
Sonicator 1	Prep Lab	Fisher 550	Prep Lab	F1215	1/1/2002
Sonicator 2	Prep Lab	Fisher XL 2020	Prep Lab	BBW02040777	1/1/2003

Instrument	Department	Description	InstType	SerialNumber	InService
Sonicator 3	Prep Lab	Fisher XL 2020	Prep Lab	G4933	1/1/2004
Sonicator 4	Prep Lab	Misonix S-4000	Prep Lab	S-59333A-08-01	8/16/2010
Stir Plate 1	Prep Lab	VWR	Prep Lab	70212020	1/1/2001
TDS Oven	WETCHEM	Fisher Isotemp Oven	WC	1055908	2/1/2008
TKN Digester	WETCHEM	Latchet BD-46	WC	1800-915	9/6/2008
TOC_2	WETCHEM	TOC Analyzer Tekmar Dohrmann Phoenix 8000	TOC	99006002	9/27/2002
Tower 1	SVOCGC	HP 7673	GC-ECD	3120A28283	1/1/2001
Tower 11	SVOCGC	Aglient 7963 Tower	GC-ECD	CN11180086	1/1/2005
Tower 2	SVOCGC	HP 7673	GC-ECD	3411A38206	1/1/2001
Tower 3	SVOCGC	HP 7673	GC-ECD	3013A21195	1/1/2000
Tower 4	SVOCGC	HP 7673	GC-ECD	3033A23011	1/1/2000
Tower 7	SVOCGCMS	Aglient 7693 Tower	GCMS-Semi	CN10240083	7/15/2010
Tower 8	SVOCGCMS	Aglient 7693 Tower	GCMS-Semi	CN10290187	8/16/2010
Tower Control Box 1	SVOCGC	HP 7673	GC-ECD	3229A29189	1/1/2001
Tower Control Box 10	SVOCGC	HP 7673	GC-FID	3113A26284	1/1/2005
Tower Control Box 2	SVOCGC	HP 7673	GC-ECD	3138A27346	1/1/2000
Tower Control Box 6	SVOCGC	HP 7673	GC-ECD	3312A34467	1/1/2004
Tower Control Box 9	SVOCGC	HP 7673	GC-ECD	3448A41000	1/1/2004
Tray 10	SVOCGC	Aglient Sampler 7693	GC-ECD	CN11170007	-
Tray 2	SVOCGC	Aglient Sample 18596B	GC-ECD	3607A41283	1/1/2000
Tray 7	SVOCGCMS	Aglient Sampler 7963	GCMS-Semi	CN12040016	7/15/2010
Tray 8	SVOCGCMS	Aglient Sampler 7963	GCMS-Semi	CN10230006	8/16/2010
Tray 9	SVOCGC	HP 18596B	GC-FID	3339A33327	1/1/2005
TSS Oven	WETCHEM	Fisher 516G	WC	103N0125	1/1/2000
Tumbler 1	Prep Lab	Analytical Testing	TCLP	0685LNJQ0010	1/1/2001
Tumbler 5	Prep Lab	Analytical Testing	TCLP	0685CPFL0006	1/1/2001
Turbidimeter	WETCHEM	Hach 2100AN 47001-60	WC	940400000226	7/1/2000
UV Light	MICRO	Sprectroline Sterilight	Auto	1442483	6/1/2005
Water Bath 1	Prep Lab	Organomation 14169	Prep Lab	52661	1/1/2007
Westco Easy Digest	WETCHEM	40/20	WC	40/25	5/1/2000

Appendix 6

Metals MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
SM 3113	Water	Antimony	0.0010	0.003	mg/L
SM 3113	Water	Arsenic	0.0014	0.005	mg/L
SM 3113	Water	Beryllium	0.00004	0.0002	mg/L
SM 3113	Water	Cadmium	0.0001	0.0002	mg/L
SM 3113	Water	Chromium	0.0003	0.001	mg/L
SM 3113	Water	Cobalt	0.0004	0.001	mg/L
SM 3113	Water	Copper	0.0009	0.005	mg/L
SM 3113	Water	Lead	0.0004	0.002	mg/L
SM 3113	Water	Molybdenum	0.0009	0.005	mg/L
SM 3113	Water	Selenium	0.0013	0.005	mg/L
SM 3113	Water	Silver	0.0001	0.0002	mg/L
200.9	Water	Thallium	0.0005	0.001	mg/L
EPA 200.7	Soil	Phosphorus	0.3877	100	mg/kg
EPA 200.7	Soil	Antimony	0.2659	1	mg/kg
EPA 200.7	Soil	Aluminum	0.3182	100	mg/kg
EPA 200.7	Soil	Silica	1.1468	50	mg/kg
EPA 200.7	Soil	Silver	0.0514	1	mg/kg
EPA 200.7	Soil	Chromium	0.0249	1	mg/kg
EPA 200.7	Soil	Cadmium	0.0096	0.5	mg/kg
EPA 200.7	Soil	Cobalt	0.0164	1	mg/kg
EPA 200.7	Soil	Copper	0.0506	1	mg/kg
EPA 200.7	Soil	Palladium	0.1717	10	mg/kg
EPA 200.7	Soil	Zinc	0.1723	5	mg/kg
EPA 200.7	Soil	Vanadium	0.0366	1	mg/kg
EPA 200.7	Soil	Lead	0.0925	1	mg/kg
EPA 200.7	Soil	Sodium	14.9325	1000	mg/kg
EPA 200.7	Soil	Nickel	0.0892	1	mg/kg
EPA 200.7	Soil	Thallium	0.1435	5	mg/kg
EPA 200.7	Soil	Tin	0.1514	5	mg/kg
EPA 200.7	Soil	Titanium	0.0275	1	mg/kg
EPA 200.7	Soil	Arsenic	0.1581	1	mg/kg
EPA 200.7	Soil	Beryllium	0.0068	0.5	mg/kg
EPA 200.7	Soil	Boron	0.2920	20	mg/kg
EPA 200.7	Soil	Bismuth	0.1080	1	mg/kg
EPA 200.7	Soil	Calcium	0.6606	100	mg/kg
EPA 200.7	Soil	Potassium	0.9562	1000	mg/kg
EPA 200.7	Soil	Selenium	0.1920	5	mg/kg
EPA 200.7	Soil	Magnesium	0.2095	100	mg/kg
EPA 200.7	Soil	Manganese	0.0741	1	mg/kg
EPA 200.7	Soil	Iron	0.0878	5	mg/kg
EPA 200.7	Soil	Barium	0.2804	1	mg/kg
EPA 200.7	Soil	Strontium	0.0362	1	mg/kg
EPA 200.7	Soil	Molybdenum	0.0997	1	mg/kg
EPA 200.7	Soil	Tellurium	0.3173	10	mg/kg

Metals MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
EPA 200.7	Soil	Lithium	0.0087	5	mg/kg
EPA 200.7	Soil	Gold	0.3510	5	mg/kg
EPA 200.7	Soil	Platinum	0.8681	35	mg/kg
SW 6010B/EPA 200.7	Water	Antimony	0.0019	0.005	mg/L
SW 6010B/EPA 200.7	Water	Arsenic	0.0016	0.005	mg/L
SW 6010B/EPA 200.7	Water	Barium	0.0004	0.005	mg/L
SW 6010B/EPA 200.7	Water	Beryllium	0.0000	0.0005	mg/L
SW 6010B/EPA 200.7	Water	Bismuth	0.0020	0.005	mg/L
SW 6010B/EPA 200.7	Water	Boron	0.0044	0.1	mg/L
SW 6010B/EPA 200.7	Water	Cadmium	0.0001	0.002	mg/L
SW 6010B/EPA 200.7	Water	Calcium	0.0049	0.1	mg/L
SW 6010B/EPA 200.7	Water	Chromium	0.0003	0.005	mg/L
SW 6010B/EPA 200.7	Water	Cobalt	0.0004	0.005	mg/L
SW 6010B/EPA 200.7	Water	Copper	0.0004	0.005	mg/L
SW 6010B/EPA 200.7	Water	Iron	0.0018	0.05	mg/L
SW 6010B/EPA 200.7	Water	Lead	0.0010	0.005	mg/L
SW 6010B/EPA 200.7	Water	Magnesium	0.0027	0.1	mg/L
SW 6010B/EPA 200.7	Water	Manganese	0.0002	0.005	mg/L
SW 6010B/EPA 200.7	Water	Molybdenum	0.0014	0.01	mg/L
SW 6010B/EPA 200.7	Water	Nickel	0.0006	0.005	mg/L
SW 6010B/EPA 200.7	Water	Potassium	0.0057	1	mg/L
SW 6010B/EPA 200.7	Water	Selenium	0.0022	0.01	mg/L
SW 6010B/EPA 200.7	Water	Silica	0.0030	0.05	mg/L
SW 6010B/EPA 200.7	Water	Silver	0.0002	0.002	mg/L
SW 6010B/EPA 200.7	Water	Sodium	0.1210	1	mg/L
SW 6010B/EPA 200.7	Water	Strontium	0.0003	0.005	mg/L
SW 6010B/EPA 200.7	Water	Thallium	0.0014	0.05	mg/L
SW 6010B/EPA 200.7	Water	Tin	0.0018	0.005	mg/L
SW 6010B/EPA 200.7	Water	Titanium	0.0002	0.005	mg/L
SW 6010B/EPA 200.7	Water	Vanadium	0.0002	0.005	mg/L
SW 6010B/EPA 200.7	Water	Zinc	0.0024	0.01	mg/L
SW 6010B/EPA 200.7	Water	Aluminum	0.0035	0.1	mg/L
SW 6010B/EPA 200.7	Water	Gold	0.0035	0.01	mg/L
SW 6010B/EPA 200.7	Water	Platinum	0.0158	0.035	mg/L
SW 6010B/EPA 200.7	Water	Palladium	0.0017	0.01	mg/L
SW 6010B/EPA 200.7	Water	Tellurium	0.0032	0.01	mg/L
SW 6010B/EPA 200.7	Water	Phosphorus	0.0030	0.1	mg/L
SW 6010B/EPA 200.7	Water	Lithium	0.0001	0.005	mg/L

Semivolatile MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
SW 8011	Water	1,2-Dibromo-3-chloropropane	0.0086	0.02	ug/L
SW 8011	Water	1,2-Dibromoethane	0.0051	0.02	ug/L
SW 8015	Soil	C10 to C20	3.8547	10	mg/kg
SW 8015	Water	C10 to C20	0.2357	0.5	mg/L
EPA 552.2	Drinking Water	Bromochloroacetic acid	0.3033	1	ug/L
EPA 552.2	Drinking Water	Dibromoacetic acid	0.4232	1	ug/L
EPA 552.2	Drinking Water	Dichloroacetic acid	0.4349	1	ug/L
EPA 552.2	Drinking Water	Monobromoacetic acid	0.4677	1	ug/L
EPA 552.2	Drinking Water	Monochloroacetic acid	0.8394	2	ug/L
EPA 552.2	Drinking Water	Trichloroacetic acid	0.3289	1	ug/L
EPA 615/SW 8151	Water	2,4,5-T	0.1006	0.25	ug/L
EPA 615/SW 8151	Water	2,4,5-TP (Silvex)	0.0525	0.25	ug/L
EPA 615/SW 8151	Water	2,4-D	0.0878	0.25	ug/L
EPA 615/SW 8151	Water	2,4-DB	0.0880	0.25	ug/L
EPA 615/SW 8151	Water	Dalapon	0.0976	0.5	ug/L
EPA 615/SW 8151	Water	Dicamba	0.0909	0.25	ug/L
EPA 615/SW 8151	Water	Dichloroprop	0.0764	0.25	ug/L
EPA 615/SW 8151	Water	Dinoseb	0.1192	0.25	ug/L
EPA 615/SW 8151	Water	MCPA	34.8557	100	ug/L
EPA 615/SW 8151	Water	MCPP	22.3020	100	ug/L
EPA 608/SW 8081	Soil	TCLP Toxaphene	0.0021	0.005	mg/kg
EPA 608/SW 8081	Soil	TCLP Methoxychlor	0.0002	0.0005	mg/kg
EPA 608/SW 8081	Soil	TCLP Heptachlor epoxide	0.0002	0.0005	mg/kg
EPA 608/SW 8081	Soil	TCLP Heptachlor	0.0002	0.0005	mg/kg
EPA 608/SW 8081	Soil	TCLP gamma-BHC	0.0002	0.0005	mg/kg
EPA 608/SW 8081	Soil	TCLP Endrin	0.0002	0.0005	mg/kg
EPA 608/SW 8081	Soil	TCLP Chlordane	0.0021	0.005	mg/kg
EPA 608/SW 8081	Soil	Dieldrin	0.0006	0.002	mg/kg
EPA 608/SW 8081	Soil	Endosulfan I	0.0006	0.002	mg/kg
EPA 608/SW 8081	Soil	Endosulfan II	0.0004	0.002	mg/kg
EPA 608/SW 8081	Soil	Endosulfan sulfate	0.0009	0.002	mg/kg
EPA 608/SW 8081	Soil	Endrin	0.0005	0.002	mg/kg
EPA 608/SW 8081	Soil	Endrin aldehyde	0.0006	0.002	mg/kg
EPA 608/SW 8081	Soil	Endrin ketone	0.0010	0.002	mg/kg
EPA 608/SW 8081	Soil	gamma-BHC	0.0006	0.002	mg/kg
EPA 608/SW 8081	Soil	gamma-Chlordane	0.0006	0.002	mg/kg
EPA 608/SW 8081	Soil	Heptachlor	0.0005	0.002	mg/kg
EPA 608/SW 8081	Soil	Heptachlor epoxide	0.0005	0.002	mg/kg
EPA 608/SW 8081	Soil	Methoxychlor	0.0010	0.002	mg/kg
EPA 608/SW 8081	Soil	Toxaphene	0.0038	0.02	mg/kg
EPA 608/SW 8081	Soil	4,4´-DDD	0.0006	0.002	mg/kg
EPA 608/SW 8081	Soil	4,4´-DDE	0.0005	0.002	mg/kg
EPA 608/SW 8081	Soil	4,4´-DDT	0.0007	0.002	mg/kg
EPA 608/SW 8081	Soil	Aldrin	0.0006	0.002	mg/kg

Semivolatile MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
EPA 608/SW 8081	Soil	alpha-BHC	0.0009	0.002	mg/kg
EPA 608/SW 8081	Soil	alpha-Chlordane	0.0006	0.002	mg/kg
EPA 608/SW 8081	Soil	beta-BHC	0.0009	0.002	mg/kg
EPA 608/SW 8081	Soil	Chlordane	0.0050	0.02	mg/kg
EPA 608/SW 8081	Soil	delta-BHC	0.0007	0.002	mg/kg
EPA 608/SW 8081	Water	beta-BHC	0.0238	0.05	ug/L
EPA 608/SW 8081	Water	Chlordane	0.2106	0.5	ug/L
EPA 608/SW 8081	Water	delta-BHC	0.0217	0.05	ug/L
EPA 608/SW 8081	Water	Dieldrin	0.0153	0.05	ug/L
EPA 608/SW 8081	Water	Endosulfan I	0.0119	0.05	ug/L
EPA 608/SW 8081	Water	Endosulfan II	0.0181	0.05	ug/L
EPA 608/SW 8081	Water	Endosulfan sulfate	0.0238	0.05	ug/L
EPA 608/SW 8081	Water	Endrin	0.0153	0.05	ug/L
EPA 608/SW 8081	Water	Endrin aldehyde	0.0168	0.05	ug/L
EPA 608/SW 8081	Water	Endrin ketone	0.0247	0.05	ug/L
EPA 608/SW 8081	Water	gamma-BHC	0.0168	0.05	ug/L
EPA 608/SW 8081	Water	gamma-Chlordane	0.0217	0.05	ug/L
EPA 608/SW 8081	Water	Heptachlor	0.0181	0.05	ug/L
EPA 608/SW 8081	Water	Heptachlor epoxide	0.0217	0.05	ug/L
EPA 608/SW 8081	Water	Methoxychlor	0.0247	0.05	ug/L
EPA 608/SW 8081	Water	Toxaphene	0.2098	0.5	ug/L
EPA 608/SW 8081	Water	4,4´-DDD	0.0153	0.05	ug/L
EPA 608/SW 8081	Water	4,4´-DDE	0.0168	0.05	ug/L
EPA 608/SW 8081	Water	4,4´-DDT	0.0217	0.05	ug/L
EPA 608/SW 8081	Water	Aldrin	0.0168	0.05	ug/L
EPA 608/SW 8081	Water	alpha-BHC	0.0217	0.05	ug/L
EPA 608/SW 8081	Water	alpha-Chlordane	0.0153	0.05	ug/L
EPA 608/SW 8082	Soil	Aroclor 1016	0.0083	0.02	mg/kg
EPA 608/SW 8082	Soil	Aroclor 1221	0.0100	0.02	mg/kg
EPA 608/SW 8082	Soil	Aroclor 1232	0.0081	0.02	mg/kg
EPA 608/SW 8082	Soil	Aroclor 1242	0.0045	0.02	mg/kg
EPA 608/SW 8082	Soil	Aroclor 1248	0.0067	0.02	mg/kg
EPA 608/SW 8082	Soil	Aroclor 1254	0.0090	0.02	mg/kg
EPA 608/SW 8082	Soil	Aroclor 1260	0.0057	0.02	mg/kg
EPA 608/SW 8082	Water	Aroclor 1016	0.2385	0.5	ug/L
EPA 608/SW 8082	Water	Aroclor 1221	0.1236	0.5	ug/L
EPA 608/SW 8082	Water	Aroclor 1232	0.2323	0.5	ug/L
EPA 608/SW 8082	Water	Aroclor 1242	0.2327	0.5	ug/L
EPA 608/SW 8082	Water	Aroclor 1248	0.1471	0.5	ug/L
EPA 608/SW 8082	Water	Aroclor 1254	0.1958	0.5	ug/L
EPA 608/SW 8082	Water	Aroclor 1260	0.2493	0.5	ug/L
SW8270	Soil	TCLP 1,4-Dichlorobenzene	0.0003	0.15	mg/kg
SW8270	Soil	TCLP 2,4,5-Trichlorophenol	0.0007	0.15	mg/kg
SW8270	Soil	TCLP 2,4,6-Trichlorophenol	0.0004	0.15	mg/kg

Semivolatile MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
SW8270	Soil	TCLP 2,4-Dinitrotoluene	0.0005	0.15	mg/kg
SW8270	Soil	TCLP 2-Methylphenol	0.0009	0.15	mg/kg
SW8270	Soil	TCLP 3 & 4-Methylphenol	0.0007	0.15	mg/kg
SW8270	Soil	TCLP Hexachlorobenzene	0.0003	0.15	mg/kg
SW8270	Soil	TCLP Hexachlorobutadiene	0.0005	0.15	mg/kg
SW8270	Soil	TCLP Hexachloroethane	0.0004	0.15	mg/kg
SW8270	Soil	TCLP Nitrobenzene	0.0003	0.15	mg/kg
SW8270	Soil	TCLP Pentachlorophenol	0.0004	0.15	mg/kg
SW8270	Soil	TCLP Pyridine	0.0005	0.15	mg/kg
SW8270	Soil	Atrazine	0.2505	0.3	mg/kg
SW8270	Soil	Bis(2-chloroisopropyl)ether	0.0136	0.15	mg/kg
SW8270	Soil	2,4-Dinitrophenol	0.0130	0.15	mg/kg
SW8270	Soil	p-Dimethylaminoazobenzene	0.0144	0.15	mg/kg
SW8270	Soil	2,4-Dimethylphenol	0.0140	0.15	mg/kg
SW8270	Soil	2,4-Dichlorophenol	0.0116	0.15	mg/kg
SW8270	Soil	2,4,6-Trichlorophenol	0.0124	0.15	mg/kg
SW8270	Soil	2,4,5-Trichlorophenol	0.0160	0.15	mg/kg
SW8270	Soil	2,3,4,6-Tetrachlorophenol	0.0161	0.15	mg/kg
SW8270	Soil	1-Naphthylamine	0.0108	0.15	mg/kg
SW8270	Soil	1-Methylnaphthalene	0.0100	0.15	mg/kg
SW8270	Soil	1,4-Naphthoquinone	0.0097	0.15	mg/kg
SW8270	Soil	1,4-Dichlorobenzene	0.0102	0.15	mg/kg
SW8270	Soil	1,3-Dichlorobenzene	0.0138	0.15	mg/kg
SW8270	Soil	1,3,5-Trinitrobenzene	0.0126	0.15	mg/kg
SW8270	Soil	1,2-Diphenylhydrazine	0.0192	0.15	mg/kg
SW8270	Soil	1,2-Dichlorobenzene	0.0091	0.15	mg/kg
SW8270	Soil	1,2,4-Trichlorobenzene	0.0110	0.15	mg/kg
SW8270	Soil	1,2,4,5-Tetrachlorobenzene	0.0142	0.15	mg/kg
SW8270	Soil	Parathion	0.0148	0.15	mg/kg
SW8270	Soil	o-Toluidine	0.0130	0.15	mg/kg
SW8270	Soil	O,O,O-Triethylphosphorothioate	0.0150	0.15	mg/kg
SW8270	Soil	N-Nitrosopyrrolidine	0.0124	0.15	mg/kg
SW8270	Soil	N-Nitrosopiperidine	0.0118	0.15	mg/kg
SW8270	Soil	N-Nitrosomorpholine	0.0121	0.15	mg/kg
SW8270	Soil	N-Nitrosomethylethylamine	0.0144	0.15	mg/kg
SW8270	Soil	N-Nitrosodiphenylamine	0.0233	0.15	mg/kg
SW8270	Soil	N-Nitrosodi-n-propylamine	0.0139	0.15	mg/kg
SW8270	Soil	N-Nitroso-di-n-butylamine	0.0129	0.15	mg/kg
SW8270	Soil	N-Nitrosodimethylamine	0.0160	0.15	mg/kg
SW8270	Soil	N-Nitrosodiethylamine	0.0135	0.15	mg/kg
SW8270	Soil	Nitrobenzene	0.0126	0.15	mg/kg
SW8270	Soil	Naphthalene	0.0128	0.15	mg/kg
SW8270	Soil	Methyl parathion	0.0099	0.15	mg/kg
SW8270	Soil	Methyl methanesulfonate	0.0160	0.15	mg/kg

Semivolatile MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
SW8270	Soil	Methapyrilene	0.0156	0.15	mg/kg
SW8270	Soil	m-Dinitrobenzene	0.0121	0.15	mg/kg
SW8270	Soil	Kepone	0.0091	0.15	mg/kg
SW8270	Soil	Isosafrole	0.0088	0.15	mg/kg
SW8270	Soil	Isophorone	0.0091	0.15	mg/kg
SW8270	Soil	Isodrin	0.0139	0.15	mg/kg
SW8270	Soil	Indeno(1,2,3-cd)pyrene	0.0131	0.15	mg/kg
SW8270	Soil	Hexachloropropene	0.0157	0.15	mg/kg
SW8270	Soil	Hexachlorophene	0.0138	0.15	mg/kg
SW8270	Soil	Hexachloroethane	0.0102	0.15	mg/kg
SW8270	Soil	Hexachlorocyclopentadiene	0.0143	0.15	mg/kg
SW8270	Soil	Hexachlorobutadiene	0.0095	0.15	mg/kg
SW8270	Soil	Hexachlorobenzene	0.0136	0.15	mg/kg
SW8270	Soil	Fluorene	0.0130	0.15	mg/kg
SW8270	Soil	Fluoranthene	0.0077	0.15	mg/kg
SW8270	Soil	Famphur	0.0136	0.15	mg/kg
SW8270	Soil	Ethyl methanesulfonate	0.0131	0.15	mg/kg
SW8270	Soil	Disulfoton	0.0165	0.15	mg/kg
SW8270	Soil	Diphenylamine	0.0192	0.15	mg/kg
SW8270	Soil	Di-n-octyl phthalate	0.0119	0.15	mg/kg
SW8270	Soil	Di-n-butyl phthalate	0.0124	0.15	mg/kg
SW8270	Soil	Dimethyl phthalate	0.0132	0.15	mg/kg
SW8270	Soil	Dimethoate	0.0143	0.15	mg/kg
SW8270	Soil	Diethyl phthalate	0.0154	0.15	mg/kg
SW8270	Soil	Dibenzofuran	0.0132	0.15	mg/kg
SW8270	Soil	Dibenz(a,h)anthracene	0.0122	0.15	mg/kg
SW8270	Soil	4-Chlorophenyl phenyl ether	0.0134	0.15	mg/kg
SW8270	Soil	Chrysene	0.0092	0.15	mg/kg
SW8270	Soil	Chlorobenzilate	0.0092	0.15	mg/kg
SW8270	Soil	Carbazole	0.0149	0.15	mg/kg
SW8270	Soil	Butyl benzyl phthalate	0.0119	0.15	mg/kg
SW8270	Soil	Bis(2-ethylhexyl)phthalate	0.0162	0.15	mg/kg
SW8270	Soil	bis-(2-Chloroethyl)ether	0.0149	0.15	mg/kg
SW8270	Soil	Bis(2-chloroethoxy)methane	0.0167	0.15	mg/kg
SW8270	Soil	Benzyl Alcohol	0.0116	0.15	mg/kg
SW8270	Soil	Benzoic acid	0.0237	0.15	mg/kg
SW8270	Soil	Benzo(k)fluoranthene	0.0134	0.15	mg/kg
SW8270	Soil	Benzo(g,h,i)perylene	0.0105	0.15	mg/kg
SW8270	Soil	Benzo(b)fluoranthene	0.0161	0.15	mg/kg
SW8270	Soil	Benzo(a)pyrene	0.0087	0.15	mg/kg
SW8270	Soil	Benzidine	0.0179	0.15	mg/kg
SW8270	Soil	Benz(a)anthracene	0.0136	0.15	mg/kg
SW8270	Soil	Aramite	0.0150	0.15	mg/kg
SW8270	Soil	Anthracene	0.0112	0.15	mg/kg

Semivolatile MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
SW8270	Soil	Aniline	0.0122	0.15	mg/kg
SW8270	Soil	Acetophenone	0.0069	0.15	mg/kg
SW8270	Soil	Acenaphthylene	0.0142	0.15	mg/kg
SW8270	Soil	Acenaphthene	0.0014	0.15	mg/kg
SW8270	Soil	a,a-Dimethylphenethylamine	0.0333	0.15	mg/kg
SW8270	Soil	7,12-Dimethylbenz(a)anthracene	0.0083	0.15	mg/kg
SW8270	Soil	5-Nitro-o-toluidine	0.0164	0.15	mg/kg
SW8270	Soil	4-Nitrophenol	0.0102	0.15	mg/kg
SW8270	Soil	4-Nitroaniline	0.0097	0.15	mg/kg
SW8270	Soil	4-Nitro-1-oxide-quinoline	0.0164	0.15	mg/kg
SW8270	Soil	Thionazin	0.0143	0.15	mg/kg
SW8270	Soil	Sulfotep	0.0116	0.15	mg/kg
SW8270	Soil	Safrole	0.0133	0.15	mg/kg
SW8270	Soil	Pyridine	0.0218	0.15	mg/kg
SW8270	Soil	Pyrene	0.0158	0.15	mg/kg
SW8270	Soil	Pronamide	0.0109	0.15	mg/kg
SW8270	Soil	p-Phenylenediamine	0.0333	0.15	mg/kg
SW8270	Soil	Phorate	0.0105	0.15	mg/kg
SW8270	Soil	Phenol	0.0143	0.15	mg/kg
SW8270	Soil	Phenanthrene	0.0095	0.15	mg/kg
SW8270	Soil	Phenacetin	0.0111	0.15	mg/kg
SW8270	Soil	Pentachlorophenol	0.0150	0.15	mg/kg
SW8270	Soil	Pentachloronitrobenzene	0.0151	0.15	mg/kg
SW8270	Soil	Pentachlorobenzene	0.0145	0.15	mg/kg
SW8270	Soil	Diallate	0.0140	0.15	mg/kg
SW8270	Soil	Dinoseb	0.0117	0.15	mg/kg
SW8270	Soil	4-Chloroaniline	0.0160	0.15	mg/kg
SW8270	Soil	4-Chloro-3-methylphenol	0.0088	0.15	mg/kg
SW8270	Soil	4-Bromophenyl phenyl ether	0.0118	0.15	mg/kg
SW8270	Soil	4-Aminobiphenyl	0.0118	0.15	mg/kg
SW8270	Soil	4,6-Dinitro-2-methylphenol	0.0131	0.15	mg/kg
SW8270	Soil	3-Nitroaniline	0.0120	0.15	mg/kg
SW8270	Soil	3-Methylcholanthrene	0.0128	0.15	mg/kg
SW8270	Soil	3,3´-Dimethylbenzidine	0.0113	0.15	mg/kg
SW8270	Soil	3,3´-Dichlorobenzidine	0.0162	0.15	mg/kg
SW8270	Soil	3 & 4-Methylphenol	0.0198	0.15	mg/kg
SW8270	Soil	2-Picoline	0.0141	0.15	mg/kg
SW8270	Soil	2-Nitrophenol	0.0078	0.15	mg/kg
SW8270	Soil	2-Nitroaniline	0.0154	0.15	mg/kg
SW8270	Soil	2-Naphthylamine	0.0110	0.15	mg/kg
SW8270	Soil	2-Methylphenol	0.0130	0.15	mg/kg
SW8270	Soil	2-Methylnaphthalene	0.0121	0.15	mg/kg
SW8270	Soil	2-Chlorophenol	0.0120	0.15	mg/kg
SW8270	Soil	2-Chloronaphthalene	0.0145	0.15	mg/kg

Semivolatile MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
SW8270	Soil	2-Acetylaminofluorene	0.0086	0.15	mg/kg
SW8270	Soil	2,6-Dinitrotoluene	0.0134	0.15	mg/kg
SW8270	Soil	2,6-Dichlorophenol	0.0115	0.15	mg/kg
SW8270	Soil	2,4-Dinitrotoluene	0.0149	0.15	mg/kg
SW8270	Water	1,2,4,5-Tetrachlorobenzene	0.4109	5	ug/L
SW8270	Water	1,2,4-Trichlorobenzene	0.3120	5	ug/L
SW8270	Water	1,2-Dichlorobenzene	0.3879	5	ug/L
SW8270	Water	1,2-Diphenylhydrazine	0.3858	5	ug/L
SW8270	Water	1,3,5-Trinitrobenzene	0.8785	5	ug/L
SW8270	Water	1,3-Dichlorobenzene	0.3192	5	ug/L
SW8270	Water	1,4-Dichlorobenzene	0.3409	5	ug/L
SW8270	Water	1,4-Naphthoquinone	0.3230	5	ug/L
SW8270	Water	1-Methylnaphthalene	0.3823	5	ug/L
SW8270	Water	1-Naphthylamine	0.2798	5	ug/L
SW8270	Water	Pyrene	0.0613	5	ug/L
SW8270	Water	Pyridine	0.4543	5	ug/L
SW8270	Water	Safrole	0.3063	5	ug/L
SW8270	Water	Sulfotep	0.3411	5	ug/L
SW8270	Water	Thionazin	0.4524	5	ug/L
SW8270	Water	Dinoseb	0.4587	5	ug/L
SW8270	Water	m-Dinitrobenzene	0.2622	5	ug/L
SW8270	Water	Carbazole	0.3556	5	ug/L
SW8270	Water	Methapyrilene	0.6066	5	ug/L
SW8270	Water	Methyl methanesulfonate	0.5224	5	ug/L
SW8270	Water	Methyl parathion	0.2455	5	ug/L
SW8270	Water	Naphthalene	0.0651	5	ug/L
SW8270	Water	Nitrobenzene	0.3142	5	ug/L
SW8270	Water	N-Nitrosodiethylamine	0.4097	5	ug/L
SW8270	Water	N-Nitrosodimethylamine	0.3756	5	ug/L
SW8270	Water	N-Nitroso-di-n-butylamine	0.3844	5	ug/L
SW8270	Water	N-Nitrosodi-n-propylamine	0.3464	5	ug/L
SW8270	Water	N-Nitrosodiphenylamine	0.6020	5	ug/L
SW8270	Water	N-Nitrosomethylethylamine	0.8127	5	ug/L
SW8270	Water	N-Nitrosomorpholine	0.7509	5	ug/L
SW8270	Water	N-Nitrosopiperidine	0.3775	5	ug/L
SW8270	Water	N-Nitrosopyrrolidine	0.3158	5	ug/L
SW8270	Water	O,O,O-Triethylphosphorothioate	0.3525	5	ug/L
SW8270	Water	o-Toluidine	0.3753	5	ug/L
SW8270	Water	Parathion	0.4500	5	ug/L
SW8270	Water	p-Dimethylaminoazobenzene	0.5113	5	ug/L
SW8270	Water	Pentachlorobenzene	0.2894	5	ug/L
SW8270	Water	Pentachloronitrobenzene	0.5815	5	ug/L
SW8270	Water	Pentachlorophenol	0.4290	1	ug/L
SW8270	Water	Phenacetin	0.3946	5	ug/L

Semivolatile MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
SW8270	Water	Phenanthrene	0.0745	5	ug/L
SW8270	Water	Phenol	0.2632	5	ug/L
SW8270	Water	Phorate	0.4399	5	ug/L
SW8270	Water	p-Phenylenediamine	1.0000	5	ug/L
SW8270	Water	Chlorobenzilate	0.3734	5	ug/L
SW8270	Water	Chrysene	0.0625	5	ug/L
SW8270	Water	Diallate	0.2902	5	ug/L
SW8270	Water	Dibenz(a,h)anthracene	0.0742	0.2	ug/L
SW8270	Water	Dibenzofuran	0.2539	5	ug/L
SW8270	Water	Diethyl phthalate	0.3745	5	ug/L
SW8270	Water	Dimethoate	0.3567	10	ug/L
SW8270	Water	Dimethyl phthalate	0.4622	5	ug/L
SW8270	Water	Di-n-butyl phthalate	0.4153	5	ug/L
SW8270	Water	Di-n-octyl phthalate	0.3422	5	ug/L
SW8270	Water	Diphenylamine	0.7186	5	ug/L
SW8270	Water	Disulfoton	0.6137	5	ug/L
SW8270	Water	Ethyl methanesulfonate	0.2075	5	ug/L
SW8270	Water	Famphur	0.2790	10	ug/L
SW8270	Water	Fluoranthene	0.0540	5	ug/L
SW8270	Water	Fluorene	0.0598	5	ug/L
SW8270	Water	Hexachlorobenzene	0.2762	5	ug/L
SW8270	Water	Hexachlorobutadiene	0.4629	5	ug/L
SW8270	Water	Hexachlorocyclopentadiene	0.3369	5	ug/L
SW8270	Water	Hexachloroethane	0.3588	5	ug/L
SW8270	Water	Hexachlorophene	0.6246	20	ug/L
SW8270	Water	Hexachloropropene	0.5007	5	ug/L
SW8270	Water	Indeno(1,2,3-cd)pyrene	0.0566	0.22	ug/L
SW8270	Water	Isodrin	0.3066	5	ug/L
SW8270	Water	Isophorone	0.2143	5	ug/L
SW8270	Water	Isosafrole	0.3718	5	ug/L
SW8270	Water	Kepone	0.3291	5	ug/L
SW8270	Water	TCLP Pyridine	0.0005	0.005	ug/L
SW8270	Water	4-Chloroaniline	0.3787	5	ug/L
SW8270	Water	4-Chlorophenyl phenyl ether	0.4765	5	ug/L
SW8270	Water	4-Nitro-1-oxide-quinoline	0.8549	10	ug/L
SW8270	Water	4-Nitroaniline	0.5080	5	ug/L
SW8270	Water	4-Nitrophenol	0.4704	5	ug/L
SW8270	Water	5-Nitro-o-toluidine	0.5383	5	ug/L
SW8270	Water	7,12-Dimethylbenz(a)anthracene	0.5041	5	ug/L
SW8270	Water	a,a-Dimethylphenethylamine	1.0000	5	ug/L
SW8270	Water	Acenaphthene	0.0350	5	ug/L
SW8270	Water	Acenaphthylene	0.0696	5	ug/L
SW8270	Water	Acetophenone	0.2731	5	ug/L
SW8270	Water	Aniline	0.3957	5	ug/L

Semivolatile MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
SW8270	Water	Anthracene	0.0504	5	ug/L
SW8270	Water	Aramite	0.6258	5	ug/L
SW8270	Water	Benz(a)anthracene	0.0840	0.26	ug/L
SW8270	Water	Benzidine	0.6622	5	ug/L
SW8270	Water	Benzo(a)pyrene	0.0820	0.2	ug/L
SW8270	Water	Benzo(b)fluoranthene	0.0527	0.17	ug/L
SW8270	Water	Benzo(g,h,i)perylene	0.0923	5	ug/L
SW8270	Water	Benzo(k)fluoranthene	0.0574	1.7	ug/L
SW8270	Water	Benzoic acid	0.6015	5	ug/L
SW8270	Water	Benzyl Alcohol	0.3838	5	ug/L
SW8270	Water	Bis(2-chloroethoxy)methane	0.4503	5	ug/L
SW8270	Water	bis-(2-Chloroethyl)ether	0.4280	5	ug/L
SW8270	Water	Bis(2-ethylhexyl)phthalate	0.3338	1	ug/L
SW8270	Water	Butyl benzyl phthalate	0.2466	5	ug/L
SW8270	Water	2,3,4,6-Tetrachlorophenol	0.2688	10	ug/L
SW8270	Water	2,4,5-Trichlorophenol	0.7169	5	ug/L
SW8270	Water	2,4,6-Trichlorophenol	0.4450	5	ug/L
SW8270	Water	2,4-Dichlorophenol	0.4485	5	ug/L
SW8270	Water	2,4-Dimethylphenol	0.4020	5	ug/L
SW8270	Water	2,4-Dinitrophenol	0.9560	10	ug/L
SW8270	Water	2,4-Dinitrotoluene	0.5212	5	ug/L
SW8270	Water	2,6-Dichlorophenol	0.3187	5	ug/L
SW8270	Water	2,6-Dinitrotoluene	0.5009	5	ug/L
SW8270	Water	2-Acetylaminofluorene	0.3802	5	ug/L
SW8270	Water	2-Chloronaphthalene	0.4271	5	ug/L
SW8270	Water	2-Chlorophenol	0.2262	5	ug/L
SW8270	Water	2-Methylnaphthalene	0.0625	5	ug/L
SW8270	Water	2-Methylphenol	0.8709	5	ug/L
SW8270	Water	2-Naphthylamine	0.4997	5	ug/L
SW8270	Water	2-Nitroaniline	0.5554	5	ug/L
SW8270	Water	2-Nitrophenol	0.3847	5	ug/L
SW8270	Water	2-Picoline	0.3810	5	ug/L
SW8270	Water	3 & 4-Methylphenol	0.7267	5	ug/L
SW8270	Water	3,3´-Dichlorobenzidine	0.3754	5	ug/L
SW8270	Water	3,3´-Dimethylbenzidine	0.3545	5	ug/L
SW8270	Water	3-Methylcholanthrene	0.3281	5	ug/L
SW8270	Water	3-Nitroaniline	0.2772	5	ug/L
SW8270	Water	4,6-Dinitro-2-methylphenol	0.4346	10	ug/L
SW8270	Water	4-Aminobiphenyl	0.4223	5	ug/L
SW8270	Water	4-Bromophenyl phenyl ether	0.2793	5	ug/L
SW8270	Water	Pronamide	0.3394	5	ug/L
SW8270	Water	Bis(2-chloroisopropyl)ether	0.4952	5	ug/L
SW8270	Water	TCLP 1,4-Dichlorobenzene	0.0003	0.005	ug/L
SW8270	Water	TCLP 2,4,5-Trichlorophenol	0.0007	0.005	ug/L

Semivolatile MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
SW8270	Water	TCLP 2,4,6-Trichlorophenol	0.0004	0.005	ug/L
SW8270	Water	TCLP 2,4-Dinitrotoluene	0.0005	0.005	ug/L
SW8270	Water	TCLP 2-Methylphenol	0.0009	0.005	ug/L
SW8270	Water	TCLP 3 & 4-Methylphenol	0.0007	0.005	ug/L
SW8270	Water	TCLP Hexachlorobenzene	0.0003	0.005	ug/L
SW8270	Water	TCLP Hexachlorobutadiene	0.0005	0.005	ug/L
SW8270	Water	TCLP Hexachloroethane	0.0004	0.005	ug/L
SW8270	Water	TCLP Nitrobenzene	0.0003	0.005	ug/L
SW8270	Water	TCLP Pentachlorophenol	0.0004	0.005	ug/L
SW8270	Water	4-Chloro-3-methylphenol	0.2934	5	ug/L
SW8270	Water	Pentachloroethane	0.5144	5	ug/L

Volatile MDLs

SpecificMetho	Matrix	Analyte	MDL	MRL	Units
MSD	Water	Vapor Space Organics	4.8818	10	uL/L
SW 8015B	Soil	Gasoline	0.1848	5	mg/kg
SW 8015	Soil	Gasoline Range Organics, C6 - C10	0.4199	5	mg/kg
SW 8015	Soil	Gasoline Range Organics, C6 - C12	0.3972	5	mg/kg
SW 8015B	Water	Gasoline	0.1848	5	mg/L
SW 8015	Water	Gasoline Range Organics, C6 - C10	0.2771	5	mg/L
SW 8015	Water	Gasoline Range Organics, C6 - C12	0.3052	5	mg/L
8015 Mod	Water	Propylene Glycol	2.2463	10	mg/L
8015 Mod	Water	Ethylene Glycol	2.5648	10	mg/L
8015 Mod	Water	Diethylene Glycol	4.8303	10	mg/L
SW 8021	Soil	Benzene	0.0005	0.005	mg/kg
SW 8021	Soil	Ethylbenzene	0.0006	0.005	mg/kg
SW 8021	Soil	m,p-Xylene	0.0011	0.01	mg/kg
SW 8021	Soil	Methyl tert-Butyl Ether	0.0002	0.005	mg/kg
SW 8021	Soil	o-Xylene	0.0005	0.005	mg/kg
SW 8021	Soil	Toluene	0.0005	0.005	mg/kg
SW 8021	Water	Benzene	0.5000	2	ug/L
SW 8021	Water	Ethylbenzene	0.6000	2	ug/L
SW 8021	Water	m,p-Xylene	1.1000	4	ug/L
SW 8021	Water	Methyl tert-Butyl Ether	0.2000	5	ug/L
SW 8021	Water	o-Xylene	0.5000	2	ug/L
SW 8021	Water	Toluene	0.5000	2	ug/L
SW 8021	Water	Xylenes, Total	1.6000	6	ug/L
EPA 524.2	Drinking Water	Trichlorofluoromethane	0.1439	0.5	ug/L
EPA 524.2	Drinking Water	1,1,1,2-Tetrachloroethane	0.1250	0.5	ug/L
EPA 524.2	Drinking Water	1,1,1-Trichloroethane	0.1200	0.5	ug/L
EPA 524.2	Drinking Water	1,1,2,2-Tetrachloroethane	0.0905	0.5	ug/L
EPA 524.2	Drinking Water	Vinyl Chloride	0.1506	0.5	ug/L
EPA 524.2	Drinking Water	o-Xylene	0.0829	0.5	ug/L
EPA 524.2	Drinking Water	Xylenes (Total)	0.2567	1.5	ug/L
EPA 524.2	Drinking Water	Acetone	2.2031	10	ug/L
EPA 524.2	Drinking Water	1,1-Dichloroethane	0.1215	0.5	ug/L
EPA 524.2	Drinking Water	1,1-Dichloroethene	0.1250	0.5	ug/L
EPA 524.2	Drinking Water	1,1-Dichloropropene	0.0800	0.5	ug/L
EPA 524.2	Drinking Water	1,2,3-Trichlorobenzene	0.1730	0.5	ug/L
EPA 524.2	Drinking Water	1,2,3-Trichloropropane	0.2084	0.5	ug/L
EPA 524.2	Drinking Water	1,2,4-Trichlorobenzene	0.0758	0.5	ug/L
EPA 524.2	Drinking Water	1,2,4-Trimethylbenzene	0.0889	0.5	ug/L
EPA 524.2	Drinking Water	1,2-Dibromoethane	0.1549	0.5	ug/L
EPA 524.2	Drinking Water	1,2-Dichlorobenzene	0.0809	0.5	ug/L
EPA 524.2	Drinking Water	1,2-Dichloroethane	0.1071	0.5	ug/L
EPA 524.2	Drinking Water	1,2-Dichloropropane	0.1439	0.5	ug/L
EPA 524.2	Drinking Water	1,3,5-Trimethylbenzene	0.0788	0.5	ug/L
EPA 524.2	Drinking Water	1,3-Dichlorobenzene	0.1058	0.5	ug/L

Volatile MDLs

SpecificMetho	Matrix	Analyte	MDL	MRL	Units
EPA 524.2	Drinking Water	1,3-Dichloropropane	0.1182	0.5	ug/L
EPA 524.2	Drinking Water	1,4-Dichlorobenzene	0.0878	0.5	ug/L
EPA 524.2	Drinking Water	2,2-Dichloropropane	0.1026	0.5	ug/L
EPA 524.2	Drinking Water	2-Chlorotoluene	0.0859	0.5	ug/L
EPA 524.2	Drinking Water	4-Chlorotoluene	0.1008	0.5	ug/L
EPA 524.2	Drinking Water	4-Isopropyltoluene	0.0920	0.5	ug/L
EPA 524.2	Drinking Water	Benzene	0.1006	0.5	ug/L
EPA 524.2	Drinking Water	Bromobenzene	0.0851	0.5	ug/L
EPA 524.2	Drinking Water	Bromochloromethane	0.1538	0.5	ug/L
EPA 524.2	Drinking Water	Bromodichloromethane	0.0968	0.5	ug/L
EPA 524.2	Drinking Water	Bromoform	0.1084	0.5	ug/L
EPA 524.2	Drinking Water	Bromomethane	0.1892	0.5	ug/L
EPA 524.2	Drinking Water	1,1,2-Trichloroethane	0.1158	0.5	ug/L
EPA 524.2	Drinking Water	Carbon Tetrachloride	0.1033	0.5	ug/L
EPA 524.2	Drinking Water	Chlorobenzene	0.0785	0.5	ug/L
EPA 524.2	Drinking Water	Chloroethane	0.1954	0.5	ug/L
EPA 524.2	Drinking Water	Chloroform	0.1276	0.5	ug/L
EPA 524.2	Drinking Water	Chloromethane	0.1745	0.5	ug/L
EPA 524.2	Drinking Water	cis-1,2-Dichloroethene	0.1022	0.5	ug/L
EPA 524.2	Drinking Water	cis-1,3-Dichloropropene	0.0897	0.5	ug/L
EPA 524.2	Drinking Water	Dibromochloromethane	0.1049	0.5	ug/L
EPA 524.2	Drinking Water	Dibromomethane	0.1139	0.5	ug/L
EPA 524.2	Drinking Water	Dichlorodifluoromethane	0.2004	0.5	ug/L
EPA 524.2	Drinking Water	Ethylbenzene	0.0767	0.5	ug/L
EPA 524.2	Drinking Water	Hexachlorobutadiene	0.1911	0.5	ug/L
EPA 524.2	Drinking Water	Isopropylbenzene	0.0788	0.5	ug/L
EPA 524.2	Drinking Water	Methyl tert-Butyl Ether	0.1440	0.5	ug/L
EPA 524.2	Drinking Water	Methylene Chloride	0.1813	0.5	ug/L
EPA 524.2	Drinking Water	m,p-Xylene	0.1738	1	ug/L
EPA 524.2	Drinking Water	n-Butylbenzene	0.0767	0.5	ug/L
EPA 524.2	Drinking Water	n-Propylbenzene	0.0806	0.5	ug/L
EPA 524.2	Drinking Water	Naphthalene	0.1813	0.5	ug/L
EPA 524.2	Drinking Water	sec-Butylbenzene	0.0846	0.5	ug/L
EPA 524.2	Drinking Water	Styrene	0.0865	0.5	ug/L
EPA 524.2	Drinking Water	tert_Butylbenzene	0.0868	0.5	ug/L
EPA 524.2	Drinking Water	Tetrachloroethene	0.2168	0.5	ug/L
EPA 524.2	Drinking Water	Toluene	0.1008	0.5	ug/L
EPA 524.2	Drinking Water	trans-1,2-Dichloroethene	0.0984	0.5	ug/L
EPA 524.2	Drinking Water	trans-1,3-Dichloropropene	0.1200	0.5	ug/L
EPA 524.2	Drinking Water	Trichloroethene	0.0950	0.5	ug/L
SW 8260 A/B	Soil	Naphthalene	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	m,p-Xylene	0.0020	0.01	mg/kg
SW 8260 A/B	Soil	Methyl tert-Butyl Ether	0.0011	0.01	mg/kg
SW 8260 A/B	Soil	Methylene Chloride	0.0014	0.005	mg/kg

Volatile MDLs

SpecificMetho	Matrix	Analyte	MDL	MRL	Units
SW 8260 A/B	Soil	Methyl methacrylate	0.0010	0.005	mg/kg
SW 8260 A/B	Soil	Methylcyclohexane	0.0005	0.005	mg/kg
SW 8260 A/B	Soil	Methyl Acetate	0.0019	0.005	mg/kg
SW 8260 A/B	Soil	Methacrylonitrile	0.0011	0.005	mg/kg
SW 8260 A/B	Soil	Isopropylbenzene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	Isobutyl Alcohol	0.0035	0.005	mg/kg
SW 8260 A/B	Soil	Iodomethane	0.0013	0.01	mg/kg
SW 8260 A/B	Soil	Hexachlorobutadiene	0.0005	0.005	mg/kg
SW 8260 A/B	Soil	Freon-113	0.0020	0.01	mg/kg
SW 8260 A/B	Soil	Ethyl methacrylate	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	Ethylbenzene	0.0005	0.005	mg/kg
SW 8260 A/B	Soil	Ethyl acetate	0.0018	0.01	mg/kg
SW 8260 A/B	Soil	Diethyl ether	0.0006	0.01	mg/kg
SW 8260 A/B	Soil	Dichlorodifluoromethane	0.0008	0.005	mg/kg
SW 8260 A/B	Soil	Dibromomethane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	Vinyl acetate	0.0019	0.01	mg/kg
SW 8260 A/B	Soil	Vinyl Chloride	0.0008	0.005	mg/kg
SW 8260 A/B	Soil	Trichlorofluoromethane	0.0010	0.005	mg/kg
SW 8260 A/B	Soil	Trichloroethene	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	trans-1,4-Dichloro-2-butene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	trans-1,3-Dichloropropene	0.0005	0.005	mg/kg
SW 8260 A/B	Soil	trans-1,2-Dichloroethene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	Toluene	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	Tetrachloroethene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	tert_Butylbenzene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	Styrene	0.0005	0.005	mg/kg
SW 8260 A/B	Soil	sec-Butylbenzene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	Propionitrile	0.0016	0.005	mg/kg
SW 8260 A/B	Soil	o-Xylene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	n-Propylbenzene	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	n-Hexane	0.0022	0.005	mg/kg
SW 8260 A/B	Soil	n-Butylbenzene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	n-Butanol	0.0026	0.05	mg/kg
SW 8260 A/B	Soil	Dibromochloromethane	0.0005	0.005	mg/kg
SW 8260 A/B	Soil	Cyclohexane	0.0006	0.01	mg/kg
SW 8260 A/B	Soil	cis-1,4-Dichloro-2-butene	0.0035	0.01	mg/kg
SW 8260 A/B	Soil	cis-1,3-Dichloropropene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	cis-1,2-Dichloroethene	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	Chloroprene	0.0005	0.005	mg/kg
SW 8260 A/B	Soil	Chloromethane	0.0021	0.005	mg/kg
SW 8260 A/B	Soil	Chloroform	0.0005	0.005	mg/kg
SW 8260 A/B	Soil	Chloroethane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	Chlorobenzene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	Carbon Tetrachloride	0.0016	0.005	mg/kg

Volatile MDLs

SpecificMetho	Matrix	Analyte	MDL	MRL	Units
SW 8260 A/B	Soil	Carbon Disulfide	0.0011	0.02	mg/kg
SW 8260 A/B	Soil	Bromomethane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	Bromoform	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	Bromodichloromethane	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	Bromochloromethane	0.0009	0.005	mg/kg
SW 8260 A/B	Soil	Bromobenzene	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	Benzene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	Allyl chloride	0.0007	0.01	mg/kg
SW 8260 A/B	Soil	Acrylonitrile	0.0014	0.02	mg/kg
SW 8260 A/B	Soil	Acrolein	0.0034	0.05	mg/kg
SW 8260 A/B	Soil	Acetonitrile	0.0024	0.04	mg/kg
SW 8260 A/B	Soil	Acetone	0.0100	0.05	mg/kg
SW 8260 A/B	Soil	4-Methyl-2-pentanone	0.0013	0.02	mg/kg
SW 8260 A/B	Soil	4-Isopropyltoluene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	4-Chlorotoluene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	2-Hexanone	0.0011	0.02	mg/kg
SW 8260 A/B	Soil	2-Chlorotoluene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	2-Chloroethyl vinyl ether	0.0007	0.025	mg/kg
SW 8260 A/B	Soil	2-Butanone	0.0025	0.02	mg/kg
SW 8260 A/B	Soil	2,2-Dichloropropane	0.0019	0.005	mg/kg
SW 8260 A/B	Soil	1,4-Dioxane	0.0046	0.1	mg/kg
SW 8260 A/B	Soil	1,4-Dichlorobenzene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	1,3-Dichloropropane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	1,3-Dichlorobenzene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	1,3,5-Trimethylbenzene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	1,2-Dichloropropane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	1,2-Dichloroethane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	1,2-Dichlorobenzene	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	1,2-Dibromoethane	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	1,2-Dibromo-3-chloropropane	0.0008	0.01	mg/kg
SW 8260 A/B	Soil	1,2,4-Trimethylbenzene	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	1,2,4-Trichlorobenzene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	1,2,3-Trichloropropane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	1,2,3-Trichlorobenzene	0.0005	0.005	mg/kg
SW 8260 A/B	Soil	1,1-Dichloropropene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	1,1-Dichloroethene	0.0006	0.005	mg/kg
SW 8260 A/B	Soil	1,1-Dichloroethane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	1,1,2-Trichloroethane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	1,1,2,2-Tetrachloroethane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	1,1,1-Trichloroethane	0.0005	0.005	mg/kg
SW 8260 A/B	Soil	1,1,1,2-Tetrachloroethane	0.0007	0.005	mg/kg
SW 8260 A/B	Soil	Isopropyl acetate	0.0014	0.01	mg/kg
SW 8260 A/B	Soil	Xylenes, Total	0.0026	0.01	mg/kg
SW 8260B	Water	Xylenes, Total	0.6780	5	ug/L

Volatile MDLs

SpecificMetho	Matrix	Analyte	MDL	MRL	Units
SW 8260B	Water	1,1,2-Trichlorotrifluoroethane	0.2308	5	ug/L
SW 8260B	Water	Isopropyl acetate	2.4115	10	ug/L
SW 8260B	Water	n-Amyl acetate	2.3797	10	ug/L
SW 8260B	Water	Chloroform	0.2684	1	ug/L
SW 8260B	Water	Chloromethane	0.3325	1	ug/L
SW 8260B	Water	Chloroprene	0.2610	1	ug/L
SW 8260B	Water	cis-1,2-Dichloroethene	0.2837	1	ug/L
SW 8260B	Water	cis-1,3-Dichloropropene	0.2582	1	ug/L
SW 8260B	Water	cis-1,4-Dichloro-2-butene	0.1294	10	ug/L
SW 8260B	Water	Cyclohexane	2.3343	5	ug/L
SW 8260B	Water	Dibromochloromethane	0.2310	1	ug/L
SW 8260B	Water	Dibromomethane	0.2914	1	ug/L
SW 8260B	Water	Dichlorodifluoromethane	0.2145	2	ug/L
SW 8260B	Water	Diethyl ether	0.3013	5	ug/L
SW 8260B	Water	Ethyl acetate	2.3852	5	ug/L
SW 8260B	Water	Ethylbenzene	0.2272	1	ug/L
SW 8260B	Water	Ethyl methacrylate	0.2028	1	ug/L
SW 8260B	Water	Hexachlorobutadiene	1.0940	5	ug/L
SW 8260B	Water	Iodomethane	0.2659	10	ug/L
SW 8260B	Water	Isobutyl Alcohol	8.8680	40	ug/L
SW 8260B	Water	Isopropylbenzene	0.2155	1	ug/L
SW 8260B	Water	Methacrylonitrile	0.3627	20	ug/L
SW 8260B	Water	Methyl Acetate	1.5229	5	ug/L
SW 8260B	Water	Methyl acrylate			ug/L
SW 8260B	Water	Methylcyclohexane	2.3904	5	ug/L
SW 8260B	Water	Methyl methacrylate	0.2056	5	ug/L
SW 8260B	Water	Methylene Chloride	0.1872	1	ug/L
SW 8260B	Water	Methyl tert-Butyl Ether	0.2461	10	ug/L
SW 8260B	Water	m,p-Xylene	0.4297	2	ug/L
SW 8260B	Water	Chloroethane	0.2474	1	ug/L
SW 8260B	Water	1,3,5-Trimethylbenzene	0.2115	1	ug/L
SW 8260B	Water	1,3-Dichlorobenzene	0.2390	1	ug/L
SW 8260B	Water	1,3-Dichloropropane	0.2677	1	ug/L
SW 8260B	Water	1,4-Dichlorobenzene	0.3638	1	ug/L
SW 8260B	Water	1,4-Dioxane	4.6981	50	ug/L
SW 8260B	Water	2,2-Dichloropropane	0.2879	1	ug/L
SW 8260B	Water	2-Butanone	0.3929	10	ug/L
SW 8260B	Water	2-Chloroethyl vinyl ether	0.2369	10	ug/L
SW 8260B	Water	2-Chlorotoluene	0.2037	1	ug/L
SW 8260B	Water	2-Hexanone	0.4267	10	ug/L
SW 8260B	Water	4-Chlorotoluene	0.2350	1	ug/L
SW 8260B	Water	4-Isopropyltoluene	0.2090	1	ug/L
SW 8260B	Water	4-Methyl-2-pentanone	0.6944	10	ug/L
SW 8260B	Water	Acetone	2.5175	10	ug/L

Volatile MDLs

SpecificMetho	Matrix	Analyte	MDL	MRL	Units
SW 8260B	Water	Acetonitrile	0.2804	40	ug/L
SW 8260B	Water	Acrolein	0.5054	20	ug/L
SW 8260B	Water	Acrylonitrile	0.2942	10	ug/L
SW 8260B	Water	Allyl chloride	0.2573	1	ug/L
SW 8260B	Water	Benzene	0.2609	1	ug/L
SW 8260B	Water	Bromobenzene	0.1895	1	ug/L
SW 8260B	Water	Bromochloromethane	0.2845	1	ug/L
SW 8260B	Water	Bromodichloromethane	0.2715	1	ug/L
SW 8260B	Water	Bromoform	0.2948	1	ug/L
SW 8260B	Water	Bromomethane	0.3147	2	ug/L
SW 8260B	Water	Carbon Disulfide	0.4012	5	ug/L
SW 8260B	Water	Carbon Tetrachloride	0.2908	1	ug/L
SW 8260B	Water	Chlorobenzene	0.2433	1	ug/L
SW 8260B	Water	Naphthalene	0.3629	1	ug/L
SW 8260B	Water	1,1,1,2-Tetrachloroethane	0.2127	1	ug/L
SW 8260B	Water	1,1,1-Trichloroethane	0.2330	1	ug/L
SW 8260B	Water	1,1,2,2-Tetrachloroethane	0.2338	1	ug/L
SW 8260B	Water	1,1,2-Trichloroethane	0.2230	1	ug/L
SW 8260B	Water	1,1-Dichloroethane	0.2577	1	ug/L
SW 8260B	Water	1,1-Dichloroethene	0.3442	1	ug/L
SW 8260B	Water	1,1-Dichloropropene	0.2460	5	ug/L
SW 8260B	Water	1,2,3-Trichlorobenzene	0.4826	5	ug/L
SW 8260B	Water	1,2,3-Trichloropropane	0.1958	1	ug/L
SW 8260B	Water	1,2,4-Trichlorobenzene	0.2817	2	ug/L
SW 8260B	Water	1,2,4-Trimethylbenzene	0.3266	1	ug/L
SW 8260B	Water	1,2-Dibromo-3-chloropropane	0.2020	10	ug/L
SW 8260B	Water	1,2-Dibromoethane	0.2166	5	ug/L
SW 8260B	Water	1,2-Dichlorobenzene	0.2322	1	ug/L
SW 8260B	Water	1,2-Dichloroethane	0.1782	1	ug/L
SW 8260B	Water	1,2-Dichloropropane	0.2872	1	ug/L
SW 8260B	Water	n-Butanol	11.1798	50	ug/L
SW 8260B	Water	n-Butylbenzene	0.2704	1	ug/L
SW 8260B	Water	n-Hexane	1.3375	5	ug/L
SW 8260B	Water	n-Propylbenzene	0.2101	1	ug/L
SW 8260B	Water	o-Xylene	0.2484	1	ug/L
SW 8260B	Water	Propionitrile	1.3352	20	ug/L
SW 8260B	Water	sec-Butylbenzene	0.2024	1	ug/L
SW 8260B	Water	Styrene	0.2215	1	ug/L
SW 8260B	Water	tert_Butylbenzene	0.1782	1	ug/L
SW 8260B	Water	Tetrachloroethene	0.3035	1	ug/L
SW 8260B	Water	Tetrahydrofuran	2.3162	20	ug/L
SW 8260B	Water	Toluene	0.2214	1	ug/L
SW 8260B	Water	trans-1,2-Dichloroethene	0.2372	1	ug/L
SW 8260B	Water	trans-1,3-Dichloropropene	0.2153	1	ug/L

Volatile MDLs

SpecificMetho	Matrix	Analyte	MDL	MRL	Units
SW 8260B	Water	trans-1,4-Dichloro-2-butene	0.2161	10	ug/L
SW 8260B	Water	Trichloroethene	0.2597	1	ug/L
SW 8260B	Water	Trichlorofluoromethane	0.2198	1	ug/L
SW 8260B	Water	Vinyl Chloride	0.2284	1	ug/L
SW 8260B	Water	Vinyl acetate	0.2207	10	ug/L

Wet Chemistry MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
SM 4500-CL-E	Soil	Chloride	0.3121	4	mg/kg
SM 4500-CL-E	Water	Chloride	0.3121	4	mg/L
SM 4500-CL-E	Soil	Chloride	0.1506	4	mg/L
SM 4500 CN-I	Water	Cyanide, Amenable to Chlorination	0.0013	0.01	mg/L
SM 4500 CN-I	Soil	Cyanide, Amenable to Chlorination	0.0013	0.01	mg/kg
SW Chapter 7 Mod	Soil	Reactive cyanide	0.0041	0.01	mg/kg
SW Chapter 7 Mod	Water	Reactive cyanide	0.0041	0.01	mg/L
EPA 335.4	Water	Cyanide, Total	0.0024	0.01	mg/L
EPA 335.4	Soil	Cyanide, Total	0.0024	0.01	mg/kg
EPA 335.4	Soil	Cyanide, Total	0.0041	0.01	mg/L
SM 4500 CN-I	Water	Cyanide, Weak Acid Dissociable	0.0013	0.01	mg/L
SM 4500 CN-I	Soil	Cyanide, Weak Acid Dissociable	0.0013	0.01	mg/kg
SM 2510B	Water	Specific Conductance	0.267	10	umhos/cm
SW 9050	Soil	Specific Conductance	0.267	10	umhos/cm
SM 2510B	Soil	Specific Conductance	0.267	10	umhos/cm
SM 2510B	Water	Neutralized Conductivity	0.267	10	umhos/cm
HACH 8023	Water	Chromium, Hexavalent	0.0048	0.01	mg/L
SM 5310C	Water	Dissolved Organic Carbon	0.125	1	mg/L
SM 5310C	Water	Dissolved Organic Carbon	0.125	1	mg/L
SM 4500 F-C	Water	Fluoride	0.0276	0.2	mg/L
SM 4500 F-C	Soil	Fluoride	0.0276	0.2	mg/kg
SM 4500 F-C	Soil	Fluoride	0.0276	0.2	mg/L
SM 4500 F-C	Water	Fluoride	0.0576	0.2	mg/L
Varies	Water	Total Phosphorus by SM4500 P-F	0.0178	0.1	mg/L
EPA 350.1	Soil	Ammonia	0.2364	1	mg/kg
EPA 350.1	Water	Ammonia	0.0229	0.2	mg/L
EPA 350.2	Water	Ammonia	0.0165	0.05	mg/L
SM 4500 NO3-F	Water	Nitrite Nitrogen as NO2-N	0.0183	0.1	mg/L
SM 4500 NO3-F	Soil	Nitrite Nitrogen as NO2-N	0.0183	0.1	mg/kg
SM 4500 NO3-F	Soil	Nitrogen, Nitrate-Nitrite	0.0256	0.1	mg/kg
SM 4500 NO3-F	Water	Nitrogen, Nitrate-Nitrite	0.0256	0.1	mg/L
SM 4500 NO3-F	Soil	Nitrate Nitrogen as NO3- N	0.0138	0.1	mg/kg
SM 4500 NO3-F	Water	Nitrate Nitrogen as NO3- N	0.0138	0.1	mg/L
EPA 1664A	Water	Oil & Grease, n-Hexane extraction	0.3629	2.5	mg/L
EPA 1664A	Water	Oil & Grease, n-Hexane extraction	0.3629	2.5	mg/L
EPA 1664A	Water	Oil & Grease, n-Hexane + Silica Gel	0.4601	2.5	mg/L
EPA 1664A	Water	Oil & Grease, n-Hexane + Silica Gel	0.4601	2.5	mg/L
SM 5520F	Water	Oil & Grease, n-Hexane + Silica Gel	0.4601	2.5	mg/L
SM 4500 P-F	Water	Phosphorus, Acid Hydrolyzable	0.0178	0.1	mg/L
EPA 365.1	Soil	Total Orthophosphate	0.0499	0.1	mg/kg
EPA 365.1	Water	Total Orthophosphate	0.0499	0.1	mg/L
EPA 420.4	Soil	Phenolics, Total Recoverable	0.003	0.5	mg/kg
EPA 420.4	Water	Phenolics, Total Recoverable	0.003	0.01	mg/L
EPA 420.4	Soil	Phenolics, Total Recoverable	0.003	0.5	mg/L

Wet Chemistry MDLs

SpecificMethod	Matrix	Analyte	MDL	MRL	Units
EPA 375.4 Mod	Water	Sulfate	1.8284	5	mg/L
EPA 375.4 Mod	Water	Sulfate	1.8284	5	mg/L
SW 3060A	Soil	SPLP Cr6	0.0034	2	mg/L
HACH 8023	Water	SPLP Cr6	0.0034	0.01	mg/L
HACH 8023	Water	Chromium, Hexavalent	0.0034	0.01	mg/L
SM 2540C	Water	TDS (Residue, Filterable)	4.6009	10	mg/L
SM 2540C	Water	TDS (Residue, Filterable)	4.6009	10	mg/L
SM 2450C	Soil	TDS (Residue, Filterable)	4.6009	10	mg/L
SM-4500Norg D	Soil	Nitrogen, Total Kjeldahl	0.2365	0.5	mg/kg
EPA 351.2	Water	Nitrogen, Total Kjeldahl	0.2365	0.5	mg/L
EPA 351.2/SM 4500 NO3-F	Water	Nitrogen, Total	0.0138	0.1	mg/L
EPA 351.2/SM 4500 NO3-F	Water	Nitrogen, Nitrate-Nitrite	0.0138	0.1	mg/L
EPA 351.2/SM 4500 NO3-F	Water	Nitrogen, Total Kjeldahl	0.2479	0.5	mg/L
EPA 351.2/SM 4500 NO3-F	Soil	Nitrogen, Total	0.0138	0.1	mg/kg
EPA 351.2/SM 4500 NO3-F	Soil	Nitrogen, Total Kjeldahl	0.2479	0.5	mg/kg
EPA 351.2/SM 4500 NO3-F	Soil	Nitrogen, Nitrate-Nitrite	0.0138	0.1	mg/kg
SM 5310C	Water	Total Organic Carbon	0.2429	1	mg/L
EPA 160.2/SM 2540	Water	TSS (Residue, Non-Filterable)	2.1689	5	mg/L
EPA 160.2	Soil	TSS (Residue, Non-Filterable)	2.1689	5	mg/L
EPA 160.2/SM 2540	Water	TSS (Residue, Non-Filterable)	2.1689	5	mg/L
EPA 160.2	Soil	TSS (Residue, Non-Filterable)	2.1689	5	mg/L
SM 2130B	Water	Turbidity	0.0217	0.1	NTU

Appendix 7

INSTRUCTIONS FOR COLLECTING BACTERIA SAMPLES

- Collect from a cold water tap. Do not sample from hoses or drinking water fountains. Remove Aerators and bypass the water softener. Run the tap for one minute before sanitizing the tap.
- Sanitize nozzle by spraying a 5.25% Clorox Bleach Solution (1 tbsp. per half gallon) on surface and the underside of the tap. This can be done by placing a bag filled with bleach solution over the nozzle, squeeze the bag to flush the solution in and out of the tap. Do this for two minutes. Fresh solution and bag should be used for each tap.
- Turn on tap and run the water for 5 minutes.
- Reduce flow from tap to a minimum.
- Remove the cap from the sample bottle. Take care not to touch the mouth of the bottle or the inside of the cap with fingers.
- DO NOT rinse bottle. Fill bottle to the 100 ml line on bottle, do not overflow bottle. Immediately recap bottle.
- Collect the sample the **same day** that you will be bringing it to the laboratory. Fill out above information and bring with sample
- **Samples must be brought to the lab Monday-Wednesday, 8:30-5:00 p.m. or before 9:00 a.m. on Thursday. We can not accept bacteria on Friday.**

CONTAINERS FOR RCI

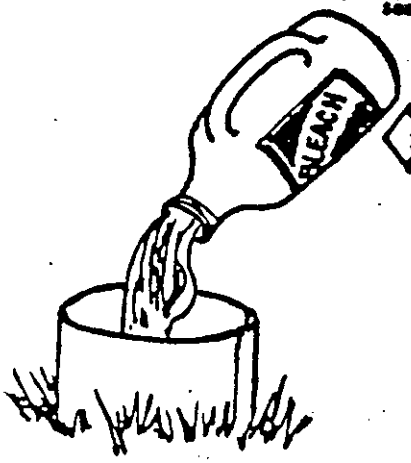
(REACTIVITY, CORROSIVITY, IGNITABLILITY)

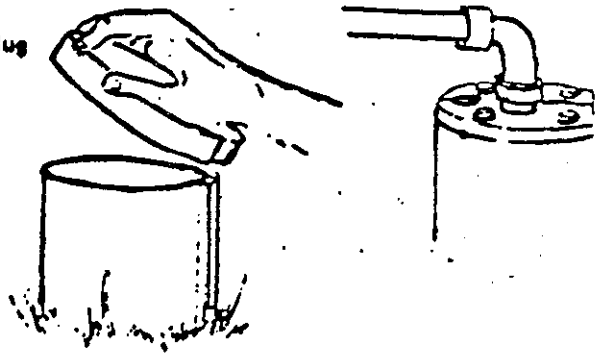
For all samples requiring RCI, 3/4oz Jars are required:

Reactivity & Corrosivity: **1/4oz Jar**

Ignitablility: **2/4oz Jars**

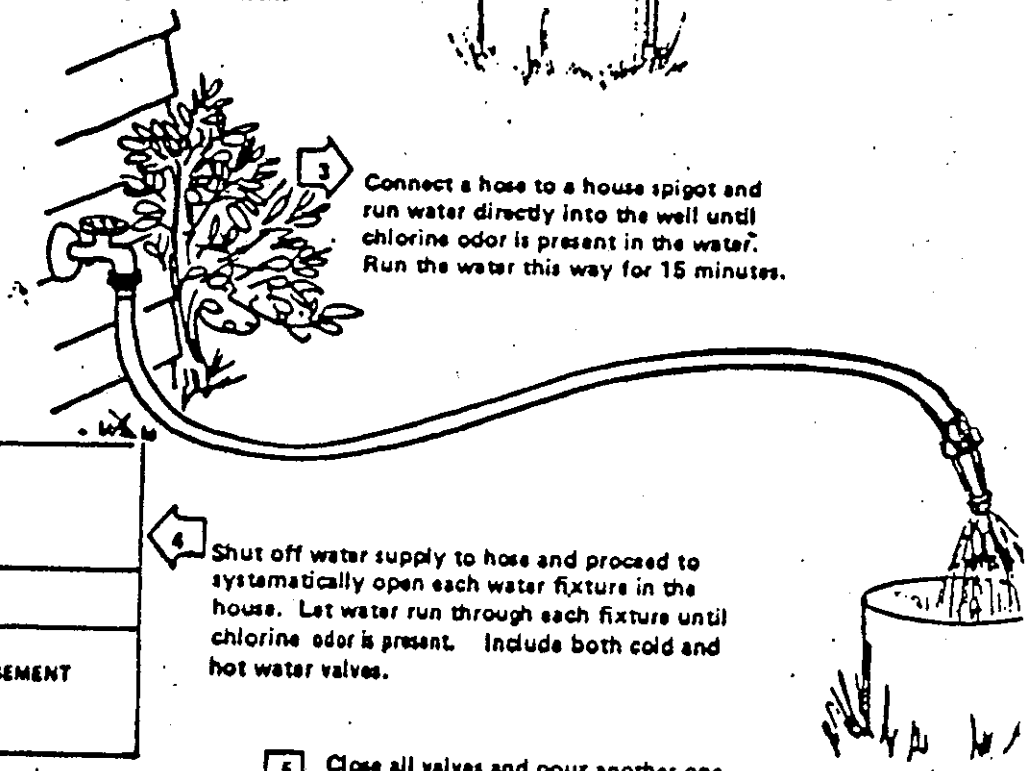
HOW TO DISINFECT A WATER WELL



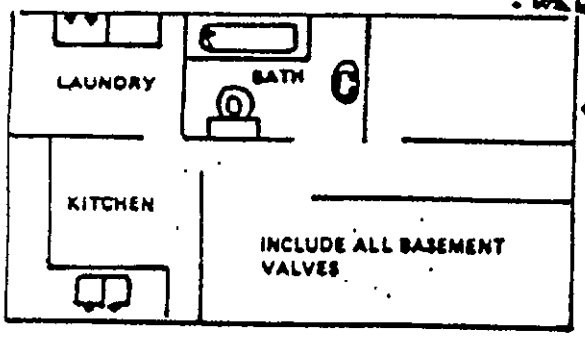


1. Remove the well cap or the vent pipe or plug if the well is equipped with a sanitary well seal.

2. Pour one gallon of household bleach (5.25% chlorine) directly into the well.

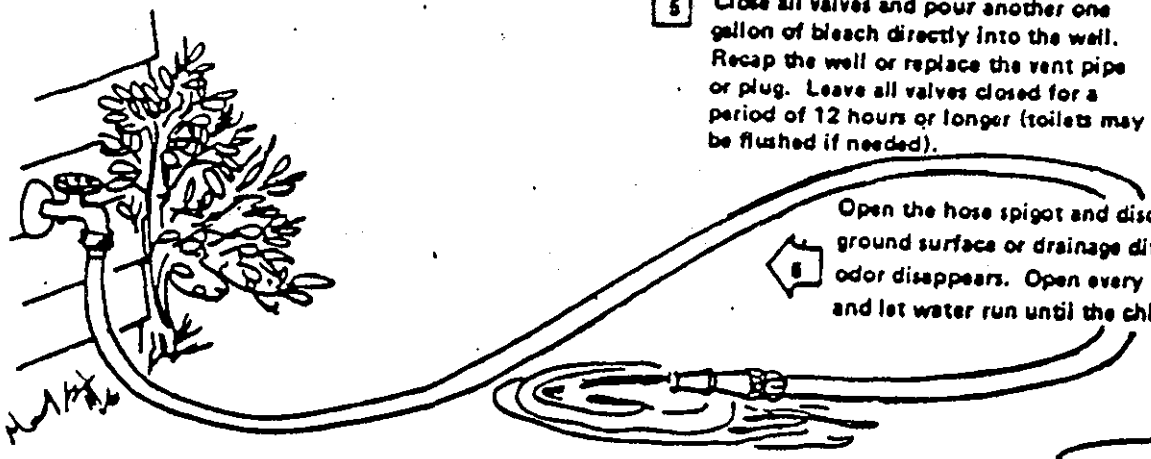


3. Connect a hose to a house spigot and run water directly into the well until chlorine odor is present in the water. Run the water this way for 15 minutes.

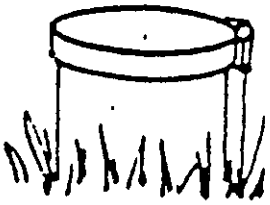


4. Shut off water supply to hose and proceed to systematically open each water fixture in the house. Let water run through each fixture until chlorine odor is present. Include both cold and hot water valves.

5. Close all valves and pour another one gallon of bleach directly into the well. Recap the well or replace the vent pipe or plug. Leave all valves closed for a period of 12 hours or longer (toilets may be flushed if needed).



6. Open the hose spigot and discharge water to ground surface or drainage ditch until chlorine odor disappears. Open every household fixture and let water run until the chlorine odor is gone.



7. The well should now be properly disinfected. Request . collect a sample of your water before using it. The phone number will usually be found listed under the city or county government offices in the white pages of your telephone directory.

At the heart of it all - a healthier Ohio.

D H.

An Equal Opportunity Employer/Provider

*Special Note: In a continuing effort to improve quality, Belmont Labs has modified its DOC sampling procedure. The following are instructions reflecting those modifications.

Sampling Instructions for DOCs (read completely before starting)

When sampling from a water tap:

1. Open the tap and allow the system to flush until the water temperature has stabilized (usually 10 minutes). Adjust the flow to about 500 mL/min.

2. Completely remove plunger from the syringe provided. Attach filter to end of syringe, writing on filter will be face up. Holding the syringe upright, Fill with sample. Insert plunger into barrel. Push syringe down to approx. the 60 ml mark.

3. Open the 40 mL VOA vial (containing sulfuric acid). Holding the vial upright, position filter over vial. Push syringe barrel down firmly, filling vial with filtered sample. Fill as near to the top as possible. Carefully complete filling the vial forming a meniscus at the top of the vial. **NOTE**- be careful not to rinse out the sulfuric acid preservative.

4. Screw the cap on the vial so that the Teflon (shiny) side of the septum is in contact with the water. Do not touch the septum and do not over tighten, it could result in cracking the vial.

5. Invert the vial; tap with your fingers to check for air bubbles. If there are air bubbles present, unscrew the cap and carefully add additional filtered sample to reform the meniscus and check again.

6. Repeat steps (1-6) for triplicate samples **using same filter and syringe**.

7. The samples must be chilled with ice to 4°C until received at the laboratory for analysis.

When sampling from an open body of water:

1. Partially fill a 1 quart wide-mouth bottle with sample from a representative area. Fill syringe with sample from the large container; and filter and described above. Fill as near to the top as possible. Carefully complete filling the vial forming a meniscus at the top of the vial. **NOTE**- be careful not to rinse out the sulfuric acid preservative.

2. Follow steps (4-7) as mentioned above.

Field Blank

1. Follow steps (2-5) using a new syringe and filter with the DI water provided.

***NOTE**—the preservative in the vial is 1:1 sulfuric acid (H_2SO_4) and is very corrosive. Protective eyewear and gloves should be worn when dispensing acid.

Sampling Instructions for Drinking Water VOCs/THMs

When sampling from a water tap:

1. Open the tap and allow the system to flush until the water temperature has stabilized (usually 10 minutes). Adjust the flow to about 500 mL/min.

2. Open the 40 mL VOA vial (containing 25 mg ascorbic acid), while holding the vial at an angle, fill as near to the top as possible. Carefully complete filling the vial forming a meniscus at the top of the vial. **NOTE**- be careful not to rinse out the ascorbic acid preservative.

3. Add **5-7** drops of 1:1 Hydrochloric Acid* - which is supplied in the small dropper bottle.

4. Screw the cap on the vial so that the Teflon (shiny) side of the septum is in contact with the water. Do not touch the septum and do not over tighten, it could result in cracking the vial.

5. Invert the vial; tap with your fingers to check for air bubbles. If there are air bubbles present, unscrew the cap and carefully add additional water to reform the meniscus and check again.

6. Shake sample for one minute.

7. Repeat steps (1-6) for duplicate samples .

8. The samples must be chilled with ice to 4°C until received at the laboratory for analysis.

When sampling from an open body of water:

1. Partially fill a 1 quart wide-mouth bottle with sample from a representative area. Fill sample vials with sample from the large container; fill as near to the top as possible. Carefully complete filling the vial forming a meniscus at the top of the vial. **NOTE**- be careful not to rinse out the ascorbic acid preservative.

2. Follow steps (3-8) as mentioned above.

***NOTE**—the preservative in the dropper bottle is 1:1 hydrochloric acid (HCl) and is very corrosive. Protective eyewear and gloves should be worn when dispensing acid.

Belmont Labs

Haloacetic Acid Sampling Instructions

1. Fill sample bottles to just overflowing but take care not to flush out the ammonium chloride preservative already in the bottles.

2. When sampling from a water tap, open the tap and allow the system to flush until the water temperature has stabilized (usually about three to five minutes). Remove the aerator so that no air bubbles can be visibly detected and collect samples from the flowing system.

3. When sampling from an open body of water, fill a 1 quart wide-mouth bottle or 1 Liter beaker with sample from a representative area, and carefully fill sample vials from the container.

4. After collecting the sample in the bottle containing the ammonium chloride, seal the bottle and agitate by hand for one minute.

LLHg Sampling Procedure

Site Preparation:

1. Designate first person as "Dirty Hands" and second person as "Clean Hands".
2. Both put on jacket, cap, mask, and Gloves ("Dirty Hands"· 3pairl "Clean Hands "-2 pair).
3. "Dirty Hands"
   a. Place large cooler near manhole
   b. Place smaller cooler with bottles near large cooler
   c. Remove manhole cover and remove first pair of gloves
   d. Open baggie containing Teflon Jar (do not remove Jar)
   e. Attach pole to jar while holding baggie with jar still inside
   HangJar over large cooler and remove baggie
   g. Open Field Blank Outer Bag, remove and open bag with bottle of water
   h. Remove cap from bottle of water and pour into Teflon Jar
   i. Replace cap and put emptied bottle back into its bag
   j. Get double-bagged field blank bottles, open outer baggie

Field BlanksCollection:

4. "Clean Hands"
   a. Open inner baggie
   b. Remove 1st field blank bottle
   c. Remove cap from 1st field blank bottle
5. "Dirty Hands"
   a. Close outer baggie and sets in cup holder
   b. Pour water from Teflon jar into 1st field blank bottle (held by "Clean Hands")
   c. Fill bottle as full to top as possible
6. "Clean Hands" replaces cap from 1st field blank bottle
7. "Dirty Hands" opens outer baggie containing 2nd field blank bottle
8. "Clean Hands"
   a. Removes 2nd field blank bottle from inner baggie
   b. Places 1st field blank into inner baggie
   c. Removes cap from 2nd field blank bottle
9. "Dirty Hands"
   a. Place outer baggie in cup holder
   b. Pour water from Teflon jar into 2nd field blank bottle (held by "Clean Hands")
   c. Fill bottle as full to top as possible
10. "Clean Hands"
    a. Replaces cap on 2nd field blank bottle
    b. Places 2nd field blank into inner baggie
    c. Closes inner baggie
11. "Dirty Hands"
    a. Closes outer baggie
    b. Placesouter baggie into small cooler

LLHg Sampling Procedure

Sample Collection:

12. "Dirty Hands"
    a. Removes 2nd pair of gloves
    b. Gets sample bottles from cooler and places in cup holder
    c. Collects wastewater sample from manhole using pole and Teflon jar
    d. Hangspole and jar over large cooler
    e. Opens outer baggie
13. "Clean Hands"
    a. Remove first pair of gloves
    b. Open inner baggie
    c. Remove 1st sample bottle
    d. Remove cap from 1st sample bottle
14. "Dirty Hands"
    a. Close outer baggie and sets in cup holder
    b. Pour wastewater from Teflon jar into 1st sample bottle (held by "Clean Hands")
    c. Fill bottle as full to top as possible
15. "Clean Hands" replaces cap from 1st sample bottle
16. "Dirty Hands" opens outer baggie containing 2nd sample bottle
17. "Clean Hands"
    a. Removes 2nd sample bottle from inner baggie
    b. Places t" filled sample bottle into inner baggie
    c. Removes cap from 2nd field blank bottle
18. "Dirty Hands"
    a. Place outer baggie in cup holder
    b. Pour wastewater from Teflon jar into 2nd sample bottle (held by "Clean Hands")
    c. Fill bottle as full to top as possible
19. "Clean Hands"
    a. Replaces cap on 2nd field blank bottle
    b. Places 2nd field blank into inner baggie
    c. Closes inner baggie
20. "Dirty Hands"
    a. Resealouter baggie
    b. Mark all sample and field blank baggieswith date and time of collection c. Document collection on Chain of Custody
    d. Place samples and field blanks in Iced cooler

Belmont Labs

Metals Analysis Sampling Instructions

1. Samples should be collected in plastic or glass bottles. Volume collected should be sufficient to insure a representative sample, allow for replicate analysis (if required), and minimize waste disposal.

2. Collect the sample the same day that it will be returned to the lab.

3. Fill sample bottles to just overflowing but take care not to flush out the nitric acid preservative already in the bottles.

4. When sampling from a private residence or business, collect sample(s) from an interior cold water tap, such as a kitchen or bathroom sink. Do not turn on the water for at least 6 hours prior to collecting.

5. When sampling from an open body of water, fill a 1-quart wide-mouth bottle or 1-Liter beaker with sample from a representative area, and carefully fill sample vials from the container.

6. When sampling from a public water supply system, open the tap and allow the system to flush until the water temperature has stabilized (usually about three to five minutes). Remove the aerator so that no air bubbles can be visibly detected and collect samples from the flowing system.

Analysis of Drinking Water for Lead and Copper

1. Lead and Copper samples should always be "first draw" samples. Water should stand in the pipes for a **minimum** of **6 hours**, but **no more than 12 hours.** The selected site should, however, be a tap that is used on a regular basis. The suggested time of day for sampling is either early morning or in the evening when the resident returns home. These times ensure that the 'necessary stagnant water conditions' are present.

2. In **single-family residences**, samples should always be drawn from the **cold water kitchen or bathroom tap only.** Please note, if you use the bathroom sink, please ensure that there is a minimum of eleven (11) to twelve (12) inches of clearance between the faucet and the bottom of the sink so a sample can properly be taken without any possibility of contamination from the faucet.

3. Samples collected in any **other type building** other than a single-family residence should be collected from a tap within the building that is **regularly used for consumption.**

Belmont Labs

Potable Wet Chemistries Sampling Instructions

1. Samples should be collected in plastic or glass bottles. Volume collected should be sufficient to insure a representative sample, allow for replicate analysis (if required), and minimize waste disposal.

2. Fill sample bottles to just overflowing but take care not to flush out the preservative already in the bottles.

3. Sample containers should already contain appropriate preservative for parameter to be analyzed. Cyanide sample containers contain ascorbic acid, but must have 10 N NaOH added **after sample has been taken**. Add entire contents of vial into sample container.

4. When sampling from a water tap, open the tap and allow the system to flush until the water temperature has stabilized (usually about three to five minutes). Remove the aerator so that no air bubbles can be visibly detected and collect sample from the flowing system.

5. When sampling from an open body of water, fill a 1-quart wide-mouth bottle or 1-Liter beaker with sample from a representative area, and carefully fill sample vials from the container.

6. Repeat steps (1-5) for duplicate samples.

7. The samples must be chilled with ice to 4°C until received at the laboratory for analysis.

Belmont Labs™
The Environmental Service Company.

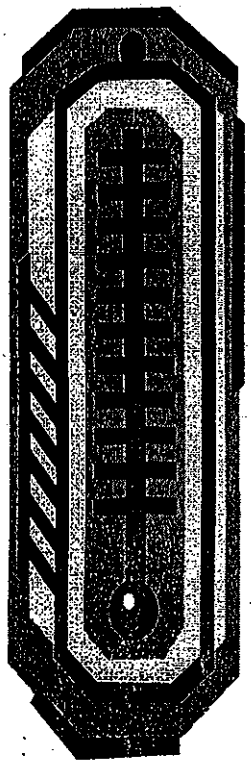
To: All Clients

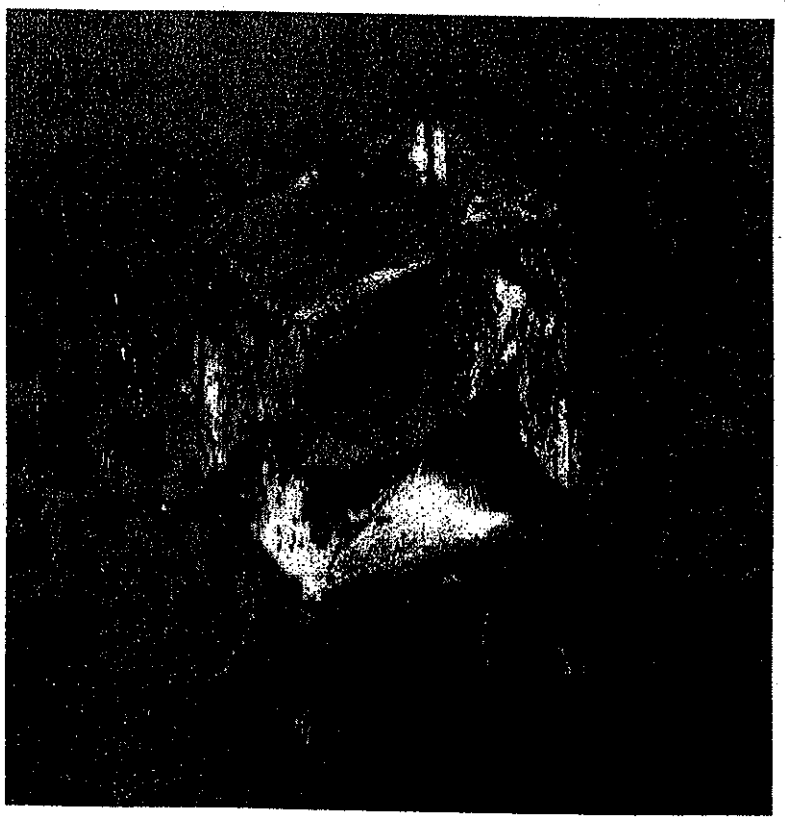
RE: **Sample Temperature Requirements**

This is just a reminder that Belmont Labs needs to receive all samples on ice at a temperature of 6 °C or less (but not frozen). Due to the higher than normal temperatures recently, extra bags of ice might be needed to keep the samples at the required temperature.

If the samples are collected and brought directly to the laboratory, an attempt must be made to start cooling the samples (putting a bag of ice in the cooler with the sample will achieve this).

If you have any questions regarding this issue, feel free to contact your Project Manager.





Belmont Labs

Sulfide Sampling Instructions

1. Samples should be collected in plastic bottles. Volume collected should be sufficient to insure a representative sample, allow for replicate analysis (if required), and minimize waste disposal.

2. Fill sample bottles to almost overflowing but take care not to flush out the preservative already in the bottles. Sample containers need to be as full as possible to minimize the amount of air the sample comes in contact with.

3. Sample containers already contain zinc acetate preservative. 10 N NaOH solution must be added to the container **after the sample has been taken**. Add entire contents of vial into sample container. Invert sample gently to mix. Do not shake the sample. Fill the sample container as full as possible to minimize headspace.

4. When sampling from a water tap, open the tap and allow the system to flush until the water temperature has stabilized (usually about three to five minutes). Remove the aerator so that no air bubbles can be visibly detected and collect sample from the flowing system.

5. When sampling from an open body of water, fill a 1-quart wide-mouth bottle or 1-Liter beaker with sample from a representative area, and carefully fill sample vials from the container.

6. Repeat steps (1-5) for duplicate samples.

7. The samples must be chilled with ice to 4°C until received at the laboratory for analysis.

If you have any questions, contact your project manager or Belmont Labs Quality Assurance Manager.

***Special Note: In a continuing effort to improve quality, Belmont Labs has modified its TOC sampling procedure. The following are instructions reflecting those modifications.**

Sampling Instructions for TOCs

When sampling from a water tap:

1. Open the tap and allow the system to flush until the water temperature has stabilized (usually 10 minutes). Adjust the flow to about 500 mL/min.

2. Open the 40 mL VOA vial (containing sulfuric acid), while holding the vial at an angle, fill as near to the top as possible. Carefully complete filling the vial forming a meniscus at the top of the vial. **NOTE**- be careful not to rinse out the sulfuric acid preservative.

3. Screw the cap on the vial so that the Teflon (shiny) side of the septum is in contact with the water. Do not touch the septum and do not over tighten, it could result in cracking the vial.

4. Invert the vial; tap with your fingers to check for air bubbles. If there are air bubbles present, unscrew the cap and carefully add additional water to reform the meniscus and check again.

5. Repeat steps (1-6) for triplicate samples.

6. The samples must be chilled with ice to 4°C until received at the laboratory for analysis.

When sampling from an open body of water:

1. Partially fill a 1 quart wide-mouth bottle with sample from a representative area. Fill sample vials with sample from the large container; fill as near to the top as possible. Carefully complete filling the vial forming a meniscus at the top of the vial. **NOTE**- be careful not to rinse out the sulfuric acid preservative.

2. Follow steps (3-6) as mentioned above.

***NOTE**—the preservative in the vial is 1:1 sulfuric acid (H_2SO_4) and is very corrosive. Protective eyewear and gloves should be worn when dispensing acid.

Appendix 8

Wet Chemistry

Analysis	Matrix	Hold	Time	HoldType	Hold2	Hold2 Type	Container	Preservation
Acidity	Water	14	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Alkalinity	Water	7	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Alkalinity Stability	Water	48	Hours	Analyzed	-	-	1-liter HDPE	Refrigerate at 4°C
BOD	Water	48	Hours	Analyzed	-	-	500 ml HDPE	Refrigerate at 4°C
CBOD	Water	48	Hours	Analyzed	-	-	500 ml HDPE	Refrigerate at 4°C
Chloride	Water	28	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Chloride	Soil	28	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Chlorine, Total Residual	Water	8	Hours	Analyzed	-	-	125 mL HDPE	Refrigerate at 4°C
Cyanide, Ameniable	Water	14	Days	Extracted	14	Analyzed	250 mL HDPE	preserved with 1:1 NAOH to pH>12
Cyanide, Reactive	Water	14	Days	Extracted	14	Analyzed	250 mL HDPE	preserved with 1:1 NAOH to pH>12
Cyanide, Total	Water	14	Days	Extracted	14	Analyzed	250 mL HDPE	preserved with 1:1 NAOH to pH>12
COD	Water	28	Days	Analyzed	-	-	125 mL HDPE	preserved with 1:1 H2SO4 to pH<2
Color	Water	48	Hours	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Conductivity	Water	25	Days	Analyzed	-	-	125 mL HDPE	Refrigerate at 4°C
Conductivity	Soil	25	Days	Analyzed	-	-	2-oz glass	Refrigerate at 4°C
COND_NEUTRA	Water	25	Days	Analyzed	-	-	125 mL HDPE	Refrigerate at 4°C
Corrosivity	Water	8	Hours	Analyzed	-	-	125 mL HDPE	Refrigerate at 4°C
Corrosivity	Soil	8	Hours	Analyzed	-	-	2-oz amber glass	Refrigerate at 4°C
Hexavalient Chromium	Water	24	Hours	Analyzed	-	-	125 mL HDPE	Refrigerate at 4°C
Dissolved Oxygen	Water	8	Hours	Analyzed	-	-	500 ml HDPE	Refrigerate at 4°C
DOC	Water	28	Days	Analyzed	-	-	40 ml VOA vial	H2SO4
Flouride	Water	7	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Flouride	Soil	28	Days	Analyzed	-	-	2-oz glass	Refrigerate at 4°C
Flashpoint	Water	14	Days	Analyzed	-	-	4-oz glass	Refrigerate at 4°C
Flashpoint	Soil	14	Days	Analyzed	-	-	4-oz glass	Refrigerate at 4°C
FOC	Water	28	Days	Analyzed	-	-	2-oz glass	Refrigerate at 4°C
FOC	Soil	28	Days	Analyzed	-	-	2-oz glass	Refrigerate at 4°C
Bicarbonate	Water	14	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Bicarbonate	Soil	14	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Ignitability	Water	14	Days	Analyzed	-	-	1-liter amber glass	Refrigerate at 4°C
Ignitability	Soil	14	Days	Analyzed	-	-	4-oz Sealed glass	Refrigerate at 4°C
Ammonia	Water	28	Days	Analyzed	-	-	250 mL HDPE	preserved with 1:1 H2SO4 to pH<2
Ammonia	Soil	28	Days	Analyzed	-	-	2-oz glass	Refrigerate at 4°C

Wet Chemistry

Analysis	Matrix	Hold	Time	HoldType	Hold2	Hold2 Type	Container	Preservation
NO2	Water	48	Hours	Analyzed	-	-	125 mL HDPE	Refrigerate at 4°C
NO2NO3	Water	28	Days	Analyzed	-	-	125 mL HDPE	preserved with 1:1 H2SO4 to pH<2
NO2NO3	Soil	28	Days	Analyzed	-	-	2-oz glass	Refrigerate at 4°C
NO3	Water	28	Days	Analyzed	-	-	125 mL HDPE	preserved with 1:1 H2SO4 to pH<2
NO3	Soil	28	Days	Analyzed	-	-	2-oz glass	Refrigerate at 4°C
Oil and Grease	Water	28	Days	Analyzed	-	-	1-liter glass	preserved- 1:1 H2SO4 to pH <2
Oil and Grease	Soil	28	Days	Analyzed	-	-	1-liter glass	preserved- 1:1 H2SO4 to pH <2
Phosphate	Water	28	Days	Analyzed	-	-	250 mL HDPE	preserved with 1:1 H2SO4 to pH<2
Phosphate, Ortho	Water	48	Hours	Analyzed	-	-	125 mL HDPE	Refrigerate at 4°C
pH	Water	15	Minutes	Analyzed	-	-	125 mL HDPE	Refrigerate at 4°C
pH	Soil	15	Minutes	Analyzed	-	-	2-oz glass	Refrigerate at 4°C
Phenolics	Water	28	Days	Analyzed	-	-	1-liter glass	preserved- 1:1 H2SO4 to pH <2
Phosphorus	Water	28	Days	Analyzed	-	-	125 mL HDPE	preserved with 1:1 H2SO4 to pH<2
Percent Moisture	Soil	7	Days	Analyzed	-	-	2-oz glass	Refrigerate at 4°C
Sulfite	Water	24	Hours	Analyzed	-	-	250mL HDPE	preserved with EDTA solution
Sulfate	Water	28	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Sulfate	Soil	28	Days	Analyzed	-	-	4-oz glass	Refrigerate at 4°C
Percent Solids	Soil	7	Days	Analyzed	-	-	2-oz glass	Refrigerate at 4°C
Percent Solids	Water	7	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Suspended Solids	Water	48	Hours	Analyzed	-	-	1-liter HDPE	Refrigerate at 4°C
Sulfide	Water	7	Days	Analyzed	-	-	500 mL HDPE	1:1 NAOH to pH>12 (Zero Headspace)
Sulfide, Methyl Blue	Water	7	Days	Analyzed	-	-	500 mL HDPE	1:1 NAOH to pH>12 (Zero Headspace)
TDS	Water	7	Days	Analyzed	-	-	500 ml HDPE	Refrigerate at 4°C
Total Inorganic Carbon	Water	28	Days	Analyzed	-	-	40 ml VOA vial	H2SO4
TKN	Water	28	Days	Analyzed	-	-	125 mL HDPE	preserved with 1:1 H2SO4 to pH<2
Total Organic Carbon	Water	28	Days	Analyzed	-	-	40 ml VOA vial	H2SO4
TSS	Water	7	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
TSS	Soil	7	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Turbidity	Water	24	Hours	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C

Wet Chemistry

Analysis	Matrix	Hold	Time	HoldType	Hold2	Hold2 Type	Container	Preservation
Total Volatile Solids	Soil	7	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C
Total Volatile Solids	Water	7	Days	Analyzed	-	-	250 mL HDPE	Refrigerate at 4°C

Appendix 9

Metals Soil Control Limits

		LCS			MS			DUP
SpecificMethod	Analyte	LL	UL	RPD	LL	UL	RPD	RPD
EPA 200.7	Aluminum	80	120	20	75	125	20	20
EPA 200.7	Antimony	80	120	20	75	125	20	20
EPA 200.7	Arsenic	80	120	20	75	125	20	20
EPA 200.7	Barium	80	120	20	75	125	20	20
EPA 200.7	Beryllium	80	120	20	75	125	20	20
EPA 200.7	Bismuth	80	120	20	75	125	20	20
EPA 200.7	Boron	80	120	20	75	125	20	20
EPA 200.7	Cadmium	80	120	20	75	125	20	20
EPA 200.7	Calcium	80	120	20	75	125	20	20
EPA 200.7	Chromium	80	120	20	75	125	20	20
EPA 200.7	Cobalt	80	120	20	75	125	20	20
EPA 200.7	Copper	80	120	20	75	125	20	20
EPA 200.7	Iron	80	120	20	75	125	20	20
EPA 200.7	Lead	80	120	20	75	125	20	20
EPA 200.7	Lithium	80	120	20	75	125	20	20
EPA 200.7	Magnesium	80	120	20	75	125	20	20
EPA 200.7	Manganese	80	120	20	75	125	20	20
EPA 200.7	Molybdenum	80	120	20	75	125	20	20
EPA 200.7	Nickel	80	120	20	75	125	20	20
EPA 200.7	Phosphorus	80	120	20	75	125	20	20
EPA 200.7	Potassium	80	120	20	75	125	20	20
EPA 200.7	Selenium	80	120	20	75	125	20	20
EPA 200.7	Silica	80	120	20	75	125	20	20
EPA 200.7	Silver	80	120	20	75	125	20	20
EPA 200.7	Sodium	80	120	20	75	125	20	20
EPA 200.7	Strontium	80	120	20	75	125	20	20
EPA 200.7	Thallium	80	120	20	75	125	20	20
EPA 200.7	Tin	80	120	20	75	125	20	20
EPA 200.7	Titanium	80	120	20	75	125	20	20
EPA 200.7	Vanadium	80	120	20	75	125	20	20
EPA 200.7	Zinc	80	120	20	75	125	20	20
7470A	Mercury	80	120	20	70	130	30	-

Limits are subject to change

Metals Water Control Limits

		LCS			MS			DUP
SpecificMethod	Analyte	LL	UL	RPD	LL	UL	RPD	RPD
3113B	Antimony	80	120	20	70	130	30	20
3113B	Arsenic	80	120	20	70	130	30	20
3113B	Beryllium	80	120	20	70	130	30	20
3113B	Cadmium	80	120	20	70	130	30	20
3113B	Chromium	80	120	20	70	130	30	20
3113B	Cobalt	80	120	20	70	130	30	20
3113B	Copper	80	120	20	70	130	30	20
3113B	Lead	80	120	20	70	130	30	20
3113B	Molybdenum	80	120	20	70	130	30	20
3113B	Nickel	80	120	20	70	130	30	20
3113B	Selenium	80	120	20	70	130	30	20
3113B	Silver	80	120	20	70	130	30	20
3113B	Thallium	80	120	20	70	130	30	20
EPA 200.7	Aluminum	85	115	20	75	125	20	20
EPA 200.7	Antimony	85	115	20	75	125	20	20
EPA 200.7	Arsenic	85	115	20	75	125	20	20
EPA 200.7	Barium	85	115	20	75	125	20	20
EPA 200.7	Beryllium	85	115	20	75	125	20	20
EPA 200.7	Bismuth	85	115	20	75	125	20	20
EPA 200.7	Boron	85	115	20	75	125	20	20
EPA 200.7	Cadmium	85	115	20	75	125	20	20
EPA 200.7	Calcium	85	115	20	75	125	20	20
EPA 200.7	Chromium	85	115	20	75	125	20	20
EPA 200.7	Cobalt	85	115	20	75	125	20	20
EPA 200.7	Copper	85	115	20	75	125	20	20
EPA 200.7	Gold	85	115	20	75	125	20	20
EPA 200.7	Iron	85	115	20	75	125	20	20
EPA 200.7	Lead	85	115	20	75	125	20	20
EPA 200.7	Lithium	85	115	20	75	125	20	20
EPA 200.7	Magnesium	85	115	20	75	125	20	20
EPA 200.7	Manganese	85	115	20	75	125	20	20
EPA 200.7	Molybdenum	85	115	20	75	125	20	20
EPA 200.7	Nickel	85	115	20	75	125	20	20
EPA 200.7	Palladium	85	115	20	75	125	20	20
EPA 200.7	Phosphorus	85	115	20	75	125	20	20
EPA 200.7	Platinum	85	115	20	75	125	20	20
EPA 200.7	Potassium	85	115	20	75	125	20	20
EPA 200.7	Selenium	85	115	20	75	125	20	20
EPA 200.7	Silica	85	115	20	75	125	20	20
EPA 200.7	Silver	85	115	20	75	125	20	20
EPA 200.7	Sodium	85	115	20	75	125	20	20
EPA 200.7	Strontium	85	115	20	75	125	20	20
EPA 200.7	Tellurium	85	115	20	75	125	20	20
EPA 200.7	Thallium	85	115	20	75	125	20	20

Metals Water Control Limits

		LCS			MS			DUP
SpecificMethod	Analyte	LL	UL	RPD	LL	UL	RPD	RPD
EPA 200.7	Tin	85	115	20	75	125	20	20
EPA 200.7	Titanium	85	115	20	75	125	20	20
EPA 200.7	Vanadium	85	115	20	75	125	20	20
EPA 200.7	Zinc	85	115	20	75	125	20	20
7471A	Mercury	80	120	20	70	130	30	-

Limits are subject to change

SVOC Soil Control Limits

Method	Analyte	LCS			MS			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
SW 8151	2,4,5-T	49	117	29					
SW 8151	2,4,5-TP (Silvex)	59	108	26					
SW 8151	2,4-D	40	109	40					
SW 8151	2,4-DB	39	116	42					
SW 8151	DCAA							26	149
SW 8151	Dicamba	10	251	50					
SW 8151	Dichloroprop	17	226	42					
SW 8151	Dinoseb	10	123	36					
EPA 608	Aroclor 1016	67.8	149	27.4	70	246	28		
EPA 608	Aroclor 1260	50.7	175	26.3	33	169	20		
EPA 608	Decachlorobiphenyl							35.1	113
EPA 608	Tetrachloro-m-xylene							28.1	112
SW 8082	Aroclor 1016	47.6	150	20	70	246	28		
SW 8082	Aroclor 1260	38.9	159	20.1	33	169	20		
SW 8082	Decachlorobiphenyl							32.5	153
SW 8082	Tetrachloro-m-xylene							35.8	122
EPA 608	4,4´-DDD	68	112	20	64	153	16		
EPA 608	4,4´-DDE	64	126	10	70	144	41		
EPA 608	4,4´-DDT	55	140	10	74	135	20		
EPA 608	Aldrin	47	134	13	63	124	39		
EPA 608	alpha-BHC	59	126	21	58	121	24		
EPA 608	alpha-Chlordane	63	111	10					
EPA 608	beta-BHC	62	109	10	70	133	19		
EPA 608	Chlordane	10	200	50					
EPA 608	delta-BHC	59	121	10	23	137	24		
EPA 608	Dieldrin	66	115	10	82	124	18		
EPA 608	Endosulfan I	54	102	10	34	136	22		
EPA 608	Endosulfan II	41	116	10	22	141	19		
EPA 608	Endosulfan sulfate	60	140	10	67	155	22		
EPA 608	Endrin	60	125	10	81	147	15		
EPA 608	Endrin aldehyde	40	124	13	52	159	29		
EPA 608	Endrin ketone	61	140	10	75	138	16		
EPA 608	gamma-BHC	58	114	11	70	123	21		
EPA 608	gamma-Chlordane	62	108	10					
EPA 608	Heptachlor	48	114	16	54	144	39		
EPA 608	Heptachlor epoxide	62	108	10	74	126	17		
EPA 608	Methoxychlor	55	140	10	75	139	18		
EPA 608	Toxaphene	10	200	50					
EPA 608	Tetrachloro-m-xylene							55	120
EPA 608	Decachlorobiphenyl							60	150

SVOC Soil Control Limits

Method	Analyte	LCS			MS			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
SW 8081	4,4´-DDD	60.7	119	14.8	64	153	16		
SW 8081	4,4´-DDE	54.3	112	12.5	70	144	41		
SW 8081	4,4´-DDT	48	136	10.2	74	135	20		
SW 8081	Aldrin	42.9	108	17.3	63	124	39		
SW 8081	alpha-BHC	44.7	108	19.5	58	121	24		
SW 8081	alpha-Chlordane	54.9	104	12.3					
SW 8081	beta-BHC	49.7	114	13.9	70	133	19		
SW 8081	Chlordane	10	200	50					
SW 8081	delta-BHC	51	111	11.4	23	137	24		
SW 8081	Dieldrin	57.8	110	11.8	82	124	18		
SW 8081	Endosulfan I	43.7	89.3	12.9	34	136	22		
SW 8081	Endosulfan II	49.7	98.7	13.8	22	141	19		
SW 8081	Endosulfan sulfate	56.5	134	13.9	67	155	22		
SW 8081	Endrin	61.8	124	14.5	81	147	15		
SW 8081	Endrin aldehyde	65.3	121	14.7	52	159	29		
SW 8081	Endrin ketone	52.5	140	13.7	75	138	16		
SW 8081	gamma-BHC	47.8	113	17.6	70	123	21		
SW 8081	gamma-Chlordane	63.7	99	13.9					
SW 8081	Heptachlor	56	118	17.8	54	144	39		
SW 8081	Heptachlor epoxide	56.7	106	12.7	74	126	17		
SW 8081	Methoxychlor	74.7	144	13	75	139	18		
SW 8081	Toxaphene	10	200	50					
SW 8081	Tetrachloro-m-xylene							54.2	118
SW 8081	Decachlorobiphenyl							42.2	143
SW 8015	C10 to C20	61.7	141	28.3	50	125	25		
SW 8015	o-Terphenyl							46	137
EPA 625	1,2,4-Trichlorobenzene	49	106	14	63	100	16		
EPA 625	1,2-Dichlorobenzene	41	87	15	41	79	22		
EPA 625	1,2-Diphenylhydrazine	10	200	30	10	200	30		
EPA 625	1,3-Dichlorobenzene	43	85	13	35	82	30		
EPA 625	1,4-Dichlorobenzene	40	84	13	36	81	28		
EPA 625	2,4,6-Trichlorophenol	48	113	19	43	105	14		
EPA 625	2,4-Dichlorophenol	53	106	15	45	104	11		
EPA 625	2,4-Dimethylphenol	36	96	24	24	95	14		
EPA 625	2,4-Dinitrophenol	12	125	35	31	76	62		
EPA 625	2,4-Dinitrotoluene	59	112	17	43	94	27		
EPA 625	2,6-Dinitrotoluene	45	117	17	55	76	13		
EPA 625	2-Chloronaphthalene	45	105	20	48	102	12		
EPA 625	2-Chlorophenol	40	91	14	40	82	14		
EPA 625	2-Nitrophenol	50	103	15	52	102	18		
EPA 625	3,3´-Dichlorobenzidine	10	200	30	10	200	30		
EPA 625	4,6-Dinitro-2-methylphenol	10	200	30	10	200	30		

SVOC Soil Control Limits

Method	Analyte	LCS			MS			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
EPA 625	4-Bromophenyl phenyl ether	45	106	16	27	106	12		
EPA 625	4-Chloro-3-methylphenol	46	116	19	50	102	16		
EPA 625	4-Chlorophenyl phenyl ether	49	106	16	53	98	11		
EPA 625	4-Nitrophenol	23	141	24	39	111	42		
EPA 625	Acenaphthene	44	102	15	59	112	35		
EPA 625	Acenaphthylene	43	102	19	45	99	32		
EPA 625	Anthracene	55	105	17	47	104	31		
EPA 625	Benz(a)anthracene	50	110	16	52	120	24		
EPA 625	Benzidine	10	200	30	10	200	30		
EPA 625	Benzo(a)pyrene	48	104	17	44	104	28		
EPA 625	Benzo(b)fluoranthene	43	104	21	41	116	23		
EPA 625	Benzo(g,h,i)perylene	45	120	23	47	103	36		
EPA 625	Benzo(k)fluoranthene	45	117	28	36	101	27		
EPA 625	Bis(2-chloroethoxy)methane	38	73	18	49	71	13		
EPA 625	bis-(2-Chloroethyl)ether	34	96	14	40	75	13		
EPA 625	Bis(2-chloroisopropyl)ether	10	200	30	10	200	30		
EPA 625	Bis(2-ethylhexyl)phthalate	40	110	18	30	109	29		
EPA 625	Butyl benzyl phthalate	42	109	17	38	104	14		
EPA 625	Chrysene	52	114	18	45	122	28		
EPA 625	Dibenz(a,h)anthracene	44	116	22	53	103	29		
EPA 625	Diethyl phthalate	50	115	15	69	90	10		
EPA 625	Dimethyl phthalate	50	110	16	76	84	10		
EPA 625	Di-n-butyl phthalate	35	115	21	53	94	15		
EPA 625	Di-n-octyl phthalate	41	109	25	50	96	17		
EPA 625	Fluoranthene	48	104	20	36	120	30		
EPA 625	Fluorene	48	106	17	39	114	34		
EPA 625	Hexachlorobenzene	46	103	14	55	102	14		
EPA 625	Hexachlorobutadiene	43	114	18	51	98	23		
EPA 625	Hexachlorocyclopentadiene	30	131	30	11	124	25		
EPA 625	Hexachloroethane	38	96	16	32	74	29		
EPA 625	Indeno(1,2,3-cd)pyrene	45	119	23	54	106	30		
EPA 625	Isophorone	44	107	15	33	116	13		
EPA 625	Naphthalene	45	100	14	35	99	22		
EPA 625	Nitrobenzene	44	100	29	62	91	15		
EPA 625	N-Nitrosodimethylamine	24	95	22	30	79	12		
EPA 625	N-Nitrosodi-n-propylamine	39	113	15	61	87	11		
EPA 625	N-Nitrosodiphenylamine	50	125	19	44	110	10		
EPA 625	Pentachlorophenol	27	143	23	36	110	15		
EPA 625	Phenanthrene	50	110	16	39	109	27		
EPA 625	Phenol	37	85	16	27	96	38		
EPA 625	Pyrene	41	103	22	47	103	32		
EPA 625	Phenol-d6							34	115
EPA 625	Terphenyl-d14							43	130
EPA 625	2,4,6-Tribromophenol							40	135

SVOC Soil Control Limits

Method	Analyte	LCS			MS			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
EPA 625	2-Fluorobiphenyl							56	115
EPA 625	2-Fluorophenol							36	101
EPA 625	Nitrobenzene-d5							50	102
SW 8270C	1,2,4,5-Tetrachlorobenzene	10	200	30	10	200	30		
SW 8270C	1,2,4-Trichlorobenzene	62.5	104	19.2	55.4	99.7	36.5		
SW 8270C	1,2-Dichlorobenzene	54.1	86.9	16.4	43.1	93.7	35.7		
SW 8270C	1,2-Diphenylhydrazine	10	200	30	10	200	30		
SW 8270C	1,3-Dichlorobenzene	54.3	87	16.7	44.2	92	35.9		
SW 8270C	1,4-Dichlorobenzene	52.2	84.3	17.3	42.4	90.5	34.5		
SW 8270C	2,3,4,6-Tetrachlorophenol	45.9	117	20.6	26.6	113	34.2		
SW 8270C	2,4,5-Trichlorophenol	57.3	95.1	18.9	27.2	112	34.2		
SW 8270C	2,4,6-Tribromophenol							29.6	129
SW 8270C	2,4,6-Trichlorophenol	59.6	95.6	19.1	37.7	107	32.5		
SW 8270C	2,4-Dichlorophenol	58.8	98.4	19.8	32.6	114	33.7		
SW 8270C	2,4-Dimethylphenol	47.2	99.8	24	24	95	37.3		
SW 8270C	2,4-Dinitrophenol	10.9	110	30	31	76	50		
SW 8270C	2,4-Dinitrotoluene	59.7	100	21.1	25	116	50		
SW 8270C	2,6-Dichlorophenol	10	200	30	10	200	30		
SW 8270C	2,6-Dinitrotoluene	59.9	100	19.2	35.7	103	48.1		
SW 8270C	2-Chloronaphthalene	57.7	104	19.3	55.7	97.9	35		
SW 8270C	2-Chlorophenol	60.2	102	18.1	43.8	111	35.8		
SW 8270C	2-Fluorobiphenyl							56.8	115
SW 8270C	2-Fluorophenol							21.4	101
SW 8270C	2-Methylnaphthalene	57.4	113	20.5	42.2	119	50		
SW 8270C	2-Methylphenol	34.7	150	17.1	28	88	30		
SW 8270C	2-Nitrophenol	56.6	99.1	19	52	102	18		
SW 8270C	3 & 4-Methylphenol	43.1	119	19.9	22.1	125	41.7		
SW 8270C	4,6-Dinitro-2-methylphenol	10	200	30	10	200	30		
SW 8270C	4-Bromophenyl phenyl ether	45.5	124	21.5	33.1	140	32.2		
SW 8270C	4-Chloro-3-methylphenol	39.8	109	19.7	50	102	50		
SW 8270C	4-Chlorophenyl phenyl ether	54.4	103	19.9	36.9	119	32.5		
SW 8270C	4-Nitrophenol	47	76.1	25.6	39	111	50		
SW 8270C	Acenaphthene	60.8	105	19.6	34.9	121	50		
SW 8270C	Acenaphthylene	56.2	118	16.7	23.7	135	50		
SW 8270C	Acetophenone	10	200	30	10	200	30		
SW 8270C	Aniline	56.6	101	16.3	14	86	50		
SW 8270C	Anthracene	49.3	123	17.5	47	104	50		
SW 8270C	Benz(a)anthracene	52.3	109	20.1	52	120	50		
SW 8270C	Benzidine	10	200	30	10	200	30		
SW 8270C	Benzo(a)pyrene	50.2	104	18.8	44	104	50		
SW 8270C	Benzo(b)fluoranthene	45.1	94.8	23.9	41	116	50		
SW 8270C	Benzo(g,h,i)perylene	48.9	127	28.4	47	103	50		
SW 8270C	Benzo(k)fluoranthene	43.1	108	25.4	36	101	50		

SVOC Soil Control Limits

Method	Analyte	LCS			MS			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
SW 8270C	Benzyl Alcohol	65.9	104	17.9	52.5	115	35		
SW 8270C	Bis(2-chloroethoxy)methane	46.3	76.1	18.9	31.5	89.7	46.3		
SW 8270C	bis-(2-Chloroethyl)ether	53.3	92.5	18.3	48.8	94.4	37.6		
SW 8270C	Bis(2-chloroisopropyl)ether	10	200	30	10	200	30		
SW 8270C	Bis(2-ethylhexyl)phthalate	51.6	126	26.1	34.4	148	45		
SW 8270C	Butyl benzyl phthalate	60	104	27.6	37.2	129	36.8		
SW 8270C	Chrysene	55.3	124	16.5	45	122	50		
SW 8270C	Dibenz(a,h)anthracene	50.2	103	25.2	53	103	46.4		
SW 8270C	Dibenzofuran	57.5	116	18.2	59.6	103	43.2		
SW 8270C	Diethyl phthalate	50	115	30	41.2	117	50		
SW 8270C	Dimethyl phthalate	63.8	96.4	17.7	44.1	114	39.2		
SW 8270C	Di-n-butyl phthalate	58.6	121	20.9	40.4	137	39.8		
SW 8270C	Di-n-octyl phthalate	66.7	111	24.4	35.3	152	39.4		
SW 8270C	Fluoranthene	78	119	19	36	120	50		
SW 8270C	Fluorene	53.3	112	18.1	23.7	145	50		
SW 8270C	Hexachlorobenzene	49	114	22.7	39	129	33.6		
SW 8270C	Hexachlorobutadiene	59.4	97.8	18.6	43.3	112	33.8		
SW 8270C	Hexachlorocyclopentadiene	30	131	28.4	11	124	50		
SW 8270C	Hexachloroethane	51	89.3	19	32	74	50		
SW 8270C	Hexachloropropene	10	200	30	10	200	30		
SW 8270C	Indeno(1,2,3-cd)pyrene	48.7	106	26.3	54	106	50		
SW 8270C	Isophorone	54.9	99.8	20.3	40.9	107	44.1		
SW 8270C	Naphthalene	56.3	101	18	35	99	50		
SW 8270C	Nitrobenzene	56.8	102	18.7	36.6	117	15		
SW 8270C	Nitrobenzene-d5							56.4	113
SW 8270C	N-Nitrosodimethylamine	38.1	109	21	31.1	101	50		
SW 8270C	N-Nitroso-di-n-butylamine	10	200	30	10	200	30		
SW 8270C	N-Nitrosodi-n-propylamine	53.2	102	19.4	41.8	110	41.4		
SW 8270C	N-Nitrosodiphenylamine	50	125	20.9	44	110	43.1		
SW 8270C	Pentachlorobenzene	10	200	30	10	200	30		
SW 8270C	Pentachloronitrobenzene	10	200	30	10	200	30		
SW 8270C	Pentachlorophenol	43.8	94.8	27.7	36	110	49.2		
SW 8270C	Phenanthrene	64.3	106	16.6	39	109	50		
SW 8270C	Phenol	55.4	95	20.9	32.9	98.3	34.5		
SW 8270C	Phenol-d6							10.6	50
SW 8270C	Pyrene	58.4	122	21.6	47	103	50		
SW 8270C	Pyridine	20	97	23.8	41	81	50		

Limits are subject to change

SVOC Water Control Limits

Method	Analyte	LCS			MS			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
SW 8011	1,2-Dibromo-3-chloropropane	78.7	134	26.1					
SW 8011	1,2-Dibromoethane	64.9	128	15.8					
EPA 615	2,4-Dichlorophenyl Acetic Acid							27.9	143
EPA 615	2,4,5-T	52.8	130	18.9					
EPA 615	2,4,5-TP (Silvex)	64	112	25.4					
EPA 615	2,4-D	45.3	125	24.2					
EPA 615	2,4-DB	53.9	124	34.9					
EPA 615	Dicamba	50.9	107	23.6					
EPA 615	Dichloroprop	46.5	134	23.8					
EPA 615	Dinoseb	28.7	110	21					
SW 8151	2,4-Dichlorophenyl Acetic Acid							27.9	143
SW 8151	2,4,5-T	52.8	130	18.9					
SW 8151	2,4,5-TP (Silvex)	64	112	25.4					
SW 8151	2,4-D	45.3	125	24.2					
SW 8151	2,4-DB	53.9	124	34.9					
SW 8151	Dicamba	50.9	107	23.6					
SW 8151	Dichloroprop	46.5	134	23.8					
SW 8151	Dinoseb	28.7	110	21					
EPA 608	Decachlorobiphenyl							22.7	115
EPA 608	Tetrachloro-m-xylene							30.4	101
EPA 608	Aroclor 1016	72.6	133	16	50	114	19		
EPA 608	Aroclor 1260	65	129	27	10	127	22		
SW 8082	Tetrachloro-m-xylene							36.1	107
SW 8082	Decachlorobiphenyl							39.6	154
SW 8082	Aroclor 1016	54.8	149	21.2	41	163	17		
SW 8082	Aroclor 1260	57.4	145	24.8	50	111	22		
EPA 608	Decachlorobiphenyl							23.2	115
EPA 608	Tetrachloro-m-xylene							33.9	92.3
EPA 608	4,4´-DDD	87.3	147	18.6	70	130	25		
EPA 608	4,4´-DDE	80	120	14.9	70	130	25		
EPA 608	4,4´-DDT	78.3	164	207	70	130	25		
EPA 608	Aldrin	45.3	111	17	70	130	25		
EPA 608	alpha-BHC	79.6	116	15.1	70	130	25		
EPA 608	beta-BHC	75.7	136	12.8	70	130	25		
EPA 608	delta-BHC	70.1	139	10.4	70	130	25		
EPA 608	Dieldrin	89.4	132	9.73	70	130	25		
EPA 608	Endosulfan I	65.3	95.6	15.5	70	130	25		
EPA 608	Endosulfan II	73.4	107	12.3	70	130	25		
EPA 608	Endosulfan sulfate	98.5	152	14.5	70	130	25		

SVOC Water Control Limits

Method	Analyte	LCS			MS			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
EPA 608	Endrin	93.2	148	13.1	70	130	25		
EPA 608	Endrin aldehyde	95.9	195	14.4	70	130	25		
EPA 608	gamma-BHC	72.8	123	16.2	70	130	25		
EPA 608	Heptachlor	62.6	149	17	70	130	25		
EPA 608	Heptachlor epoxide	79.7	131	10.5	70	130	25		
SW 8081	Decachlorobiphenyl							20.7	123
SW 8081	Tetrachloro-m-xylene							47	134
SW 8081	4,4´-DDD	60.9	129	17.9	70	130	25		
SW 8081	4,4´-DDE	51.5	115	14.5	70	130	25		
SW 8081	4,4´-DDT	58.8	129	19	70	130	25		
SW 8081	Aldrin	37.8	98.4	12.3	70	130	25		
SW 8081	alpha-BHC	49	121	11.7	70	130	25		
SW 8081	alpha-Chlordane	55.3	110	13.3					
SW 8081	beta-BHC	69.3	109	10.9	70	130	25		
SW 8081	Chlordane	10	200	30					
SW 8081	delta-BHC	60.5	124	11.3	70	130	25		
SW 8081	Dieldrin	60.6	122	13.2	70	130	25		
SW 8081	Endosulfan I	48.2	103	12.6	70	130	25		
SW 8081	Endosulfan II	54.1	117	16.4	70	130	25		
SW 8081	Endosulfan sulfate	61	148	18.4	70	130	25		
SW 8081	Endrin	70.7	143	14.6	70	130	25		
SW 8081	Endrin aldehyde	49.6	161	16.4	70	130	25		
SW 8081	Endrin ketone	44.9	157	18					
SW 8081	gamma-BHC	52.1	112	11.4	70	130	25		
SW 8081	gamma-Chlordane	57.9	107	9.9					
SW 8081	Heptachlor	45.6	138	16.3	70	130	25		
SW 8081	Heptachlor epoxide	61.8	114	13.1	70	130	25		
SW 8081	Methoxychlor	62.2	187	19.5					
SW 8081	Toxaphene	10	200	30					
EPA 625	Phenol-d6							12	50
EPA 625	2-Fluorophenol							12.1	94.8
EPA 625	2,4,6-Tribromophenol							21	130
EPA 625	Terphenyl-d14							42.2	155
EPA 625	2-Fluorobiphenyl							47.9	131
EPA 625	Nitrobenzene-d5							49	119
EPA 625	1,2,4-Trichlorobenzene	41.6	107	30	52	121	20		
EPA 625	1,2-Dichlorobenzene	31.6	90.2	30	49	85	15		
EPA 625	1,3-Dichlorobenzene	20.8	93.7	30	46	85	15		
EPA 625	1,4-Dichlorobenzene	25.4	89.4	30	42	93	21		
EPA 625	2,4,6-Trichlorophenol	62.7	106	29.5	47	129	28		
EPA 625	2,4-Dichlorophenol	64.1	106	21.1	70	130	20		
EPA 625	2,4-Dimethylphenol	42.6	108	30	39	100	22		

SVOC Water Control Limits

Method	Analyte	LCS			MS			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
EPA 625	2,4-Dinitrophenol	14.3	121	35	10	146	51		
EPA 625	2,4-Dinitrotoluene	68.9	120	14.7	72	132	17		
EPA 625	2,6-Dinitrotoluene	77.5	109	12	72	132	17		
EPA 625	2-Chloronaphthalene	62.2	108	27.3	43	114	10		
EPA 625	2-Chlorophenol	61.6	100	19.5	43	91	24		
EPA 625	2-Nitrophenol	60.8	109	23.6	60	120	20		
EPA 625	4,6-Dinitro-2-methylphenol	23.4	140	30	31	135	42		
EPA 625	4-Bromophenyl phenyl ether	48.9	153	28.5	64	137	22		
EPA 625	4-Chloro-3-methylphenol	49	111	16.2	57	113	27		
EPA 625	4-Chlorophenyl phenyl ether	58.9	127	24.9	69	126	13		
EPA 625	4-Nitrophenol	13.6	50	44	12	64	36		
EPA 625	Acenaphthene	69.9	110	20.5	67	110	16		
EPA 625	Acenaphthylene	71.2	114	26	46	130	10		
EPA 625	Anthracene	53.2	150	27	46	140	24		
EPA 625	Benz(a)anthracene	50.2	146	28	65	125	20		
EPA 625	Benzo(a)pyrene	39.2	151	30	32	200	21		
EPA 625	Benzo(b)fluoranthene	36.4	133	30	24	228	44		
EPA 625	Benzo(g,h,i)perylene	42.2	170	34.9	38	222	19		
EPA 625	Benzo(k)fluoranthene	36.2	145	30	11	162	30		
EPA 625	Bis(2-chloroethoxy)methane	52.4	83.7	13.2	44	124	22		
EPA 625	bis-(2-Chloroethyl)ether	61.7	98.4	16.5	19	120	24		
EPA 625	Bis(2-ethylhexyl)phthalate	62	155	23.7	57	130	24		
EPA 625	Butyl benzyl phthalate	47	128	27.2	59	131	19		
EPA 625	Chrysene	58.1	144	32.6	62	124	18		
EPA 625	Dibenz(a,h)anthracene	37.3	156	36.5	14	245	23		
EPA 625	Diethyl phthalate	10	114	46.7	33	137	10		
EPA 625	Dimethyl phthalate	10	112	100	10	137	40		
EPA 625	Di-n-butyl phthalate	52.8	145	21	44	130	20		
EPA 625	Di-n-octyl phthalate	65.1	150	23.9	47	135	19		
EPA 625	Fluoranthene	73.7	150	27.2	52	136	20		
EPA 625	Fluorene	62.6	128	21.1	63	122	19		
EPA 625	Hexachlorobenzene	47.1	149	31.4	60	134	23		
EPA 625	Hexachlorobutadiene	24	116	30	51	123	34		
EPA 625	Hexachlorocyclopentadiene	60	150	20	67	150	25		
EPA 625	Hexachloroethane	40	113	30	42	90	20		
EPA 625	Indeno(1,2,3-cd)pyrene	35.6	157	30	30	223	29		
EPA 625	Isophorone	65.2	105	14.9	57	154	21		
EPA 625	Naphthalene	59.8	97.2	35.1	43	120	14		
EPA 625	Nitrobenzene	67.6	105	13.9	40	142	23		
EPA 625	N-Nitrosodimethylamine	26.8	75.6	24.6	12	180	25		
EPA 625	N-Nitrosodi-n-propylamine	43.2	141	18.9	51	102	14		
EPA 625	Pentachlorophenol	31.9	122	30	30	129	35		
EPA 625	Phenanthrene	69.9	120	24.5	46	128	20		
EPA 625	Phenol	21.7	50.8	29.7	17	45	25		

SVOC Water Control Limits

Method	Analyte	LCS			MS			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
EPA 625	Pyrene	59.5	144	30.7	53	127	20		
SW 8270C	Phenol-d6							13.3	57.1
SW 8270C	2-Fluorophenol							19.2	78.1
SW 8270C	2,4,6-Tribromophenol							26	113
SW 8270C	Terphenyl-d14							41.4	126
SW 8270C	2-Fluorobiphenyl							49.8	107
SW 8270C	Nitrobenzene-d5							55.8	117
SW 8270C	1,2,4,5-Tetrachlorobenzene	10	200	50	50	122	21		
SW 8270C	1,2,4-Trichlorobenzene	41.6	107	18.2	52	121	20		
SW 8270C	1,2-Dichlorobenzene	36.3	87.8	17.3	49	85	15		
SW 8270C	1,2-Diphenylhydrazine	10	200	50	60	120	20		
SW 8270C	1,3-Dichlorobenzene	30	80.6	20.2	46	85	15		
SW 8270C	1,4-Dichlorobenzene	36.8	79.4	32.9	42	93	21		
SW 8270C	2,3,4,6-Tetrachlorophenol	40.1	132	19	60	120	20		
SW 8270C	2,4,5-Trichlorophenol	49.3	111	21.9	60	120	20		
SW 8270C	2,4,6-Trichlorophenol	55.4	109	17.7	47	129	28		
SW 8270C	2,4-Dichlorophenol	54.8	113	17.7	70	130	20		
SW 8270C	2,4-Dimethylphenol	41.4	107	23.8	39	100	22		
SW 8270C	2,4-Dinitrophenol	14	107	30	10	146	51		
SW 8270C	2,4-Dinitrotoluene	70.5	116	12.6	72	132	17		
SW 8270C	2,6-Dichlorophenol	10	200	50	53	117	27		
SW 8270C	2,6-Dinitrotoluene	67.4	118	12.1	72	132	17		
SW 8270C	2-Chloronaphthalene	61.8	104	18.9	43	114	10		
SW 8270C	2-Chlorophenol	62.1	101	15.8	43	91	24		
SW 8270C	2-Methylnaphthalene	56.5	114	18	60	120	20		
SW 8270C	2-Methylphenol	17.6	146	15.3	60	120	20		
SW 8270C	2-Nitrophenol	56.1	107	20.7	60	120	20		
SW 8270C	3 & 4-Methylphenol	27.1	101	16.7	60	120	20		
SW 8270C	4,6-Dinitro-2-methylphenol	47.2	130	26	31	135	42		
SW 8270C	4-Bromophenyl phenyl ether	69.7	129	26.7	64	137	22		
SW 8270C	4-Chloro-3-methylphenol	65.4	103	13.4	57	113	27		
SW 8270C	4-Chlorophenyl phenyl ether	66.8	122	21.6	69	126	13		
SW 8270C	4-Nitrophenol	15	46	30	12	64	36		
SW 8270C	Acenaphthene	67.7	107	16.6	67	110	16		
SW 8270C	Acenaphthylene	67	114	15	46	130	10		
SW 8270C	Acetophenone	10	200	50	60	120	20		
SW 8270C	Aniline	45.7	97.3	20	60	120	20		
SW 8270C	Anthracene	72.8	133	17.3	46	140	24		
SW 8270C	Benz(a)anthracene	67.2	120	19	65	125	20		
SW 8270C	Benzidine	70	130	20	60	120	20		
SW 8270C	Benzo(a)pyrene	56	121	20.2	32	200	21		
SW 8270C	Benzo(b)fluoranthene	51.2	106	25.9	24	228	44		
SW 8270C	Benzo(g,h,i)perylene	64.2	125	21.2	38	222	19		

SVOC Water Control Limits

Method	Analyte	LCS			MS			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
SW 8270C	Benzo(k)fluoranthene	48.8	123	24.4	11	162	30		
SW 8270C	Benzyl Alcohol	61.1	103	14.6	60	120	20		
SW 8270C	Bis(2-chloroethoxy)methane	51.2	86.1	10.7	44	124	22		
SW 8270C	bis-(2-Chloroethyl)ether	63.9	99.7	13.2	19	120	24		
SW 8270C	Bis(2-chloroisopropyl)ether	52	96.7	10	14	124	18		
SW 8270C	Bis(2-ethylhexyl)phthalate	67.8	146	21	57	130	24		
SW 8270C	Butyl benzyl phthalate	60.7	111	20	59	131	19		
SW 8270C	Chrysene	69.6	119	19	62	124	18		
SW 8270C	Dibenz(a,h)anthracene	52.6	120	21.8	14	245	23		
SW 8270C	Dibenzofuran	66.4	119	50	60	120	20		
SW 8270C	Diethyl phthalate	28	95	30	33	137	10		
SW 8270C	Dimethyl phthalate	13	76	48	10	137	40		
SW 8270C	Di-n-butyl phthalate	60.9	135	21.6	44	130	20		
SW 8270C	Di-n-octyl phthalate	77.1	125	23.9	47	135	19		
SW 8270C	Fluoranthene	83.5	134	13	52	136	20		
SW 8270C	Fluorene	67.7	124	18	63	122	19		
SW 8270C	Hexachlorobenzene	67.1	121	21.6	60	134	23		
SW 8270C	Hexachlorobutadiene	30	100	30	51	123	34		
SW 8270C	Hexachlorocyclopentadiene	36	124	30	67	150	25		
SW 8270C	Hexachloroethane	21	83	30	42	90	20		
SW 8270C	Hexachloropropene	10	200	50	60	120	20		
SW 8270C	Indeno(1,2,3-cd)pyrene	56.1	119	30	30	223	29		
SW 8270C	Isophorone	67.8	105	12.4	57	154	21		
SW 8270C	Naphthalene	58.3	97.4	30	43	120	14		
SW 8270C	Nitrobenzene	67.1	111	13	40	142	23		
SW 8270C	N-Nitrosodimethylamine	29.9	75.5	21.8	12	180	25		
SW 8270C	N-Nitroso-di-n-butylamine	10	200	50	70	130	20		
SW 8270C	N-Nitrosodi-n-propylamine	64.7	111	18.5	51	102	14		
SW 8270C	N-Nitrosodiphenylamine	10	200	50	60	120	20		
SW 8270C	Pentachlorobenzene	10	200	50	60	120	20		
SW 8270C	Pentachloronitrobenzene	10	200	50	60	120	20		
SW 8270C	Pentachlorophenol	34.6	112	30	30	129	35		
SW 8270C	Phenanthrene	71.8	112	21.3	46	128	20		
SW 8270C	Phenol	19.4	52.2	23.9	17	45	25		
SW 8270C	Pyrene	67.6	121	24.9	53	127	20		
SW 8270C	Pyridine	22.1	73.9	27.7	60	120	20		

Limits are subject to change

VOC Soil Limits

Method	Analyte	LCS			MSLL			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
SW 8021	a,a,a-Trifluorotoluene							54.7	117
SW 8021	Benzene	79.2	119	9.87	10	159	40		
SW 8021	Ethylbenzene	82.5	124	12.1	10	185	40		
SW 8021	m,p-Xylene	79.8	122	10.8	10	180	40		
SW 8021	Methyl tert-Butyl Ether	70.7	127	9.71	12	157	40		
SW 8021	o-Xylene	78.6	122	10.5	10	181	40		
SW 8021	Toluene	78.6	121	10.4	10	169	40		
SW 8015B	a,a,a-Trifluorotoluene							58.7	112
SW 8015B	Gasoline	87	113	13	16	134	22		
EPA 624	1,1,1,2-Tetrachloroethane	69	142	23	38	121	50		
EPA 624	1,1,1-Trichloroethane	58	127	20	35	131	60		
EPA 624	1,1,2,2-Tetrachloroethane	74	141	20	12	144	51		
EPA 624	1,1,2-Trichloroethane	73	140	15	33	126	46		
EPA 624	1,1-Dichloroethane	60	130	20	44	119	48		
EPA 624	1,1-Dichloroethene	62	142	20	31	125	61		
EPA 624	1,1-Dichloropropene	63	142	24	34	126	81		
EPA 624	1,2,3-Trichlorobenzene	60	147	27	10	110	71		
EPA 624	1,2,3-Trichloropropane	71	145	24	10	136	58		
EPA 624	1,2,4-Trichlorobenzene	58	150	44	10	87	60		
EPA 624	1,2,4-Trimethylbenzene	67	141	31	14	129	71		
EPA 624	1,2-Dibromo-3-chloropropane	55	154	31	10	148	57		
EPA 624	1,2-Dibromoethane	72	140	20	31	123	56		
EPA 624	1,2-Dichlorobenzene	68	143	31	12	103	80		
EPA 624	1,2-Dichloroethane	70	142	18	48	114	40		
EPA 624	1,2-Dichloropropane	66	139	22	44	118	48		
EPA 624	1,3,5-Trimethylbenzene	66	142	30	16	130	74		
EPA 624	1,3-Dichlorobenzene	67	141	31	12	106	60		
EPA 624	1,3-Dichloropropane	75	139	17	31	128	50		
EPA 624	1,4-Dichlorobenzene	66	139	32	12	102	80		
EPA 624	1,4-Dioxane	21	195	100	78	130	24		
EPA 624	2,2-Dichloropropane	10	180	40	10	149	50		
EPA 624	2-Butanone	44	120	29	10	159	60		
EPA 624	2-Chloroethyl vinyl ether	68	138	29					
EPA 624	2-Chlorotoluene	69	137	30	18	108	75		
EPA 624	2-Hexanone	10	172	40	10	194	58		
EPA 624	2-Nitropropane	10	251	200	10	311	210		
EPA 624	4-Chlorotoluene	71	140	30	10	116	80		
EPA 624	4-Isopropyltoluene	67	141	31	16	123	80		
EPA 624	4-Methyl-2-pentanone	10	185	100	10	186	60		
EPA 624	Acetone	10	229	40	10	218	60		
EPA 624	Acetonitrile	35	169	69	22	170	70		
EPA 624	Acrolein	10	200	50	10	200	50		

VOC Soil Limits

Method	Analyte	LCS			MSLL			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
EPA 624	Acrylonitrile	64	150	34	22	140	69		
EPA 624	Allyl chloride	50	149	35	28	128	68		
EPA 624	Benzene	64	138	25	39	126	61		
EPA 624	Bromobenzene	73	140	30	15	109	50		
EPA 624	Bromochloromethane	72	132	25	47	124	48		
EPA 624	Bromodichloromethane	72	138	25	40	114	49		
EPA 624	Bromoform	70	144	30	19	119	63		
EPA 624	Bromomethane	10	199	40	10	173	40		
EPA 624	Carbon Disulfide	38	148	36	17	133	74		
EPA 624	Carbon Tetrachloride	49	148	34	23	128	60		
EPA 624	Chlorobenzene	70	135	21	27	111	50		
EPA 624	Chloroethane	17	186	99	17	153	75		
EPA 624	Chloroform	64	134	28	35	130	52		
EPA 624	Chloromethane	47	143	25	22	139	42		
EPA 624	Chloroprene	58	160	36	28	127	81		
EPA 624	cis-1,2-Dichloroethene	66	138	25	42	118	63		
EPA 624	cis-1,3-Dichloropropene	66	141	25	27	113	50		
EPA 624	cis-1,4-Dichloro-2-butene	10	200	50					
EPA 624	Cyclohexane	45	135	43	10	138	80		
EPA 624	Dibromochloromethane	70	139	25	29	122	59		
EPA 624	Dibromomethane	76	135	23	39	126	48		
EPA 624	Dichlorodifluoromethane	20	181	34	10	184	108		
EPA 624	Diethyl ether	41	164	35	42	131	63		
EPA 624	Ethyl acetate	10	180	70	10	140	34		
EPA 624	Ethyl methacrylate	47	157	29	20	141	70		
EPA 624	Ethylbenzene	71	134	31	27	117	40		
EPA 624	Freon-113	50	147	35	29	140	60		
EPA 624	Hexachlorobutadiene	56	150	30	10	115	57		
EPA 624	Iodomethane	13	162	31	10	127	50		
EPA 624	Isobutyl Alcohol	10	157	76	10	186	80		
EPA 624	Isopropylbenzene	71	141	30	24	119	60		
EPA 624	m,p-Xylene	70	138	31	26	114	40		
EPA 624	Methacrylonitrile	62	138	26	10	150	50		
EPA 624	Methyl Acetate	10	235	40					
EPA 624	Methyl acrylate	10	200	50					
EPA 624	Methyl methacrylate	47	156	28	20	154	65		
EPA 624	Methyl tert-Butyl Ether	54	153	35	38	126	50		
EPA 624	Methylcyclohexane	57	133	38	10	133	60		
EPA 624	Methylene Chloride	10	195	51	10	179	58		
EPA 624	Naphthalene	53	157	31	10	114	64		
EPA 624	n-Butanol	10	200	50					
EPA 624	n-Butylbenzene	70	143	30	10	118	60		
EPA 624	n-Hexane	10	185	60	10	122	70		
EPA 624	n-Propylbenzene	69	143	31	16	114	60		

VOC Soil Limits

Method	Analyte	LCS			MSLL			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
EPA 624	o-Xylene	72	139	23	28	119	40		
EPA 624	Propionitrile	56	149	31	26	145	45		
EPA 624	sec-Butylbenzene	63	147	30	10	144	60		
EPA 624	Styrene	71	142	22	17	104	40		
EPA 624	tert_Butylbenzene	67	141	31	12	152	71		
EPA 624	Tetrachloroethene	41	161	40	24	114	50		
EPA 624	Tetrahydrofuran	10	247	70	10	264	100		
EPA 624	Toluene	70	136	22	32	121	40		
EPA 624	trans-1,2-Dichloroethene	36	159	24	32	122	50		
EPA 624	trans-1,3-Dichloropropene	64	142	20	19	109	51		
EPA 624	trans-1,4-Dichloro-2-butene	44	162	26	10	157	80		
EPA 624	Trichloroethene	65	136	23	42	109	38		
EPA 624	Trichlorofluoromethane	41	163	26	10	158	120		
EPA 624	Vinyl acetate	10	208	77	10	127	119		
EPA 624	Vinyl Chloride	45	149	27	22	143	60		
EPA 624	1,2-Dichloroethane-d4							40	145
EPA 624	4-Bromofluorobenzene							41	140
EPA 624	Dibromofluoromethane							35	141
EPA 624	Toluene-d8							44	130
SW 8260A	1,1,1,2-Tetrachloroethane	68	123	23	38	121	50		
SW 8260A	1,1,1-Trichloroethane	61.3	128	24.9	35	131	60		
SW 8260A	1,1,2,2-Tetrachloroethane	67.5	131	25.6	12	144	51		
SW 8260A	1,1,2-Trichloroethane	69.5	127	23.6	33	126	46		
SW 8260A	1,1-Dichloroethane	61.5	136	26.8	44	119	48		
SW 8260A	1,1-Dichloroethene	62	120	29.5	31	125	61		
SW 8260A	1,1-Dichloropropene	68.5	128	24	34	126	81		
SW 8260A	1,2,3-Trichlorobenzene	60.3	144	28.9	10	110	71		
SW 8260A	1,2,3-Trichloropropane	70.2	128	26.6	10	136	58		
SW 8260A	1,2,4-Trichlorobenzene	74.6	135	31.5	10	87	60		
SW 8260A	1,2,4-Trimethylbenzene	71.2	134	28.6	14	129	71		
SW 8260A	1,2-Dibromo-3-chloropropane	66.1	142	22.1	10	148	57		
SW 8260A	1,2-Dibromoethane	69.5	125	26.1	31	123	56		
SW 8260A	1,2-Dichlorobenzene	67	137	26.4	12	103	80		
SW 8260A	1,2-Dichloroethane	62.9	126	23.2	48	114	40		
SW 8260A	1,2-Dichloropropane	69.6	124	23.8	44	118	48		
SW 8260A	1,3,5-Trimethylbenzene	66.8	141	30	16	130	74		
SW 8260A	1,3-Dichlorobenzene	66.7	139	28.9	12	106	60		
SW 8260A	1,3-Dichloropropane	71.4	126	23.7	31	128	50		
SW 8260A	1,4-Dichlorobenzene	60	141	28.5	12	102	80		
SW 8260A	1,4-Dioxane	34	186	74	78	130	24		
SW 8260A	2,2-Dichloropropane	72.6	126	26.9	10	149	50		
SW 8260A	2-Butanone	64.3	137	23.7	10	159	60		
SW 8260A	2-Chloroethyl vinyl ether	77	124	178					

VOC Soil Limits

Method	Analyte	LCS			MSLL			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
SW 8260A	2-Chlorotoluene	71.7	130	30	18	108	75		
SW 8260A	2-Hexanone	58.4	143	30	10	194	58		
SW 8260A	2-Nitropropane	61	141	36	10	311	210		
SW 8260A	4-Chlorotoluene	70.1	131	28	10	116	80		
SW 8260A	4-Isopropyltoluene	66.3	131	30	16	123	80		
SW 8260A	4-Methyl-2-pentanone	59	139	28.1	10	186	60		
SW 8260A	Acetone	46	162	29.2	10	218	60		
SW 8260A	Acetonitrile	33	164	30	22	170	70		
SW 8260A	Acrolein	10	200	30	10	200	50		
SW 8260A	Acrylonitrile	60.4	138	30	22	140	69		
SW 8260A	Allyl chloride	54.7	141	30	28	128	68		
SW 8260A	Benzene	66.5	128	22.1	39	126	61		
SW 8260A	Bromobenzene	63.9	133	24.5	15	109	50		
SW 8260A	Bromochloromethane	67.3	134	27.6	47	124	48		
SW 8260A	Bromodichloromethane	64.5	125	26	40	114	49		
SW 8260A	Bromoform	63.4	124	25.7	19	119	63		
SW 8260A	Bromomethane	42.1	119	26.7	10	173	40		
SW 8260A	Carbon Disulfide	50.8	129	29.2	17	133	74		
SW 8260A	Carbon Tetrachloride	59.6	127	24.9	23	128	60		
SW 8260A	Chlorobenzene	65.9	133	23.4	27	111	50		
SW 8260A	Chloroethane	51.2	137	25.6	17	153	75		
SW 8260A	Chloroform	66.5	132	24.8	35	130	52		
SW 8260A	Chloromethane	66	141	26.5	22	139	42		
SW 8260A	Chloroprene	54.5	135	26.4	28	127	81		
SW 8260A	cis-1,2-Dichloroethene	61.1	139	24.7	42	118	63		
SW 8260A	cis-1,3-Dichloropropene	66.6	127	24	27	113	50		
SW 8260A	cis-1,4-Dichloro-2-butene	10	200	50					
SW 8260A	Cyclohexane	50.2	135	24.6	10	138	80		
SW 8260A	Dibromochloromethane	66.1	121	26.1	29	122	59		
SW 8260A	Dibromomethane	65.5	127	24.7	39	126	48		
SW 8260A	Dichlorodifluoromethane	64.3	161	31.3	10	184	108		
SW 8260A	Diethyl ether	62.1	123	27.3	42	131	63		
SW 8260A	Ethyl acetate	71.7	134	26.7	10	140	34		
SW 8260A	Ethyl methacrylate	58.2	133	26.4	20	141	70		
SW 8260A	Ethylbenzene	64.7	132	23.5	27	117	40		
SW 8260A	Freon-113	62.1	125	29.1	29	140	60		
SW 8260A	Hexachlorobutadiene	54.3	162	30	10	115	57		
SW 8260A	Iodomethane	64.6	120	28.2	10	127	50		
SW 8260A	Isobutyl Alcohol	10	157	85	10	186	80		
SW 8260A	Isopropylbenzene	70.1	123	24.3	24	119	60		
SW 8260A	m,p-Xylene	64.4	137	25.8	26	114	40		
SW 8260A	Methacrylonitrile	69.1	122	27.6	10	150	50		
SW 8260A	Methyl Acetate	60.6	131	27.8					
SW 8260A	Methyl acrylate	10	200	50					

VOC Soil Limits

Method	Analyte	LCS			MSLL			Surrogate	
		LL	UL	RPD	LL	UL	RPD	LL	UL
SW 8260A	Methyl methacrylate	55.5	133	26.2	20	154	65		
SW 8260A	Methyl tert-Butyl Ether	61.6	130	23.3	38	126	50		
SW 8260A	Methylcyclohexane	48.7	141	21.9	10	133	60		
SW 8260A	Methylene Chloride	60	127	30	10	179	58		
SW 8260A	Naphthalene	56.9	158	29.3	10	114	64		
SW 8260A	n-Butanol	10	200	50					
SW 8260A	n-Butylbenzene	57.3	144	30	10	118	60		
SW 8260A	n-Hexane	39	159	30	10	122	70		
SW 8260A	n-Propylbenzene	69.3	132	30	16	114	60		
SW 8260A	o-Xylene	64.5	135	25	28	119	40		
SW 8260A	Propionitrile	66.7	143	26.1	26	145	45		
SW 8260A	sec-Butylbenzene	66.7	131	28.4	10	144	60		
SW 8260A	Styrene	61.9	135	25.8	17	104	40		
SW 8260A	tert_Butylbenzene	69	127	25.3	12	152	71		
SW 8260A	Tetrachloroethene	70.6	125	24.9	24	114	50		
SW 8260A	Tetrahydrofuran	66.8	150	27.5	10	264	100		
SW 8260A	Toluene	66.8	130	22.8	32	121	40		
SW 8260A	trans-1,2-Dichloroethene	70	128	26.1	32	122	50		
SW 8260A	trans-1,3-Dichloropropene	78	118	24.6	19	109	51		
SW 8260A	trans-1,4-Dichloro-2-butene	66	143	34	10	157	80		
SW 8260A	Trichloroethene	63.7	129	23.2	42	109	38		
SW 8260A	Trichlorofluoromethane	66.4	122	24.7	10	158	120		
SW 8260A	Vinyl acetate	29	204	59	10	127	119		
SW 8260A	Vinyl Chloride	57.4	129	25.1	22	143	60		
SW 8260A	1,2-Dichloroethane	62.9	126	23.2	48	114	40		
SW 8260A	4-Bromofluorobenzene							37.9	147
SW 8260A	Dibromofluoromethane							71.2	133
SW 8260A	Toluene-d8							62	130

Limits are subject to change

VOC Water Limits

Method	Analyte	BSLL	BSUL	BSRPD	MSLL	MSUL	MSRPD	SURLL	SURUL
SW 8021	a,a,a-Trifluorotoluene							59.5	112
SW 8021	Benzene	77	120	11.7	10	159	40		
SW 8021	Ethylbenzene	84.2	118	13	10	185	40		
SW 8021	m,p-Xylene	80.3	119	10.9	10	180	40		
SW 8021	Methyl tert-Butyl Ether	71.4	124	14.3	12	157	40		
SW 8021	o-Xylene	79.6	118	11.8	10	181	40		
SW 8021	Toluene	78.7	117	11.5	10	169	40		
8015 Mod	Diethylene Glycol	67	134						
8015 Mod	Ethylene Glycol	60.2	127						
8015 Mod	Propylene Glycol	63.7	124						
SW 8015B	a,a,a-Trifluorotoluene							62.5	115
SW 8015B	Gasoline	87	113	13	16	134	22		
MSD	Vapor Space Organics	74.5	140						
EPA 624	1,1,1,2-Tetrachloroethane	75.2	120	10	77	104	16		
EPA 624	1,1,1-Trichloroethane	76.7	129	10.3	58.9	135	13.5		
EPA 624	1,1,2,2-Tetrachloroethane	77.3	131	12.5	73	133	12.3		
EPA 624	1,1,2-Trichloroethane	73.9	124	10	68.5	125	19		
EPA 624	1,1-Dichloroethane	74.2	128	10	56	138	17.8		
EPA 624	1,1-Dichloroethene	72.8	131	12.5	40.9	145	20.3		
EPA 624	1,1-Dichloropropene	76.2	132	11	58.1	130	17.9		
EPA 624	1,2,3-Trichlorobenzene	81.8	126	14.8	72.2	107	21.3		
EPA 624	1,2,3-Trichloropropane	67.9	130	11	42.3	132	10.5		
EPA 624	1,2,4-Trichlorobenzene	80.9	125	13.2	75.6	103	19.1		
EPA 624	1,2,4-Trimethylbenzene	86.8	127	10.6	73.9	116	15.6		
EPA 624	1,2-Dibromo-3-chloropropane	63.8	128	21	54.2	115	21.6		
EPA 624	1,2-Dibromoethane	74.6	121	10.2	77.8	105	16.2		
EPA 624	1,2-Dichlorobenzene	84.4	120	10	82.4	106	16.3		
EPA 624	1,2-Dichloroethane	74.7	125	10	60.9	124	13.9		
EPA 624	1,2-Dichloropropane	70.1	130	10	58.2	130	16.5		
EPA 624	1,3,5-Trimethylbenzene	76.3	140	20	75.1	116	18.4		
EPA 624	1,3-Dichlorobenzene	85.5	121	10	82.6	106	15.5		
EPA 624	1,3-Dichloropropane	74	127	10	65.9	123	18.2		
EPA 624	1,4-Dichlorobenzene	84.3	121	10	87.8	102	15.8		
EPA 624	1,4-Dioxane	20	200	66	21	161	33.8		
EPA 624	2,2-Dichloropropane	72.7	143	12.3	52.9	136	14		
EPA 624	2-Butanone	59.2	157	27.5	30.2	141	33.4		
EPA 624	2-Chloroethyl vinyl ether	72.9	129	15.6			6.72		
EPA 624	2-Chlorotoluene	80.5	129	11.7	77	119	13		
EPA 624	2-Hexanone	68.3	132	19.5	51.2	127	16.3		
EPA 624	2-Nitropropane	64.6	131	15.8	10	254	24.9		

EPA 624	4-Chlorotoluene	79.4	120	11.6	72.2	118	16.1
EPA 624	4-Isopropyltoluene	83.4	128	13.7	88.6	105	14.7
EPA 624	4-Methyl-2-pentanone	69.3	133	19	56.4	129	21.2
EPA 624	Acetone	46.1	187	23	28	151	42
EPA 624	Acetonitrile	45	166	48	35	172	27
EPA 624	Acrolein	51	186	23.8	10	200	50
EPA 624	Acrylonitrile	50.3	141	22.2	10	194	18.7
EPA 624	Allyl chloride	74.7	141	12	43.1	149	22.7
EPA 624	Benzene	75.3	128	10	57.3	130	16.8
EPA 624	Bromobenzene	78.7	119	10	72.3	116	10.2
EPA 624	Bromochloromethane	82	124	10	78.7	120	18.4
EPA 624	Bromodichloromethane	72.4	127	10	71.8	121	16.1
EPA 624	Bromoform	46	141	15.3	51.1	128	14.1
EPA 624	Bromomethane	41.7	167	26.5	37	141	42.8
EPA 624	Carbon Disulfide	72.1	142	12.2	42	152	22.8
EPA 624	Carbon Tetrachloride	72	130	12.1	58.7	132	11.9
EPA 624	Chlorobenzene	87.5	118	7.62	79.6	112	17.4
EPA 624	Chloroethane	57	142	17.8	46.5	153	23.4
EPA 624	Chloroform	80.9	126	8.55	69.5	131	16.3
EPA 624	Chloromethane	61	141	26.2	57.5	124	38.5
EPA 624	Chloroprene	71.7	131	12	49.6	134	50
EPA 624	cis-1,2-Dichloroethene	75.3	128	9.21	52.7	138	20.2
EPA 624	cis-1,3-Dichloropropene	67.3	134	10	54	125	15.2
EPA 624	cis-1,4-Dichloro-2-butene	10	200	30			
EPA 624	Cyclohexane	53.9	146	29.8	43	144	63.2
EPA 624	Dibromochloromethane	58.4	131	10	65.1	113	13.9
EPA 624	Dibromomethane	75.8	123	10	63	127	16.8
EPA 624	Dichlorodifluoromethane	51.1	156	21.7	64.6	133	30.8
EPA 624	Diethyl ether	70.5	130	10	28.1	146	26.6
EPA 624	Ethyl acetate	65.4	137	18.2	47	126	21.1
EPA 624	Ethyl methacrylate	76.7	128	10.5	43.4	152	15.7
EPA 624	Ethylbenzene	81.1	124	10	74.4	115	16.7
EPA 624	Freon-113	71.9	126	13.1	42.8	138	25.4
EPA 624	Hexachlorobutadiene	53.9	148	58	67.8	111	17.2
EPA 624	Iodomethane	58.1	151	12.4	31.2	142	35.9
EPA 624	Isobutyl Alcohol	23	270	76.7	10	219	60
EPA 624	Isopropylbenzene	82	121	11.4	82.2	111	13.1
EPA 624	m,p-Xylene	81.2	131	10	81.4	113	17.1
EPA 624	Methacrylonitrile	62.5	148	17.1	48.4	159	13.4
EPA 624	Methyl Acetate	58.2	150	22.4	37.1	122	22.2
EPA 624	Methyl acrylate	10	200	30			
EPA 624	Methyl methacrylate	68.1	132	13.6	48.9	128	20.7
EPA 624	Methyl tert-Butyl Ether	79.2	125	10	44.4	142	19.3
EPA 624	Methylcyclohexane	76.3	126	14	77	113	4.63
EPA 624	Methylene Chloride	78.9	127	10	50.3	143	17.1
EPA 624	Naphthalene	74.5	135	17.7	66	111	26.2
EPA 624	n-Butanol	10	200	30			

EPA 624	n-Butylbenzene	83.7	131	14.7	81.3	117	15		
EPA 624	n-Hexane	58.9	149	22.9	50	126	30.9		
EPA 624	Nitrobenzene	77	131	14.3	47.6	139	11.1		
EPA 624	n-Propylbenzene	81.3	125	12.6	86.2	110	13.7		
EPA 624	o-Xylene	79.3	121	10	78.7	108	16.4		
EPA 624	Propionitrile	48.7	181	36.6	46.1	150	52		
EPA 624	sec-Butylbenzene	84.2	130	13.1	88.3	111	14.9		
EPA 624	Styrene	79.5	122	10	55.4	126	13.6		
EPA 624	tert_Butylbenzene	70.4	143	23.4	86.5	106	17.4		
EPA 624	Tetrachloroethene	58.3	164	14.7	73	112	12.9		
EPA 624	Tetrahydrofuran	34.4	188	34.6					
EPA 624	Toluene	79.1	130	10	62.9	130	17.2		
EPA 624	trans-1,2-Dichloroethene	83.3	124	10.7	57.8	140	19.7		
EPA 624	trans-1,3-Dichloropropene	70	133	6.98	52	133	15.3		
EPA 624	trans-1,4-Dichloro-2-butene	3.12	199	18.2	10	138	18.8		
EPA 624	Trichloroethene	80.2	119	9.53	81.6	106	14.8		
EPA 624	Trichlorofluoromethane	61.1	137	22.8	85.2	118	17.1		
EPA 624	Vinyl acetate	36	205	23.9	10	164	60		
EPA 624	Vinyl Chloride	65.7	154	27.2	62.3	146	30.9		
EPA 624	1,2-Dichloroethane-d4							86.6	123
EPA 624	4-Bromofluorobenzene							76.7	114
EPA 624	Dibromofluoromethane							88	129
EPA 624	Toluene-d8							83.5	127
SW 8260B	1,1,1,2-Tetrachloroethane	75.2	120	10	72.2	110	11.9		
SW 8260B	1,1,1-Trichloroethane	76.7	129	10.3	64.1	134	10.7		
SW 8260B	1,1,2,2-Tetrachloroethane	77.3	131	12.5	77.1	130	10.1		
SW 8260B	1,1,2-Trichloroethane	73.9	124	10	60.5	131	12.8		
SW 8260B	1,1-Dichloroethane	74.2	128	10	61	133	13.6		
SW 8260B	1,1-Dichloroethene	72.8	131	12.5	56	137	15.3		
SW 8260B	1,1-Dichloropropene	76.2	132	11	59.9	134	13.6		
SW 8260B	1,2-Dibromoethane	74.6	121	10.2	67.7	112	13		
SW 8260B	1,2-Dichloroethane	74.7	125	10	55.9	132	12.4		
SW 8260B	1,2-Dichloropropane	70.1	130	10	54.8	133	12.8		
SW 8260B	1,3-Dichloropropane	74	127	10	56.8	130	12.8		
SW 8260B	2,2-Dichloropropane	72.7	143	12.3	62.8	137	12.2		
SW 8260B	2-Butanone	59.2	157	27.5	37.7	140	29.9		
SW 8260B	2-Chlorotoluene	80.5	129	11.7	72.8	129	11.3		
SW 8260B	2-Hexanone	68.3	132	19.5	45.2	137	16		
SW 8260B	4-Chlorotoluene	79.4	120	11.6	76.4	116	13.4		
SW 8260B	4-Methyl-2-pentanone	69.3	133	19	57	129	15.7		
SW 8260B	Acetone	46.1	187	23	23.6	142	47.6		
SW 8260B	Acetonitrile	45	166	48	23.9	147	77.6		
SW 8260B	Acrolein	51	186	23.8	-11.4	222	23		
SW 8260B	Acrylonitrile	50.3	141	22.2	40.9	134	17.1		
SW 8260B	Allyl chloride	74.7	141	12	54.9	141	15.8		
SW 8260B	Benzene	75.3	128	10	59.5	129	13.8		

SW 8260B	Bromobenzene	78.7	119	10	74.8	115	10		
SW 8260B	Bromochloromethane	82	124	10	72.8	124	14		
SW 8260B	Bromodichloromethane	72.4	127	10	58	129	11.2		
SW 8260B	Bromoform	46	141	15.3	13.5	159	52.8		
SW 8260B	Bromomethane	41.7	167	26.5	11.8	148	39.9		
SW 8260B	Carbon Disulfide	72.1	142	12.2	57.8	138	15.8		
SW 8260B	Carbon Tetrachloride	72	130	12.1	70.3	121	10.6		
SW 8260B	Chlorobenzene	87.5	118	7.62	79.7	115	11.9		
SW 8260B	Chloroethane	57	142	17.8	11.6	169	28.7		
SW 8260B	Chloroform	80.9	126	8.55	70.1	128	13.4		
SW 8260B	Chloromethane	61	141	26.2	28.6	149	49.2		
SW 8260B	cis-1,2-Dichloroethene	75.3	128	9.21	62.7	129	15.8		
SW 8260B	cis-1,3-Dichloropropene	67.3	134	10	50.5	129	12.9		
SW 8260B	Dibromochloromethane	58.4	131	10	55.9	121	11.7		
SW 8260B	Dibromomethane	75.8	123	10	56.4	131	12.7		
SW 8260B	Dichlorodifluoromethane	51.1	156	21.7	48.4	136	47.9		
SW 8260B	Ethylbenzene	81.1	124	10	72.3	120	12.6		
SW 8260B	Iodomethane	58.1	151	12.4	36	145	32.4		
SW 8260B	m,p-Xylene	81.2	131	10	75.5	121	13.6		
SW 8260B	Methyl tert-Butyl Ether	79.2	125	10	55.2	132	15.9		
SW 8260B	Methylene Chloride	78.9	127	10	66.7	122	13.2		
SW 8260B	n-Hexane	58.9	149	22.9	43.5	139	24		
SW 8260B	o-Xylene	79.3	121	10	74.5	115	11.9		
SW 8260B	Styrene	79.5	122	10	60.3	123	11		
SW 8260B	Tetrachloroethene	58.3	164	14.7	75.9	115	10.9		
SW 8260B	Toluene	79.1	130	10	60.9	135	12.5		
SW 8260B	trans-1,2-Dichloroethene	83.3	124	10.7	69.6	128	13.2		
SW 8260B	trans-1,3-Dichloropropene	70	133	6.98	50.2	136	12.5		
SW 8260B	Trichloroethene	80.2	119	9.53	78.4	108	10.6		
SW 8260B	Trichlorofluoromethane	61.1	137	22.8	59.2	130	22.7		
SW 8260B	Vinyl acetate	36	205	23.9	33.7	221	22.7		
SW 8260B	Vinyl Chloride	65.7	154	27.2	60.7	135	49.6		
SW 8260B	1,2-Dichloroethane-d4							79	128
SW 8260B	4-Bromofluorobenzene							66.8	119
SW 8260B	Dibromofluoromethane							86	129
SW 8260B	Toluene-d8							73.3	132

Limits are subject to change

Wetchem Soil Control Limits

Method	Analyte	LCS		MS			DUP
		LL	UL	LL	UL	RPD	RPD
SM-4500Norg D	Nitrogen, Total Kjeldahl	88	131				25
D 2216	Percent Moisture						5
SW 9034+9030 Modified	Sulfide	49	118				10
SM 2320B	Alkalinity, Total (As CaCO3)	90	110				11
SW Chapter 7 Modified	Reactive sulfide	49	118				10
SW Chapter 7 Modified	Reactive cyanide	66	129	44	144		43
D 2216	% Solids						5
SM 4500-CL-E	Chloride	90	110	90	110	10	10
SW 9045C	pH						5
SW 9034+9030 Modified	Sulfide	49	118				10
EPA 350.1/SM 4500NH3	Ammonia	60	118				26
SM 4500 NO3-F	Nitrate Nitrogen as NO3- N	90	110	90	110		10
SM 4500 NO3-F	Nitrite Nitrogen as NO2-N	90	110	90	110		10
SM 4500 NO3-F	Nitrogen, Nitrate-Nitrite	90	110	90	110		10
EPA 365.1	Total Orthophosphate	90	110	90	110		10
EPA 420.4	Phenolics, Total Recoverable	79	128	50	134		61
SW 9045 C	pH	98	102				5
SW 9050	Specific Conductance	90	110				10
EPA 335.4	Cyanide, Total	66	128	57	123		27
SM 4500 CN-I	Cyanide, Amenable to Chlorination	61	133	50	113		27
SM 4500 CN-I	Cyanide, Weak Acid Dissociable	61	128	81	123		18
SM 4500 F-C	Fluoride	90	110	90	110		10
SW 3060A	Chromium, Hexavalent	79	116				10
EPA 160.2	Suspended Solids (Non-Filterable)	75	111				27
SM 4500-CO2-D	Bicarbonate Alkalinity	85	111				10
EPA 351.2/SM 4500 NO3-F	Nitrogen, Total Kjeldahl	80	120				25
EPA 351.2/SM 4500 NO3-F	Nitrogen, Nitrate-Nitrite	90	110				10

Limits are subject to change

Wetchem Water Control Limits

		LCS		MS			DUP
SpecificMethod	Analyte	LL	UL	LL	UL	RPD	RPD
EPA 375.4 Modified	Sulfate	81	116				10
EPA 350.1	Ammonia	87	117	50	96		27
SM 2510B	Neutralized Conductivity	90	110				10
SM 2320B	Alkalinity, Hydroxide (As CaCO3)	90	110				10
SM 2320B	Alkalinity-M (as CaCO3)	90	110				11
SM 2320B	Alkalinity, Phenolphthalein (as CaCO3)	90	110				10
HACH 8023	Chromium, Hexavalent	79	116	50	150	30	10
EPA 410.4	Soluble Chemical Oxygen Demand	73	116				30
EPA 405.1/SM 5210	Biochemical Oxygen Demand	54	167				22
EPA 1664A	Oil & Grease, n-Hexane + Silica Gel	70	107				
SM 2540C	TDS (Residue, Filterable)	90	110				5
EPA 351.2/SM4500NO3-F	Nitrogen, Nitrate-Nitrite	90	110				10
EPA 351.2/SM4500NO3-F	Nitrogen, Total Kjeldahl	80	120				25
SM 4500 F-C	Fluoride	90	110	84	119		10
EPA 1664A	Oil & Grease, n-Hexane + Silica Gel	70	130				
EPA 376.1	Sulfide, Dissolved	49	118				10
EPA 350.2	Ammonia	70	130	70	130		30
EPA 375.4 Modified	Sulfate	81	116				10
HACH 8023	Chromium, Hexavalent	79	116	50	150	30	10
SM 4500 F-C	Fluoride	90	110	90	110		10
SM 4500 CN-I	Cyanide, Weak Acid Dissociable	61	128	81	123		18
SM 4500 CN-I	Cyanide, Amenable to Chlorination	61	133	50	113		27
SW 9045B	pH	98	102				5
EPA 335.4	Cyanide, Total	66	129	57	123		43
SM 4500 H+	pH	98	102				5
EPA 420.4	Phenolics, Total Recoverable	79	128	50	134		61
SM 4500-CO2-D	Carbonate Alkalinity	85	111				10
SM 4500-CO2-D	Bicarbonate Alkalinity	85	111				10
EPA 405.1/SM 5210	CBOD	37	101				24
SM 4500-CL-E	Chloride	90	110	90	110	10	10
SM 4500-CL-G	Chlorine	90	110				10
EPA 410.4	Chemical Oxygen Demand	90	110	90	110	10	10
SM 2510B	Specific Conductance	90	110				10
EPA 365.1	Total Orthophosphate	90	110	90	110		10
SM 4500 NO3-F	Nitrogen, Nitrate-Nitrite	90	110	90	110		10
SM 4500 NO3-F	Nitrate Nitrogen as NO3- N	90	110	90	110		10
EPA 1664A	Oil & Grease, n-Hexane extraction	70	130				
SM 5520F	Oil & Grease, n-Hexane + Silica Gel	70	107				
SM 4500 NO3-F	Nitrite Nitrogen as NO2-N	90	110	90	110		10
EPA 425.1	MBAS	64	127				27
EPA 376.2	Sulfide	49	118				10
EPA 1664A	Oil & Grease, n-Hexane extraction	79	144				
EPA 160.2	TSS (Non-Filterable)	77	117				27
SW Chapter 7 Modified	Reactive cyanide	66	129	44	144		43

Wetchem Water Control Limits

		LCS		MS			DUP
SpecificMethod	Analyte	LL	UL	LL	UL	RPD	RPD
SW Chapter 7 Modified	Reactive sulfide	49	118				10
HACH 8023	Chromium, Hexavalent	79	116	50	150	30	10
EPA 405.1/SM 5210	Biochemical Oxygen Demand	42	99				22
SM 5310C	Dissolved Organic Carbon	90	110				10
EPA 376.1/SM 4500S2-F	Sulfide	49	118				10
EPA 160.2/SM 2540	Suspended Solids (Non-Filterable)	75	111				27
EPA 180.1	Turbidity	91	118				12
SM 2320B	Acidity, Total	90	110				11
SM 2320B	Alkalinity, Total (As CaCO3)	90	110				11
EPA 351.2	Nitrogen, Total Kjeldahl	88	132				25
SM 5310C	Total Organic Carbon	90	110				10

Limits are subject to change

Appendix 10

Qualifier	Description
!	See narrative.
*	Value Exceeds Maximum Contaminant Level
_A	Negative
_C	Negative-Negative
_D	Negative-Positive
_E	Positive-Positive
_G	No Growth
_IN	Invalid
_P	Positive
_W-05	No free liquid was visually observed in the sample.
_X	> 7380
_Y	< (Custom Value)
A-01	[Custom Value]
AA	The result for the Total Cyanide or Total Oil and Grease is below the detectable limit, thus the subset parameters Cyanide (WAD, A) or O&G (Non-Bio) are BDL.
ANALYST	[Custom Value]
B	Analyte is detected in the associated blank.
B-03	The dilution blank exceed the required limit per method EPA 405.1.
B-04	The GGA standard was outside of the accpetable range per the requirements of method EPA 405.1.
B-05	Contamination in blank is carryover from previous sample analyzed in same purge vessel. This contamination is not present in purge vessels that associated samples were purged in.
B-06	Sample dilutions did not yield a result within the intended range.
B-07	The analyte was detected in the method blank, however the analyte was not detected in the sample.
BDL	Below Detection Limit
BT	Excessive amounts of non coliform bacteria were present; the fecal coliform count was not able to be determined.
C	Sample Result Confirmed
C-02	Compound carryover from previous sample
C-H	Sample results were confirmed using historical data.
CONT.	Sample was received in a container that is not method approved.
CORR	The sample is not corrosive according to 40 CFR 261.22 and SW-846 Method 9040C which states a sample must be at least 20% aqueous (free liquid) to be analyzed for corrosivity.
D	Sample was analyzed at a dilution.
D-02	Hydrocarbon pattern present in the requested fuel quantitation range but does not resemble the pattern of the requested fuel.
E	The concentration indicated for this analyte is an estimated value outside of the calibration range of the instrument. This value is considered an estimate.
F	Unable to obtain a reliable result due to matrix interference.
F-01	>
F-02	> [Custom Value]
F-03	Sample flashed at room temperture [Custom Value] °F the sample could flash at a lower temperature.

Qualifier	Description
F-04	The Flashpoints/ Ignitibility container had been opened prior to flashpoint analysis being performed. Volatile material can escape from the sample if it opened before analysis giving a biased result.
FILT	The sample was filtered prior to analysis.
FRE-P	Free product was observed in the sample container.
GC-05	Results confirmed by GCMS.
GC-10	A unknown compound is coeluting with MTBE. This is Probably causing an artificially high MTBE value.
H	Analysis completed outside of holding time.
HDSP	Sample aliquot taken from VOA vial with headspace (air bubble greater than 6 mm diameter).
HOM	Sample cannot be homogenized due to sample matrix
I-01	Due to matrix interference, the sample cannot be accurately quantified. The reported result is qualitative.
INV	Unreportable
J	Analyte detected below quantitation limits. Estimated concentration for TICs.
J, Present	J, Present
J-01	J, Present
K	Result from method of standard additions.
L	Laboratory control sample recovery outside of acceptance limits high, sample results are below detection limits. Sample data is still acceptable.
L-ME	Laboratory spike is outside of acceptance limits, but is within the marginal exceedance limit.
M	Matrix spike and/or matrix spike duplicate recovery outside of acceptance limits.
MI	Analyte was manually integrated.
N	A case narrative is used in conjunction with this analytical result.
O-01	This compound is a common laboratory contaminant.
O-08	The original extraction of this sample yielded QC recoveries outside acceptance criteria. It was re-extracted after the recommended maximum hold time.
P	Sample preservation does not meet method specified requirements.
PE	Sample is part of a performance evaluation study, therefore holding times do not apply.
PRELM	Preliminary result. Revised report to follow.
Q-01	See qualifier page
QC-5	Sample was originally analyzed within hold time. However, it was determined that positive interference was contributing to the sample result. So the sample was reanalyzed at a dilution to eliminate the interference.
QI-01	Internal standards for this sample were out of control during the initial analysis performed within hold time. Immediate re-analysis (outside of recommended hold time) has confirmed the original result.
QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
QM-06	Due to noted non-homogeneity of the QC sample matrix, the MS/MSD did not provide reliable results for accuracy and precision. Sample results for the QC batch were accepted based on LCS/LCSD percent recoveries and RPD values.

Qualifier	Description
R	RPD outside of accepted recovery limits.
R-01	The Reporting Limit for this analyte has been raised to account for matrix interference.
R-02	Elevated Reporting Limits due to limited sample volume.
R-04	The Reporting Limits for this analysis are elevated due to sample foaming.
R-05	The sample was diluted due to the presence of high levels of non-target analytes resulting in elevated reporting limits.
S	Surrogate recovery is outside of acceptance limits.
S-01	The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interference's.
S-02	The surrogate recovery is outside of accpetance limits high, but there were no target analytes present in the sample.
S-04	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
S-06	The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interference's.
S-DUP	Duplicate analysis confirmed surrogate failure due to matrix effects.
S-QC	Surrogate result is outside of acceptance limits. The remaining number of surrogates within acceptance limits satisfies method criteria for producing valid data.
V	Calibration criteria exceeded, but acceptable per the method.
Z-01	< [Custom Value]
Z-02	< [Custom Value]
Z-03	[Custom Value]

Appendix 11

Belmont Labs
Ethics and Data Integrity Agreement

I, _____(print name), 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 Belmont Labs. I understand that the company's vision is to perform its duties for the greater good and long-term survival of all organisms in the biosphere. Our core values are honesty, compassion, success, service, and integrity. I understand that it is critical for our long-term success that each and every employee aligns with all company core values.

I agree that in the performance of my duties for Belmont Labs and its clients, I shall conform to the following ethics standards and will report immediately to the Quality Assurance Manager and the appropriate supervisor any information concerning misrepresentation of analytical data that includes, but is not limited to:

• Altering an instrument computer or clock for any inappropriate purpose;
• Altering the contents of logbooks and/or data sheets to misrepresent data;
• Misrepresenting an analyst's identity;
• Changing raw data documents with correction fluid;
• Preparation and submittal of 'fake' data packages;
• Inappropriate calibration techniques such as peak shaving, setting fraudulent integrator parameters, use of computer macros that alter QC results, or altering biological testing controls;
• Changing reported results without proper documentation and approval;
• Altering injection volumes for calibration and misrepresenting the true values;
• Failure to comply with standard operating procedures or methods without proper documentation and approval;
• Any attempt to misrepresent data or events as they actually occur in the course of data production, review, or reporting;
• Disposing of or deleting electronic data files or hardcopy of raw data;
• Engaging in any practice that ultimately misrepresents data or narratives in any way.

I will not knowingly participate in any such activity and will not tolerate unethical practices by others. I understand that confidentiality will be strictly enforced by Belmont Labs when dealing with these matters. As a further extension of my commitment to this program, I am responsible for seeking approval to report data resulting from techniques or procedures that may deviate from standard operating procedures, methods, or industry standard practices. Any such reporting of data will include a laboratory narrative that must be approved by the appropriate supervisor and the QA Manager.

If I am unsure of how to properly handle data generated by me, I am responsible for seeking advice and approval from the Quality Assurance Manager and the appropriate supervisor. I agree to inform the Quality Assurance Manager and the appropriate supervisor of any accidental reporting of non-authentic data by others or myself within 24 hours of discovery.

I understand that if I knowingly participate in any such prohibited activity, I will be subject to serious disciplinary action that may include immediate termination by Belmont Labs. I also understand that I face individual suspension and debarment from all Federal programs should I be convicted of such practices. I understand that suspension and debarment from all Federal programs affects my ability to work in the environmental field, as well as, any other professions where government funding or loans may be involved. I understand the most serious consequence of unethical conduct can be imprisonment if convicted.

My signature affirms my understanding of the consequences of violating this 'ETHICS AND DATA INTEGRITY AGREEMENT' and my commitment to its intent. My signature further affirms that I have received formal training on this topic.

(Signature) (Date)

_____ _____

_____ _____
Sam Elam – Owner/CEO Date
Revision 2 (October 29, 2008)

State of New Jersey

Department of Environmental Protection

Certifies That

Pace Analytical - Dayton

Laboratory Certification ID # OH007

is hereby approved as a

Nationally Accredited Environmental Laboratory

to perform the analyses as indicated on the Annual Certified Parameter List which must accompany this certificate to be valid

having duly met the requirements of the

Regulations Governing the Certification of Laboratories and Environmental Measurements N.J.A.C. 7:18 et. seq.

and

having been found compliant with the 2009 TNI Standard approved by the

The NELAC Institute

Expires June 30, 2015

Joseph F. Aiello, Manager
Office of Quality Assurance

NJDEP is a NELAP Recognized Accreditation Body

This certificate is to be conspicuously displayed at the laboratory with the annual certified parameter list in a location on the premises visible to the public. Consumers are urged to verify the laboratory's current accreditation status with the State of NJ, NELAP.

New Jersey Department of Environmental Protection

National Environmental Laboratory Accreditation Program

ANNUAL CERTIFIED PARAMETER LIST AND CURRENT STATUS

Effective as of 11/01/2014 until 06/30/2015

Laboratory Name: PACE ANALYTICAL-DAYTON Laboratory Number: OH007 Activity ID: NLC140004
25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SDW02 -- Inorganic Parameters Including Na + Ca

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SDW02.06000	DW	Automated Cadmium Reduction	[SM 4500-NO3 F]	Nitrite
Certified	Yes	NJ	SDW02.13000	DW	Manual Potentiometric Ion Select Electrode	[SM 4500-F C]	Fluoride
Certified	Yes	NJ	SDW02.15200	DW	Spectrophotometric, Distill, Semi Automated	[EPA 335.4]	Cyanide
Certified	Yes	NJ	SDW02.20000	DW	ICP	[EPA 200.7]	Sodium
Certified	Yes	NJ	SDW02.24000	DW	Gravimetric At 180	[SM 2540 C]	Total dissolved solids (TDS)
Certified	Yes	NJ	SDW02.27000	DW	ICP	[EPA 200.7]	Calcium
Certified	Yes	NJ	SDW02.27300	DW	Hardness By Calculation	[SM 2340 B]	Total hardness
Certified	Yes	NJ	SDW02.28000	DW	Titrimetric Indicator	[SM 2320 B]	Alkalinity
Applied	No	NJ	SDW02.35000	DW	Conductance	[SM 2510 B]	Conductivity
Certified	Yes	NJ	SDW02.39510	DW	Persulfate-UV, Filtration	[SM 5310 C]	Dissolved organic carbon (DOC)
Certified	Yes	NJ	SDW02.39610	DW	Persulfate-UV	[SM 5310 C]	Total organic carbon (TOC)

Category: SDW03 -- Analyze-Immediately Inorganic Parameter

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SDW03.03000	DW	DPD, Colorimetric	[SM 4500-Cl G]	Chlorine - residual
Certified	Yes	NJ	SDW03.08000	DW	Electrometric	[SM 4500-H B]	pH

Category: SDW04 -- Inorganic Parameters, Metals

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SDW04.03000	DW	ICP	[EPA 200.7]	Aluminum
Certified	Yes	NJ	SDW04.05000	DW	AA, Graphite Furnace	[SM 3113 B]	Antimony
Certified	Yes	NJ	SDW04.09000	DW	AA, Graphite Furnace	[SM 3113 B]	Arsenic
Certified	Yes	NJ	SDW04.16000	DW	ICP	[EPA 200.7]	Barium
Certified	Yes	NJ	SDW04.20000	DW	ICP	[EPA 200.7]	Beryllium
Certified	Yes	NJ	SDW04.22000	DW	AA, Graphite Furnace	[SM 3113 B]	Cadmium
Certified	Yes	NJ	SDW04.28000	DW	ICP	[EPA 200.7]	Chromium
Certified	Yes	NJ	SDW04.33000	DW	ICP	[EPA 200.7]	Copper

KEY: AE = Air and Emissions, BT = Biological Tissues, DW = Drinking Water, NPW = Non-Potable Water, SCM = Solid and Chemical Materials

New Jersey Department of Environmental Protection

National Environmental Laboratory Accreditation Program

ANNUAL CERTIFIED PARAMETER LIST AND CURRENT STATUS

Effective as of 11/01/2014 until 06/30/2015

Laboratory Name: PACE ANALYTICAL-DAYTON Laboratory Number: OH007 Activity ID: NLC140004
25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SDW04 -- Inorganic Parameters, Metals

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SDW04.37000	DW	ICP	[EPA 200.7]	Iron
Certified	Yes	NJ	SDW04.38000	DW	Graphite Furnace	[SM 3113 B]	Lead
Certified	Yes	NJ	SDW04.41100	DW	ICP	[EPA 200.7]	Magnesium
Certified	Yes	NJ	SDW04.44000	DW	ICP	[EPA 200.7]	Manganese
Certified	Yes	NJ	SDW04.46000	DW	Manual Cold Vapor	[EPA 245.1]	Mercury
Certified	Yes	NJ	SDW04.52000	DW	ICP	[EPA 200.7]	Nickel
Certified	Yes	NJ	SDW04.55000	DW	AA, Graphite Furnace	[SM 3113 B]	Selenium
Certified	Yes	NJ	SDW04.62000	DW	ICP	[EPA 200.7]	Silver
Certified	Yes	NJ	SDW04.67000	DW	ICP	[EPA 200.7]	Zinc

Category: SDW05 -- Organic Parameters, Chromatography

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SDW05.22010	DW	Liquid/Liquid Extraction/GC	[EPA 552.2]	Bromochloroacetic acid
Certified	Yes	NJ	SDW05.22050	DW	Liquid/Liquid Extraction/GC	[EPA 552.2]	Dibromoacetic acid
Certified	Yes	NJ	SDW05.22060	DW	Liquid/Liquid Extraction/GC	[EPA 552.2]	Dichloroacetic acid
Certified	Yes	NJ	SDW05.22070	DW	Liquid/Liquid Extraction/GC	[EPA 552.2]	Monobromoacetic acid (MBAA)
Certified	Yes	NJ	SDW05.22080	DW	Liquid/Liquid Extraction/GC	[EPA 552.2]	Monochloroacetic acid (MCAA)
Certified	Yes	NJ	SDW05.22100	DW	Liquid/Liquid Extraction/GC	[EPA 552.2]	Trichloroacetic acid

Category: SDW06 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SDW06.01010	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Bromoform
Certified	Yes	NJ	SDW06.01020	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Chloroform
Certified	Yes	NJ	SDW06.01030	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dibromochloromethane
Certified	Yes	NJ	SDW06.01040	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Bromodichloromethane
Certified	Yes	NJ	SDW06.02010	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Benzene
Certified	Yes	NJ	SDW06.02020	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Carbon tetrachloride

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SDW06 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SDW06.02030	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Chlorobenzene
Certified	Yes	NJ	SDW06.02040	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichlorobenzene (1,2-)
Certified	Yes	NJ	SDW06.02050	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichlorobenzene (1,3-)
Certified	Yes	NJ	SDW06.02060	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichlorobenzene (1,4-)
Certified	Yes	NJ	SDW06.02070	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloroethane (1,1-)
Certified	Yes	NJ	SDW06.02080	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloroethane (1,2-)
Certified	Yes	NJ	SDW06.02090	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloroethene (cis-1,2-)
Certified	Yes	NJ	SDW06.02100	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloroethene (trans-1,2-)
Certified	Yes	NJ	SDW06.02110	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Methylene chloride (Dichloromethane)
Certified	Yes	NJ	SDW06.02120	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloropropane (1,2-)
Certified	Yes	NJ	SDW06.02130	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Ethylbenzene
Certified	Yes	NJ	SDW06.02140	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Methyl tert-butyl ether
Certified	Yes	NJ	SDW06.02150	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Naphthalene
Certified	Yes	NJ	SDW06.02160	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Styrene
Certified	Yes	NJ	SDW06.02170	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Tetrachloroethane (1,1,2,2-)
Certified	Yes	NJ	SDW06.02180	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Tetrachloroethene
Certified	Yes	NJ	SDW06.02190	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Trichloroethane (1,1,1-)
Certified	Yes	NJ	SDW06.02200	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Trichloroethene
Certified	Yes	NJ	SDW06.02210	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Toluene
Certified	Yes	NJ	SDW06.02220	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Trichlorobenzene (1,2,4-)
Certified	Yes	NJ	SDW06.02230	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloroethene (1,1-)
Certified	Yes	NJ	SDW06.02240	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Trichloroethane (1,1,2-)
Certified	Yes	NJ	SDW06.02250	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Vinyl chloride
Certified	Yes	NJ	SDW06.02260	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Xylenes (total)
Certified	Yes	NJ	SDW06.03010	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Bromobenzene
Certified	Yes	NJ	SDW06.03020	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Bromochloromethane
Certified	Yes	NJ	SDW06.03030	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Bromomethane
Certified	Yes	NJ	SDW06.03040	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Butylbenzene (n-)
Certified	Yes	NJ	SDW06.03050	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Sec-butylbenzene
Certified	Yes	NJ	SDW06.03060	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Tert-butylbenzene
Certified	Yes	NJ	SDW06.03070	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Chloroethane
Certified	Yes	NJ	SDW06.03080	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Chloromethane

KEY: AE = Air and Emissions, BT = Biological Tissues, DW = Drinking Water, NPW = Non-Potable Water, SCM = Solid and Chemical Materials

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SDW06 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SDW06.03090	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Chlorotoluene (2-)
Certified	Yes	NJ	SDW06.03100	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Chlorotoluene (4-)
Certified	Yes	NJ	SDW06.03110	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dibromo-3-chloropropane (1,2-)
Certified	Yes	NJ	SDW06.03120	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dibromoethane (1,2-) (EDB)
Certified	Yes	NJ	SDW06.03130	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dibromomethane
Certified	Yes	NJ	SDW06.03140	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichlorodifluoromethane
Certified	Yes	NJ	SDW06.03150	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloropropane (1,3-)
Certified	Yes	NJ	SDW06.03160	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloropropane (2,2-)
Certified	Yes	NJ	SDW06.03170	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloropropene (1,1-)
Certified	Yes	NJ	SDW06.03180	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloropropene (cis-1,3-)
Certified	Yes	NJ	SDW06.03190	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloropropene (trans-1,3-)
Certified	Yes	NJ	SDW06.03200	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Hexachlorobutadiene (1,3-)
Certified	Yes	NJ	SDW06.03210	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Isopropylbenzene
Certified	Yes	NJ	SDW06.03220	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Isopropyltoluene (4-)
Certified	Yes	NJ	SDW06.03230	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Propylbenzene (n-)
Certified	Yes	NJ	SDW06.03240	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Tetrachloroethane (1,1,1,2-)
Certified	Yes	NJ	SDW06.03250	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Trichlorobenzene (1,2,3-)
Certified	Yes	NJ	SDW06.03260	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Trichlorofluoromethane
Certified	Yes	NJ	SDW06.03270	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Trichloropropane (1,2,3-)
Certified	Yes	NJ	SDW06.03280	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Trimethylbenzene (1,2,4-)
Certified	Yes	NJ	SDW06.03300	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Trimethylbenzene (1,3,5-)
Certified	Yes	NJ	SDW06.03310	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Nitrobenzene
Certified	Yes	NJ	SDW06.03410	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Acetone
Certified	Yes	NJ	SDW06.03420	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Acrylonitrile
Certified	Yes	NJ	SDW06.03430	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Allyl chloride
Certified	Yes	NJ	SDW06.03440	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Butanone (2-) [Methyl ethyl ketone]
Certified	Yes	NJ	SDW06.03450	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Carbon disulfide
Certified	Yes	NJ	SDW06.03480	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Dichloro-2-butene (trans-1,4-)
Certified	Yes	NJ	SDW06.03500	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Diethyl ether (Ethyl ether)
Certified	Yes	NJ	SDW06.03510	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Ethyl methacrylate
Certified	Yes	NJ	SDW06.03515	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Hexane (n-)
Certified	Yes	NJ	SDW06.03520	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Hexachloroethane

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New Jersey Department of Environmental Protection

National Environmental Laboratory Accreditation Program

ANNUAL CERTIFIED PARAMETER LIST AND CURRENT STATUS

Effective as of 11/01/2014 until 06/30/2015

Laboratory Name: PACE ANALYTICAL-DAYTON Laboratory Number: OH007 Activity ID: NLC140004
25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SDW06 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SDW06.03530	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Hexanone (2-)
Certified	Yes	NJ	SDW06.03540	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Methacrylonitrile
Certified	Yes	NJ	SDW06.03550	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Methyl acrylate
Certified	Yes	NJ	SDW06.03570	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Methyl methacrylate
Certified	Yes	NJ	SDW06.03580	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Pentanone (4-methyl-2-) (MIBK)
Certified	Yes	NJ	SDW06.03590	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Nitropropane (2-)
Certified	Yes	NJ	SDW06.03600	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Pentachloroethane
Certified	Yes	NJ	SDW06.03610	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Propionitrile
Certified	Yes	NJ	SDW06.03620	DW	GC/MS, P & T or Direct Injection, Capillary	[EPA 524.2]	Tetrahydrofuran

Category: SHW03 -- Analyze-Immediately Parameters

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Applied	No	NJ	SHW03.01000	NPW	Aqueous, Electrometric	[SW-846 9040C]	pH

Category: SHW04 -- Inorganic Parameters

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW04.01000	NPW	Acid Digestion/Surface and Groundwater, ICP, FLAA	[SW-846 3005A]	Metals, Total Rec and Dissolved
Certified	Yes	NJ	SHW04.33000	NPW	AA, Manual Cold Vapor	[SW-846 7470A]	Mercury - liquid waste

Category: SHW06 -- Organic Parameters, Chromatography

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Applied	No	NJ	SHW06.02010	NPW	Microextraction, GC, ECD	[SW-846 8011]	Dibromoethane (1,2-) (EDB)
Applied	No	NJ	SHW06.02020	NPW	Microextraction, GC, ECD	[SW-846 8011]	Dibromo-3-chloropropane (1,2-)
Certified	Yes	NJ	SHW06.12130	NPW	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Endosulfan I

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ENGLEWOOD, OH 45322

Category: SHW06 -- Organic Parameters, Chromatography

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW06.23010	NPW	GC, Extraction, ECD, Capillary	[SW-846 8151A]	Dalapon
Certified	Yes	NJ	SHW06.23020	NPW	GC, Extraction, ECD, Capillary	[SW-846 8151A]	Dicamba
Certified	Yes	NJ	SHW06.23021	NPW	GC, Extraction, ECD, Capillary	[SW-846 8151A]	Dichlorprop
Certified	Yes	NJ	SHW06.23030	NPW	GC, Extraction, ECD, Capillary	[SW-846 8151A]	Dinoseb
Certified	Yes	NJ	SHW06.23040	NPW	GC, Extraction, ECD, Capillary	[SW-846 8151A]	D (2,4-)
Certified	Yes	NJ	SHW06.23041	NPW	GC, Extraction, ECD, Capillary	[SW-846 8151A]	DB (2,4-)
Applied	No	NJ	SHW06.23050	NPW	GC, Extraction, ECD, Capillary	[SW-846 8151A]	T (2,4,5-)
Certified	Yes	NJ	SHW06.23060	NPW	GC, Extraction, ECD, Capillary	[SW-846 8151A]	TP (2,4,5-) (Silvex)
Certified	Yes	NJ	SHW06.23063	NPW	GC, Extraction, ECD, Capillary	[SW-846 8151A]	MCPA
Certified	Yes	NJ	SHW06.23064	NPW	GC, Extraction, ECD, Capillary	[SW-846 8151A]	MCPP

Category: WPP02 -- Inorg. Parameters, Nutrients and Demands

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP02.01500	NPW	Electrometric or Color Titration	[SM 2320 B-11]	Alkalinity as CaCO3
Certified	Yes	NJ	WPP02.04000	NPW	Distillation or Gas Diffusion, Semi-automated Phenate	[SM 4500-NH3 B+H-11] [EPA 350.1]	Ammonia
Applied	No	NJ	WPP02.05010	NPW	Dissolved Oxygen Depletion - LDO Probe	[SM 5210 B-11 + HACH 10360 (DO)]	Biochemical oxygen demand
Certified	Yes	NJ	WPP02.06000	NPW	ICP	[EPA 200.7]	Boron
Certified	Yes	NJ	WPP02.08000	NPW	Digestion, ICP	[EPA 200.7]	Calcium
Applied	No	NJ	WPP02.09510	NPW	Dissolved Oxygen Depl., Nitrif. Inhib., LDO Electrode	[SM 5210 B-11 + HACH 10360 (DO)]	Carbonaceous BOD (CBOD)
Certified	Yes	NJ	WPP02.10500	NPW	Spectrophotometric Manual/Auto	[EPA 410.4] [OTHER Hach 8000]	Chemical oxygen demand
Certified	Yes	NJ	WPP02.12500	NPW	Colorimetric, Automated (Ferricyanide)	[SM 4500-Cl E-11]	Chloride
Applied	No	NJ	WPP02.13500	NPW	Colorimetric (Platinum-Cobalt)	[SM 2120 B-11]	Color
Certified	Yes	NJ	WPP02.15500	NPW	Distillation, Spectrophotometric (Auto)	[EPA 335.4]	Cyanide
Applied	No	NJ	WPP02.16500	NPW	Distillation + Electrode, Manual	[SM 4500-F B + C-11]	Fluoride
Certified	Yes	NJ	WPP02.20100	NPW	Ca + Mg Carbonates, ICP	[EPA 200.7]	Hardness - total as CaCO3
Certified	Yes	NJ	WPP02.22500	NPW	Digestion, Semiauto. Digestor, Colorimetric	[EPA 351.2]	Kjeldahl nitrogen - total
Certified	Yes	NJ	WPP02.24000	NPW	Digestion, ICP	[EPA 200.7]	Magnesium
Certified	Yes	NJ	WPP02.27000	NPW	Cadmium Reduction, Automated	[SM 4500-NO3 F-11]	Nitrate - nitrite

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: WPP02 -- Inorg. Parameters, Nutrients and Demands

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP02.28010	NPW	Auto, bypass Cd reduction	[SM 4500-NO3 F-11]	Nitrite
Applied	No	NJ	WPP02.29100	NPW	Gravimetric, Hexane Extractable Material-LL	[EPA 1664A]	Oil & grease - hem-LL
Certified	Yes	NJ	WPP02.30010	NPW	Heated or UV	[SM 5310C-11]	Total organic carbon (TOC)
Certified	Yes	NJ	WPP02.30050	NPW	Filtration and Oxidation or Combustion	[SM 5310 B, C or D]	Dissolved organic carbon (DOC)
Certified	Yes	NJ	WPP02.30500	NPW	Total Kjeldahl-N Minus Ammonia-N	[EPA 351.1, .2 - 350.1]	Organic nitrogen
Certified	Yes	NJ	WPP02.31000	NPW	Ascorbic Acid, Automated	[EPA 365.1]	Orthophosphate
Applied	No	NJ	WPP02.33000	NPW	Manual Distillation, Colorimetric Auto	[EPA 420.4]	Phenols
Certified	No	NJ	WPP02.35600	NPW	Digestion, ICP	[EPA 200.7]	Phosphorus (total)
Certified	Yes	NJ	WPP02.36500	NPW	Digestion, ICP	[EPA 200.7]	Potassium
Certified	Yes	NJ	WPP02.38500	NPW	Gravimetric, 180 Degrees C	[SM 2540 C-11]	Residue - filterable (TDS)
Certified	Yes	NJ	WPP02.39000	NPW	Gravimetric, 103-105 Degrees C, Post Washing	[SM 2540 D-11]	Residue - nonfilterable (TSS)
Applied	No	NJ	WPP02.42500	NPW	0.45u Filtration + ICP	[EPA 200.7]	Silica - dissolved
Certified	Yes	NJ	WPP02.44000	NPW	Digestion, ICP	[EPA 200.7]	Sodium
Applied	No	NJ	WPP02.47000	NPW	Gravimetric	[SM 4500-SO4 C or D-11]	Sulfate

Category: WPP03 -- Analyze-Immediately Inorganic Parameters

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Applied	No	NJ	WPP03.05000	NPW	Spectrophotometric, DPD	[SM 4500-Cl G-11]	Chlorine
Applied	No	NJ	WPP03.08100	NPW	Luminescence Based Sensor	[OTHER HACH 10360]	Oxygen (dissolved)
Applied	No	NJ	WPP03.09000	NPW	Electrometric	[SM 4500-H B-11]	pH
Applied	No	NJ	WPP03.12000	NPW	Titrimetric, Iodine-Iodate	[SM 4500-SO3 B-11]	Sulfite - SO3

Category: WPP04 -- Inorganic Parameters, Metals

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP04.02000	NPW	Digestion, ICP	[EPA 200.7]	Aluminum
Certified	Yes	NJ	WPP04.04500	NPW	Digestion, ICP	[EPA 200.7]	Antimony
Certified	Yes	NJ	WPP04.05600	NPW	Digestion, ICP	[EPA 200.7]	Arsenic

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Category: WPP04 -- Inorganic Parameters, Metals

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP04.08000	NPW	Digestion, ICP	[EPA 200.7]	Barium
Certified	Yes	NJ	WPP04.11000	NPW	Digestion, ICP	[EPA 200.7]	Beryllium
Certified	Yes	NJ	WPP04.13500	NPW	Digestion, ICP	[EPA 200.7]	Cadmium
Certified	Yes	NJ	WPP04.15000	NPW	0.45u Filter, Colorimetric DPC	[SM 3500-Cr B-11]	Chromium (VI)
Certified	Yes	NJ	WPP04.18000	NPW	Digestion, ICP	[EPA 200.7]	Chromium
Certified	Yes	NJ	WPP04.19500	NPW	Digestion, ICP	[EPA 200.7]	Cobalt
Certified	Yes	NJ	WPP04.21500	NPW	Digestion, ICP	[EPA 200.7]	Copper
Certified	Yes	NJ	WPP04.26500	NPW	Digestion, ICP	[EPA 200.7]	Iron
Certified	Yes	NJ	WPP04.28000	NPW	Digestion, ICP	[EPA 200.7]	Lead
Applied	No	NJ	WPP04.31000	NPW	Digestion, ICP	[EPA 200.7]	Manganese
Certified	Yes	NJ	WPP04.33000	NPW	Manual Cold Vapor	[EPA 245.1]	Mercury
Certified	Yes	NJ	WPP04.35000	NPW	Digestion, ICP	[EPA 200.7]	Molybdenum
Certified	Yes	NJ	WPP04.37500	NPW	Digestion, ICP	[EPA 200.7]	Nickel
Certified	Yes	NJ	WPP04.45500	NPW	Digestion, ICP	[EPA 200.7]	Selenium
Certified	Yes	NJ	WPP04.48000	NPW	Digestion, ICP	[EPA 200.7]	Silver
Certified	Yes	NJ	WPP04.49500	NPW	Digestion, AA Furnace	[EPA 279.2]	Thallium
Applied	No	NJ	WPP04.50000	NPW	Digestion, ICP	[EPA 200.7]	Thallium
Certified	Yes	NJ	WPP04.51100	NPW	Digestion, ICP	[EPA 200.7]	Tin
Certified	Yes	NJ	WPP04.52050	NPW	Digestion, ICP	[EPA 200.7]	Titanium
Certified	Yes	NJ	WPP04.54000	NPW	Digestion, ICP	[EPA 200.7]	Vanadium
Certified	Yes	NJ	WPP04.56500	NPW	Digestion, ICP	[EPA 200.7]	Zinc

Category: WPP05 -- Organic Parameters, Chromatography

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP05.02010	NPW	Purge & Trap, GC (PID)	[EPA 602]	Benzene
Certified	Yes	NJ	WPP05.02060	NPW	Purge & Trap, GC (PID)	[EPA 602]	Ethylbenzene
Certified	Yes	NJ	WPP05.02062	NPW	Purge & Trap, GC (PID)	[EPA 602]	Methyl tert-butyl ether
Certified	Yes	NJ	WPP05.02070	NPW	Purge & Trap, GC (PID)	[EPA 602]	Toluene
Certified	Yes	NJ	WPP05.02080	NPW	Purge & Trap, GC (PID)	[EPA 602]	Xylenes (total)

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ENGLEWOOD, OH 45322

Category: WPP05 -- Organic Parameters, Chromatography

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP05.09010	NPW	Extract/GC (ECD)	[EPA 608]	Aldrin
Certified	Yes	NJ	WPP05.09020	NPW	Extract/GC (ECD)	[EPA 608]	Alpha BHC
Certified	Yes	NJ	WPP05.09030	NPW	Extract/GC (ECD)	[EPA 608]	Beta BHC
Certified	Yes	NJ	WPP05.09040	NPW	Extract/GC (ECD)	[EPA 608]	Delta BHC
Certified	Yes	NJ	WPP05.09050	NPW	Extract/GC (ECD)	[EPA 608]	Lindane (gamma BHC)
Certified	Yes	NJ	WPP05.09060	NPW	Extract/GC (ECD)	[EPA 608]	Chlordane
Certified	Yes	NJ	WPP05.09062	NPW	Extract/GC (ECD)	[EPA 608]	Chlordane (alpha) (cis-)
Certified	Yes	NJ	WPP05.09063	NPW	Extract/GC (ECD)	[EPA 608]	Chlordane (gamma) (trans-)
Certified	Yes	NJ	WPP05.09070	NPW	Extract/GC (ECD)	[EPA 608]	DDD (4,4'-)
Certified	Yes	NJ	WPP05.09080	NPW	Extract/GC (ECD)	[EPA 608]	DDE (4,4'-)
Certified	Yes	NJ	WPP05.09090	NPW	Extract/GC (ECD)	[EPA 608]	DDT (4,4'-)
Certified	Yes	NJ	WPP05.09100	NPW	Extract/GC (ECD)	[EPA 608]	Dieldrin
Certified	Yes	NJ	WPP05.09110	NPW	Extract/GC (ECD)	[EPA 608]	Endosulfan I
Certified	Yes	NJ	WPP05.09120	NPW	Extract/GC (ECD)	[EPA 608]	Endosulfan II
Certified	Yes	NJ	WPP05.09130	NPW	Extract/GC (ECD)	[EPA 608]	Endosulfan sulfate
Certified	Yes	NJ	WPP05.09140	NPW	Extract/GC (ECD)	[EPA 608]	Endrin
Certified	Yes	NJ	WPP05.09150	NPW	Extract/GC (ECD)	[EPA 608]	Endrin aldehyde
Certified	Yes	NJ	WPP05.09160	NPW	Extract/GC (ECD)	[EPA 608]	Endrin ketone
Certified	Yes	NJ	WPP05.09170	NPW	Extract/GC (ECD)	[EPA 608]	Heptachlor
Certified	Yes	NJ	WPP05.09180	NPW	Extract/GC (ECD)	[EPA 608]	Heptachlor epoxide
Certified	Yes	NJ	WPP05.09190	NPW	Extract/GC (ECD)	[EPA 608]	Methoxychlor
Certified	Yes	NJ	WPP05.09200	NPW	Extract/GC (ECD)	[EPA 608]	Toxaphene
Certified	Yes	NJ	WPP05.11010	NPW	Extract/GC (ECD)	[EPA 608]	PCB 1016
Certified	Yes	NJ	WPP05.11020	NPW	Extract/GC (ECD)	[EPA 608]	PCB 1221
Certified	Yes	NJ	WPP05.11030	NPW	Extract/GC (ECD)	[EPA 608]	PCB 1232
Certified	Yes	NJ	WPP05.11040	NPW	Extract/GC (ECD)	[EPA 608]	PCB 1242
Certified	Yes	NJ	WPP05.11050	NPW	Extract/GC (ECD)	[EPA 608]	PCB 1248
Certified	Yes	NJ	WPP05.11060	NPW	Extract/GC (ECD)	[EPA 608]	PCB 1254
Certified	Yes	NJ	WPP05.11070	NPW	Extract/GC (ECD)	[EPA 608]	PCB 1260

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Category: WPP06 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP06.02000	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Allyl chloride
Certified	Yes	NJ	WPP06.02003	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Acetone
Certified	Yes	NJ	WPP06.02007	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Acrolein
Certified	Yes	NJ	WPP06.02009	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Acrylonitrile
Certified	Yes	NJ	WPP06.02010	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Benzene
Certified	Yes	NJ	WPP06.02015	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Bromobenzene
Certified	Yes	NJ	WPP06.02017	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Bromochloromethane
Certified	Yes	NJ	WPP06.02020	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Bromodichloromethane
Certified	Yes	NJ	WPP06.02030	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Bromoform
Certified	Yes	NJ	WPP06.02040	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Bromomethane
Certified	Yes	NJ	WPP06.02041	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Butanone (2-) [Methyl ethyl ketone]
Certified	Yes	NJ	WPP06.02044	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Butylbenzene (n-)
Certified	Yes	NJ	WPP06.02045	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Carbon disulfide
Certified	Yes	NJ	WPP06.02050	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Carbon tetrachloride
Certified	Yes	NJ	WPP06.02060	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Chlorobenzene
Certified	Yes	NJ	WPP06.02070	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Chloroethane
Certified	Yes	NJ	WPP06.02080	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Chloroethyl vinyl ether (2-)
Certified	Yes	NJ	WPP06.02090	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Chloroform
Certified	Yes	NJ	WPP06.02100	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Chloromethane
Certified	Yes	NJ	WPP06.02103	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Chlorotoluene (2-)
Certified	Yes	NJ	WPP06.02105	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Chlorotoluene (4-)
Certified	Yes	NJ	WPP06.02106	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Cyclohexanone
Certified	Yes	NJ	WPP06.02107	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dibromo-3-chloropropane (1,2-)
Certified	Yes	NJ	WPP06.02110	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dibromochloromethane
Certified	Yes	NJ	WPP06.02115	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dibromoethane (1,2-) (EDB)
Certified	Yes	NJ	WPP06.02116	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dibromomethane
Certified	Yes	NJ	WPP06.02118	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloro-2-butene (cis-1,4-)
Certified	Yes	NJ	WPP06.02120	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichlorobenzene (1,2-)
Certified	Yes	NJ	WPP06.02130	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichlorobenzene (1,3-)
Certified	Yes	NJ	WPP06.02140	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichlorobenzene (1,4-)
Certified	Yes	NJ	WPP06.02143	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloro-2-butene (trans-1,4-)
Certified	Yes	NJ	WPP06.02145	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichlorodifluoromethane

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New Jersey Department of Environmental Protection

National Environmental Laboratory Accreditation Program

ANNUAL CERTIFIED PARAMETER LIST AND CURRENT STATUS

Effective as of 11/01/2014 until 06/30/2015

Laboratory Name: PACE ANALYTICAL-DAYTON Laboratory Number: OH007 Activity ID: NLC140004
25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: WPP06 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP06.02150	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloroethane (1,1-)
Certified	Yes	NJ	WPP06.02160	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloroethane (1,2-)
Certified	Yes	NJ	WPP06.02170	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloroethene (1,1-)
Certified	Yes	NJ	WPP06.02175	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloroethene (cis-1,2-)
Certified	Yes	NJ	WPP06.02180	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloroethene (trans-1,2-)
Certified	Yes	NJ	WPP06.02190	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloropropane (1,2-)
Certified	Yes	NJ	WPP06.02192	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloropropane (1,3-)
Certified	Yes	NJ	WPP06.02194	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloropropane (2,2-)
Certified	Yes	NJ	WPP06.02195	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloropropene (1,1-)
Certified	Yes	NJ	WPP06.02198	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Diethyl ether (Ethyl ether)
Certified	Yes	NJ	WPP06.02200	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloropropene (cis-1,3-)
Certified	Yes	NJ	WPP06.02210	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dichloropropene (trans-1,3-)
Certified	Yes	NJ	WPP06.02212	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Ethyl acetate
Certified	Yes	NJ	WPP06.02220	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Ethylbenzene
Certified	Yes	NJ	WPP06.02223	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Hexane (n-)
Certified	Yes	NJ	WPP06.02225	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Isopropanol
Certified	Yes	NJ	WPP06.02226	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Isopropyl acetate
Certified	Yes	NJ	WPP06.02230	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Methylene chloride (Dichloromethane)
Certified	Yes	NJ	WPP06.02232	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Methyl tert-butyl ether
Certified	Yes	NJ	WPP06.02233	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Methyl isobutyl ketone (MIBK)
Certified	Yes	NJ	WPP06.02235	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Tetrahydrofuran
Certified	Yes	NJ	WPP06.02238	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Styrene
Certified	Yes	NJ	WPP06.02240	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Tetrachloroethane (1,1,2,2-)
Certified	Yes	NJ	WPP06.02245	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Tetrachloroethane (1,1,1,2-)
Certified	Yes	NJ	WPP06.02250	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Tetrachloroethene
Certified	Yes	NJ	WPP06.02260	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Toluene
Certified	Yes	NJ	WPP06.02270	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Trichloroethane (1,1,1-)
Certified	Yes	NJ	WPP06.02280	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Trichloroethane (1,1,2-)
Certified	Yes	NJ	WPP06.02290	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Trichloroethene
Certified	Yes	NJ	WPP06.02300	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Trichlorofluoromethane
Certified	Yes	NJ	WPP06.02305	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
Certified	Yes	NJ	WPP06.02307	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Vinyl acetate

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: WPP06 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP06.02310	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Vinyl chloride
Certified	Yes	NJ	WPP06.02312	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Xylenes (total)
Certified	Yes	NJ	WPP06.02315	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Xylene (o-)
Certified	Yes	NJ	WPP06.02317	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Xylene (m- + p-)
Certified	Yes	NJ	WPP06.02320	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Acetonitrile
Certified	Yes	NJ	WPP06.02322	NPW	GC/MS, P&T, Capillary Column	[EPA 624]	Cyclohexane
Certified	Yes	NJ	WPP06.02325	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Hexanone (2-)
Certified	Yes	NJ	WPP06.02326	NPW	GC/MS, P&T, Capillary Column	[EPA 624]	Methyl acetate
Certified	Yes	NJ	WPP06.02328	NPW	GC/MS, P&T, Capillary Column	[EPA 624]	Methylcyclohexane
Certified	Yes	NJ	WPP06.02330	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Methyl iodide
Certified	Yes	NJ	WPP06.02410	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Dioxane (1,4-)
Certified	Yes	NJ	WPP06.02415	NPW	GC/MS, P&T, Capillary Column	[EPA 624]	Butanol (1-)
Certified	Yes	NJ	WPP06.02430	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Ethyl methacrylate
Certified	Yes	NJ	WPP06.02440	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Hexachlorobutadiene (1,3-)
Certified	Yes	NJ	WPP06.02450	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Iso-butyl alcohol
Certified	Yes	NJ	WPP06.02460	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Isopropylbenzene
Certified	Yes	NJ	WPP06.02470	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Isopropyltoluene (4-)
Certified	Yes	NJ	WPP06.02490	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Methacrylonitrile
Certified	Yes	NJ	WPP06.02500	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Methyl methacrylate
Certified	Yes	NJ	WPP06.02510	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Naphthalene
Certified	Yes	NJ	WPP06.02517	NPW	GC/MS, P&T, Capillary Column	[EPA 624]	Nitropropane (2-)
Certified	Yes	NJ	WPP06.02520	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Propionitrile
Certified	Yes	NJ	WPP06.02540	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Propylbenzene (n-)
Certified	Yes	NJ	WPP06.02550	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Sec-butylbenzene
Certified	Yes	NJ	WPP06.02590	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Tert-butylbenzene
Certified	Yes	NJ	WPP06.02610	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Trichlorobenzene (1,2,3-)
Certified	Yes	NJ	WPP06.02620	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Trichlorobenzene (1,2,4-)
Certified	Yes	NJ	WPP06.02630	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Trichloropropane (1,2,3-)
Certified	Yes	NJ	WPP06.02650	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Trimethylbenzene (1,2,4-)
Certified	Yes	NJ	WPP06.02660	NPW	GC/MS, P & T, Capillary Column	[EPA 624]	Trimethylbenzene (1,3,5-)
Certified	Yes	NJ	WPP06.03010	NPW	Extract, GC/MS	[EPA 625]	Acenaphthene
Certified	Yes	NJ	WPP06.03020	NPW	Extract, GC/MS	[EPA 625]	Acenaphthylene

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: WPP06 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP06.03025	NPW	Extract, GC/MS	[EPA 625]	Aminobiphenyl (4-)
Certified	Yes	NJ	WPP06.03030	NPW	Extract, GC/MS	[EPA 625]	Anthracene
Certified	Yes	NJ	WPP06.03032	NPW	Extract, GC/MS	[EPA 625]	Aramite
Certified	Yes	NJ	WPP06.03040	NPW	Extract, GC/MS	[EPA 625]	Benzo(a)anthracene
Certified	Yes	NJ	WPP06.03050	NPW	Extract, GC/MS	[EPA 625]	Benzo(b)fluoranthene
Certified	Yes	NJ	WPP06.03060	NPW	Extract, GC/MS	[EPA 625]	Benzo(k)fluoranthene
Certified	Yes	NJ	WPP06.03070	NPW	Extract, GC/MS	[EPA 625]	Benzo(a)pyrene
Certified	Yes	NJ	WPP06.03080	NPW	Extract, GC/MS	[EPA 625]	Benzo(ghi)perylene
Certified	Yes	NJ	WPP06.03090	NPW	Extract, GC/MS	[EPA 625]	Butylbenzylphthalate
Certified	Yes	NJ	WPP06.03100	NPW	Extract, GC/MS	[EPA 625]	Bis (2-chloroethyl) ether
Certified	Yes	NJ	WPP06.03110	NPW	Extract, GC/MS	[EPA 625]	Bis (2-chloroethoxy) methane
Certified	Yes	NJ	WPP06.03120	NPW	Extract, GC/MS	[EPA 625]	Bis (2-ethylhexyl) phthalate
Certified	Yes	NJ	WPP06.03130	NPW	Extract, GC/MS	[EPA 625]	Bis (2-chloroisopropyl) ether
Certified	Yes	NJ	WPP06.03140	NPW	Extract, GC/MS	[EPA 625]	Bromophenyl-phenyl ether (4-)
Certified	Yes	NJ	WPP06.03145	NPW	Extract, GC/MS	[EPA 625]	Biphenylamine (4-)
Certified	Yes	NJ	WPP06.03147	NPW	Extract, GC/MS	[EPA 625]	Chlorobenzilate
Certified	Yes	NJ	WPP06.03150	NPW	Extract, GC/MS	[EPA 625]	Chloronaphthalene (2-)
Certified	Yes	NJ	WPP06.03160	NPW	Extract, GC/MS	[EPA 625]	Chlorophenyl-phenyl ether (4-)
Certified	Yes	NJ	WPP06.03170	NPW	Extract, GC/MS	[EPA 625]	Chrysene
Certified	Yes	NJ	WPP06.03180	NPW	Extract, GC/MS	[EPA 625]	Dibenzo(a,h)anthracene
Certified	Yes	NJ	WPP06.03186	NPW	Extract, GC/MS	[EPA 625]	Dibenzofuran
Certified	Yes	NJ	WPP06.03190	NPW	Extract, GC/MS	[EPA 625]	Di-n-butyl phthalate
Applied	No	NJ	WPP06.03200	NPW	Extract, GC/MS		Dichlorobenzene (1,3-)
Applied	No	NJ	WPP06.03210	NPW	Extract, GC/MS		Dichlorobenzene (1,2-)
Applied	No	NJ	WPP06.03220	NPW	Extract, GC/MS		Dichlorobenzene (1,4-)
Certified	Yes	NJ	WPP06.03230	NPW	Extract, GC/MS	[EPA 625]	Dichlorobenzidine (3,3'-)
Certified	Yes	NJ	WPP06.03235	NPW	Extract, GC/MS	[EPA 625]	Dichlorophenol (2,6-)
Certified	Yes	NJ	WPP06.03240	NPW	Extract, GC/MS	[EPA 625]	Diethyl phthalate
Certified	Yes	NJ	WPP06.03242	NPW	Extract, GC/MS	[EPA 625]	Dimethoate
Certified	Yes	NJ	WPP06.03244	NPW	Extract, GC/MS	[EPA 625]	Dimethylbenz(a)anthracene (7,12-)
Certified	Yes	NJ	WPP06.03246	NPW	Extract, GC/MS	[EPA 625]	Dimethyl benzidine (3,3-)
Certified	Yes	NJ	WPP06.03250	NPW	Extract, GC/MS	[EPA 625]	Dimethyl phthalate

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: WPP06 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Applied	No	NJ	WPP06.03253	NPW	Extract, GC/MS	[EPA 625]	Dinitrobenzene (1,3-)
Certified	Yes	NJ	WPP06.03255	NPW	Extract, GC/MS	[EPA 625]	Dinoseb
Certified	Yes	NJ	WPP06.03260	NPW	Extract, GC/MS	[EPA 625]	Dinitrotoluene (2,4-)
Certified	Yes	NJ	WPP06.03270	NPW	Extract, GC/MS	[EPA 625]	Dinitrotoluene (2,6-)
Certified	Yes	NJ	WPP06.03280	NPW	Extract, GC/MS	[EPA 625]	Di-n-octyl phthalate
Certified	Yes	NJ	WPP06.03281	NPW	Extract, GC/MS	[EPA 625]	Diphenylamine
Certified	Yes	NJ	WPP06.03283	NPW	Extract, GC/MS	[EPA 625]	Disulfoton
Certified	Yes	NJ	WPP06.03285	NPW	Extract, GC/MS	[EPA 625]	Famphur
Certified	Yes	NJ	WPP06.03290	NPW	Extract, GC/MS	[EPA 625]	Fluoranthene
Certified	Yes	NJ	WPP06.03300	NPW	Extract, GC/MS	[EPA 625]	Fluorene
Certified	Yes	NJ	WPP06.03310	NPW	Extract, GC/MS	[EPA 625]	Hexachlorobenzene
Certified	Yes	NJ	WPP06.03320	NPW	Extract, GC/MS	[EPA 625]	Hexachlorobutadiene (1,3-)
Certified	Yes	NJ	WPP06.03330	NPW	Extract, GC/MS	[EPA 625]	Hexachloroethane
Certified	Yes	NJ	WPP06.03333	NPW	Extract, GC/MS	[EPA 625]	Hexachlorophene
Certified	Yes	NJ	WPP06.03335	NPW	Extract, GC/MS	[EPA 625]	Hexachloropropene
Certified	Yes	NJ	WPP06.03340	NPW	Extract, GC/MS	[EPA 625]	Indeno(1,2,3-cd)pyrene
Certified	Yes	NJ	WPP06.03343	NPW	Extract, GC/MS	[EPA 625]	Isodrin
Certified	Yes	NJ	WPP06.03350	NPW	Extract, GC/MS	[EPA 625]	Isophorone
Certified	Yes	NJ	WPP06.03355	NPW	Extract, GC/MS	[EPA 625]	Kepone
Certified	Yes	NJ	WPP06.03358	NPW	Extract, GC/MS	[EPA 625]	Methylnaphthalene (2-)
Certified	Yes	NJ	WPP06.03360	NPW	Extract, GC/MS	[EPA 625]	Naphthalene
Certified	Yes	NJ	WPP06.03362	NPW	Extract, GC/MS	[EPA 625]	Napththylamine (1-)
Certified	Yes	NJ	WPP06.03364	NPW	Extract, GC/MS	[EPA 625]	Napththylamine (2-)
Certified	Yes	NJ	WPP06.03365	NPW	Extract, GC/MS	[EPA 625]	N-Nitrosomorpholine
Certified	Yes	NJ	WPP06.03366	NPW	Extract, GC/MS	[EPA 625]	Chloroaniline (4-)
Certified	Yes	NJ	WPP06.03367	NPW	Extract, GC/MS	[EPA 625]	Nitroaniline (2-)
Certified	Yes	NJ	WPP06.03368	NPW	Extract, GC/MS	[EPA 625]	Nitroaniline (3-)
Certified	Yes	NJ	WPP06.03369	NPW	Extract, GC/MS	[EPA 625]	Nitroaniline (4-)
Certified	Yes	NJ	WPP06.03370	NPW	Extract, GC/MS	[EPA 625]	Nitrobenzene
Certified	Yes	NJ	WPP06.03380	NPW	Extract, GC/MS	[EPA 625]	N-Nitroso-di-n-propylamine
Certified	Yes	NJ	WPP06.03390	NPW	Extract, GC/MS	[EPA 625]	Phenanthrene
Certified	Yes	NJ	WPP06.03400	NPW	Extract, GC/MS	[EPA 625]	Pyrene

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

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Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP06.03402	NPW	Extract, GC/MS	[EPA 625]	Pentachlorobenzene
Certified	Yes	NJ	WPP06.03405	NPW	Extract, GC/MS	[EPA 625]	Tetrachlorobenzene (1,2,4,5-)
Certified	Yes	NJ	WPP06.03410	NPW	Extract, GC/MS	[EPA 625]	Trichlorobenzene (1,2,4-)
Certified	Yes	NJ	WPP06.03414	NPW	Extract, GC/MS	[EPA 625]	Trinitrobenzene (1,3,5-)
Certified	Yes	NJ	WPP06.03420	NPW	Extract, GC/MS	[EPA 625]	Methyl phenol (4-chloro-3-)
Certified	Yes	NJ	WPP06.03430	NPW	Extract, GC/MS	[EPA 625]	Chlorophenol (2-)
Certified	Yes	NJ	WPP06.03440	NPW	Extract, GC/MS	[EPA 625]	Dichlorophenol (2,4-)
Certified	Yes	NJ	WPP06.03450	NPW	Extract, GC/MS	[EPA 625]	Dimethylphenol (2,4-)
Certified	Yes	NJ	WPP06.03460	NPW	Extract, GC/MS	[EPA 625]	Dinitrophenol (2,4-)
Certified	Yes	NJ	WPP06.03470	NPW	Extract, GC/MS	[EPA 625]	Dinitrophenol (2-methyl-4,6-)
Certified	Yes	NJ	WPP06.03480	NPW	Extract, GC/MS	[EPA 625]	Nitrophenol (2-)
Certified	Yes	NJ	WPP06.03490	NPW	Extract, GC/MS	[EPA 625]	Nitrophenol (4-)
Certified	Yes	NJ	WPP06.03495	NPW	Extract, GC/MS	[EPA 625]	Pentachloronitrobenzene
Certified	Yes	NJ	WPP06.03497	NPW	Extract, GC/MS	[EPA 625]	Phenacetin
Certified	Yes	NJ	WPP06.03500	NPW	Extract, GC/MS	[EPA 625]	Pentachlorophenol
Certified	Yes	NJ	WPP06.03502	NPW	Extract, GC/MS	[EPA 625]	Phenylenediamine (1,4-)
Certified	Yes	NJ	WPP06.03504	NPW	Extract, GC/MS	[EPA 625]	Phenylethylamine (alpha, alpha-Dimethyl)
Certified	Yes	NJ	WPP06.03510	NPW	Extract, GC/MS	[EPA 625]	Phenol
Certified	Yes	NJ	WPP06.03511	NPW	Extract, GC/MS	[EPA 625]	Phosphorothioate (O,O,O-triethyl)
Certified	Yes	NJ	WPP06.03512	NPW	Extract, GC/MS	[EPA 625]	Tetrachlorophenol (2,3,4,6-)
Certified	Yes	NJ	WPP06.03513	NPW	Extract, GC/MS	[EPA 625]	Picoline (2-)
Certified	Yes	NJ	WPP06.03517	NPW	Extract, GC/MS	[EPA 625]	Quinoline -1-Oxide (4-Nitro)
Certified	Yes	NJ	WPP06.03518	NPW	Extract, GC/MS	[EPA 625]	Trichlorophenol (2,4,5-)
Certified	Yes	NJ	WPP06.03520	NPW	Extract, GC/MS	[EPA 625]	Trichlorophenol (2,4,6-)
Certified	Yes	NJ	WPP06.03530	NPW	Extract, GC/MS	[EPA 625]	Benzoic acid
Certified	Yes	NJ	WPP06.03540	NPW	Extract, GC/MS	[EPA 625]	Methylphenol (4-)
Certified	Yes	NJ	WPP06.03550	NPW	Extract, GC/MS	[EPA 625]	Acetophenone
Certified	Yes	NJ	WPP06.03570	NPW	Extract, GC/MS	[EPA 625]	Aniline
Certified	Yes	NJ	WPP06.03580	NPW	Extract, GC/MS	[EPA 625]	Benzidine
Certified	Yes	NJ	WPP06.03590	NPW	Extract, GC/MS	[EPA 625]	Carbazole
Certified	Yes	NJ	WPP06.03605	NPW	Extract, GC/MS	[EPA 625]	Diphenylhydrazine (1,2-)
Certified	Yes	NJ	WPP06.03610	NPW	Extract, GC/MS	[EPA 625]	Methylphenol (2-)

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New Jersey Department of Environmental Protection

National Environmental Laboratory Accreditation Program

ANNUAL CERTIFIED PARAMETER LIST AND CURRENT STATUS

Effective as of 11/01/2014 until 06/30/2015

Laboratory Name: PACE ANALYTICAL-DAYTON Laboratory Number: OH007 Activity ID: NLC140004
25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: WPP06 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	WPP06.03612	NPW	Extract, GC/MS	[EPA 625]	Methylphenol (3-)
Certified	Yes	NJ	WPP06.03620	NPW	Extract, GC/MS	[EPA 625]	Decane (n-)
Certified	Yes	NJ	WPP06.03660	NPW	Extract, GC/MS	[EPA 625]	Hexachlorocyclopentadiene
Certified	Yes	NJ	WPP06.03675	NPW	Extract, GC/MS	[EPA 625]	N-Nitroso-di-n-butylamine
Certified	Yes	NJ	WPP06.03677	NPW	Extract, GC/MS	[EPA 625]	N-Nitrosodiethylamine
Certified	Yes	NJ	WPP06.03680	NPW	Extract, GC/MS	[EPA 625]	N-Nitrosodimethylamine
Certified	Yes	NJ	WPP06.03683	NPW	Extract, GC/MS	[EPA 625]	N-Nitrosopiperidine
Certified	Yes	NJ	WPP06.03690	NPW	Extract, GC/MS	[EPA 625]	N-Nitrosodiphenylamine
Certified	Yes	NJ	WPP06.03693	NPW	Extract, GC/MS	[EPA 625]	Parathion
Certified	Yes	NJ	WPP06.03695	NPW	Extract, GC/MS	[EPA 625]	N-Nitrosopyrrolidine
Certified	Yes	NJ	WPP06.03700	NPW	Extract, GC/MS	[EPA 625]	Octadecane (n-)
Certified	Yes	NJ	WPP06.03703	NPW	Extract, GC/MS	[EPA 625]	Parathion methyl
Certified	Yes	NJ	WPP06.03705	NPW	Extract, GC/MS	[EPA 625]	Pentachloroethane
Certified	Yes	NJ	WPP06.03714	NPW	Extract, GC/MS	[EPA 625]	Toluidine (5-nitro-2-)
Certified	Yes	NJ	WPP06.03720	NPW	Extract, GC/MS	[EPA 625]	Pyridine
Applied	No	NJ	WPP06.03730	NPW	Extract, GC/MS	[EPA 625]	Methylphenanthrene (1-)
Certified	Yes	NJ	WPP06.03750	NPW	Extract, GC/MS	[EPA 625]	Methanesulfonate (Methyl-)
Certified	Yes	NJ	WPP06.03760	NPW	Extract, GC/MS	[EPA 625]	Methapyrilene
Certified	Yes	NJ	WPP06.03780	NPW	Extract, GC/MS	[EPA 625]	Methylcholanthrene (3-)
Certified	Yes	NJ	WPP06.03790	NPW	Extract, GC/MS	[EPA 625]	Napthoquinone (1,4-)
Certified	Yes	NJ	WPP06.03800	NPW	Extract, GC/MS	[EPA 625]	Safrole
Certified	Yes	NJ	WPP06.03810	NPW	Extract, GC/MS	[EPA 625]	Sulfotepp

Category: SHW02 -- Characteristics of Hazardous Waste

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Applied	No	NJ	SHW02.01000	NPW, SCM	Pensky Martens	[SW-846 1010] [SW-846 1010A]	Ignitability
Applied	No	NJ	SHW02.03000	NPW, SCM	Aqueous Waste, Potentiometric	[SW-846 9040C]	Corrosivity - pH waste, >20% water
Certified	Yes	NJ	SHW02.06900	NPW, SCM	TCLP, Toxicity Procedure, ZHE	[SW-846 1311]	Volatile organics
Certified	Yes	NJ	SHW02.06950	NPW, SCM	TCLP, Toxicity Procedure, Shaker	[SW-846 1311]	Semivolatile organics

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Laboratory Name: PACE ANALYTICAL-DAYTON Laboratory Number: OH007 Activity ID: NLC140004
25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SHW02 -- Characteristics of Hazardous Waste

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW02.07000	NPW, SCM	TCLP, Toxicity Procedure, Shaker	[SW-846 1311]	Metals
Certified	Yes	NJ	SHW02.08000	NPW, SCM	Synthetic PPT Leachate Procedure	[SW-846 1312]	Metals - organics

Category: SHW04 -- Inorganic Parameters

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Applied	No	NJ	SHW04.01500	NPW, SCM	Acid Digestion/Aqueous Samples, ICP, FLAA	[SW-846 3010A]	Metals, Total
Certified	Yes	NJ	SHW04.05000	NPW, SCM	ICP	[SW-846 6010B]	Aluminum
Certified	Yes	NJ	SHW04.06500	NPW, SCM	ICP	[SW-846 6010B]	Antimony
Applied	No	NJ	SHW04.08000	NPW, SCM	AA, Graphite Furnace	[SW-846 7041]	Antimony
Certified	Yes	NJ	SHW04.09000	NPW, SCM	ICP	[SW-846 6010B]	Arsenic
Applied	No	NJ	SHW04.11100	NPW, SCM	AA, Graphite Furnace	[SW-846 7060A]	Arsenic
Certified	Yes	NJ	SHW04.11500	NPW, SCM	ICP	[SW-846 6010B]	Barium
Certified	Yes	NJ	SHW04.13500	NPW, SCM	ICP	[SW-846 6010B]	Beryllium
Applied	No	NJ	SHW04.15000	NPW, SCM	AA, Graphite Furnace	[SW-846 7091]	Beryllium
Applied	No	NJ	SHW04.15100	NPW, SCM	ICP	[SW-846 6010B]	Boron
Certified	Yes	NJ	SHW04.15500	NPW, SCM	ICP	[SW-846 6010B]	Cadmium
Applied	No	NJ	SHW04.17000	NPW, SCM	AA, Graphite Furnace	[SW-846 7131A]	Cadmium
Certified	Yes	NJ	SHW04.17500	NPW, SCM	ICP	[SW-846 6010B]	Calcium
Certified	Yes	NJ	SHW04.18500	NPW, SCM	ICP	[SW-846 6010B]	Chromium
Applied	No	NJ	SHW04.20000	NPW, SCM	AA, Graphite Furnace	[SW-846 7191]	Chromium
Certified	Yes	NJ	SHW04.22500	NPW, SCM	ICP	[SW-846 6010B]	Cobalt
Applied	No	NJ	SHW04.24000	NPW, SCM	AA, Graphite Furnace	[SW-846 7201]	Cobalt
Certified	Yes	NJ	SHW04.24500	NPW, SCM	ICP	[SW-846 6010B]	Copper
Applied	No	NJ	SHW04.25500	NPW, SCM	AA, Graphite Furnace	[SW-846 7211]	Copper
Certified	Yes	NJ	SHW04.26000	NPW, SCM	ICP	[SW-846 6010B]	Iron
Certified	Yes	NJ	SHW04.27500	NPW, SCM	ICP	[SW-846 6010B]	Lead
Applied	No	NJ	SHW04.29000	NPW, SCM	AA, Graphite Furnace	[SW-846 7421]	Lead
Certified	Yes	NJ	SHW04.29500	NPW, SCM	ICP	[SW-846 6010B]	Lithium
Certified	Yes	NJ	SHW04.30500	NPW, SCM	ICP	[SW-846 6010B]	Magnesium

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SHW04 -- Inorganic Parameters

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW04.34000	NPW, SCM	ICP	[SW-846 6010B]	Molybdenum
Applied	No	NJ	SHW04.35000	NPW, SCM	AA, Graphite Furnace	[SW-846 7481]	Molybdenum
Certified	Yes	NJ	SHW04.35500	NPW, SCM	ICP	[SW-846 6010B]	Nickel
Applied	No	NJ	SHW04.36600	NPW, SCM	AA, Graphite Furnace	[SW-846 7521]	Nickel
Certified	Yes	NJ	SHW04.37000	NPW, SCM	ICP	[SW-846 6010B]	Phosphorus
Certified	Yes	NJ	SHW04.38000	NPW, SCM	ICP	[SW-846 6010B]	Potassium
Certified	Yes	NJ	SHW04.39000	NPW, SCM	ICP	[SW-846 6010B]	Selenium
Applied	No	NJ	SHW04.39500	NPW, SCM	AA, Graphite Furnace	[SW-846 7740]	Selenium
Certified	Yes	NJ	SHW04.41000	NPW, SCM	ICP	[SW-846 6010B]	Silver
Applied	No	NJ	SHW04.42500	NPW, SCM	AA, Graphite Furnace	[SW-846 7761]	Silver
Certified	Yes	NJ	SHW04.43000	NPW, SCM	ICP	[SW-846 6010B]	Sodium
Applied	No	NJ	SHW04.44000	NPW, SCM	ICP	[SW-846 6010B]	Strontium
Applied	No	NJ	SHW04.46500	NPW, SCM	AA, Graphite Furnace	[SW-846 7841]	Thallium
Certified	Yes	NJ	SHW04.47100	NPW, SCM	ICP	[SW-846 6010B]	Tin
Certified	Yes	NJ	SHW04.47145	NPW, SCM	ICP	[SW-846 6010B]	Titanium
Certified	Yes	NJ	SHW04.47500	NPW, SCM	ICP	[SW-846 6010B]	Vanadium
Certified	Yes	NJ	SHW04.49000	NPW, SCM	ICP	[SW-846 6010B]	Zinc

Category: SHW05 -- Organic Parameters, Prep. / Screening

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW05.01000	NPW, SCM	Separatory Funnel Extraction	[SW-846 3510C]	Semivolatile organics
Certified	Yes	NJ	SHW05.05000	NPW, SCM	Ultrasonic Extraction	[SW-846 3550B]	Semivolatile organics
Certified	Yes	NJ	SHW05.06000	NPW, SCM	Waste Dilution	[SW-846 3580A]	Organics
Certified	Yes	NJ	SHW05.07000	NPW, SCM	Purge & Trap Aqueous	[SW-846 5030B]	Volatile organics
Certified	Yes	NJ	SHW05.07300	NPW, SCM	Closed System Purge & Trap	[SW-846 5035A-L]	Volatile organics - low conc.
Certified	Yes	NJ	SHW05.07310	NPW, SCM	Methanol Extract, Closed System P & T	[SW-846 5035A-H]	Volatile organics - high conc.

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Laboratory Name: PACE ANALYTICAL-DAYTON Laboratory Number: OH007 Activity ID: NLC140004
25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SHW06 -- Organic Parameters, Chromatography

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW06.04010	NPW, SCM	GC P&T, FID	[SW-846 8015B]	Gasoline range organic
Certified	Yes	NJ	SHW06.04500	NPW, SCM	Extraction, GC, FID	[SW-846 8015B]	Diesel range organic
Certified	Yes	NJ	SHW06.05010	NPW, SCM	GC, Direct Injection or P & T, PID-HECD	[SW-846 8021B]	Benzene
Certified	Yes	NJ	SHW06.05060	NPW, SCM	GC, Direct Injection or P & T, PID-HECD	[SW-846 8021B]	Ethylbenzene
Certified	Yes	NJ	SHW06.05070	NPW, SCM	GC, Direct Injection or P & T, PID-HECD	[SW-846 8021B]	Toluene
Certified	Yes	NJ	SHW06.05080	NPW, SCM	GC, Direct Injection or P & T, PID-HECD	[SW-846 8021B]	Xylene (o-)
Certified	Yes	NJ	SHW06.05090	NPW, SCM	GC, Direct Injection or P & T, PID-HECD	[SW-846 8021B]	Xylene (m-)
Certified	Yes	NJ	SHW06.05100	NPW, SCM	GC, Direct Injection or P & T, PID-HECD	[SW-846 8021B]	Xylene (p-)
Certified	Yes	NJ	SHW06.05105	NPW, SCM	GC, Direct Injection or P & T, PID-HECD	[SW-846 8021B]	Xylenes (total)
Applied	No	NJ	SHW06.05360	NPW, SCM	GC, Direct Injection or P & T, PID-HECD	[SW-846 8021B]	Methyl tert-butyl ether
Certified	Yes	NJ	SHW06.12010	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Aldrin
Certified	Yes	NJ	SHW06.12020	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Alpha BHC
Certified	Yes	NJ	SHW06.12030	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Beta BHC
Certified	Yes	NJ	SHW06.12040	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Delta BHC
Certified	Yes	NJ	SHW06.12050	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Lindane (gamma BHC)
Certified	Yes	NJ	SHW06.12060	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Chlordane (technical)
Certified	Yes	NJ	SHW06.12070	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Chlordane (alpha) (cis-)
Certified	Yes	NJ	SHW06.12080	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Chlordane (gamma) (trans-)
Certified	Yes	NJ	SHW06.12090	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	DDD (4,4'-)
Certified	Yes	NJ	SHW06.12100	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	DDE (4,4'-)
Certified	Yes	NJ	SHW06.12110	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	DDT (4,4'-)
Certified	Yes	NJ	SHW06.12120	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Dieldrin
Certified	Yes	NJ	SHW06.12140	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Endosulfan II
Certified	Yes	NJ	SHW06.12150	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Endosulfan sulfate
Certified	Yes	NJ	SHW06.12160	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Endrin
Certified	Yes	NJ	SHW06.12170	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Endrin aldehyde
Certified	Yes	NJ	SHW06.12180	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Endrin ketone
Certified	Yes	NJ	SHW06.12190	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Heptachlor
Certified	Yes	NJ	SHW06.12200	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Heptachlor epoxide
Certified	Yes	NJ	SHW06.12210	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Methoxychlor
Certified	Yes	NJ	SHW06.12220	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8081A]	Toxaphene
Certified	Yes	NJ	SHW06.13110	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8082]	PCB 1016

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SHW06 -- Organic Parameters, Chromatography

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Certified	Yes	NJ	SHW06.13120	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8082]	PCB 1221
Certified	Yes	NJ	SHW06.13130	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8082]	PCB 1232
Certified	Yes	NJ	SHW06.13140	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8082]	PCB 1242
Certified	Yes	NJ	SHW06.13150	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8082]	PCB 1248
Certified	Yes	NJ	SHW06.13160	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8082]	PCB 1254
Certified	Yes	NJ	SHW06.13170	NPW, SCM	GC, Extraction, ECD or HECD, Capillary	[SW-846 8082]	PCB 1260

Category: SHW07 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW07.04010	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Benzene
Certified	Yes	NJ	SHW07.04011	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Bromobenzene
Certified	Yes	NJ	SHW07.04012	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Butylbenzene (n-)
Certified	Yes	NJ	SHW07.04013	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Sec-butylbenzene
Certified	Yes	NJ	SHW07.04014	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Tert-butylbenzene
Certified	Yes	NJ	SHW07.04020	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Chlorobenzene
Certified	Yes	NJ	SHW07.04022	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Chlorotoluene (2-)
Certified	Yes	NJ	SHW07.04023	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Chlorotoluene (4-)
Certified	Yes	NJ	SHW07.04030	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichlorobenzene (1,2-)
Certified	Yes	NJ	SHW07.04040	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichlorobenzene (1,3-)
Certified	Yes	NJ	SHW07.04050	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichlorobenzene (1,4-)
Certified	Yes	NJ	SHW07.04060	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Ethylbenzene
Certified	Yes	NJ	SHW07.04065	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Isopropylbenzene
Certified	Yes	NJ	SHW07.04067	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Propylbenzene (n-)
Certified	Yes	NJ	SHW07.04070	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Toluene
Certified	Yes	NJ	SHW07.04071	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Isopropyltoluene (4-)
Certified	Yes	NJ	SHW07.04072	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Trichlorobenzene (1,2,3-)
Certified	Yes	NJ	SHW07.04073	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Trimethylbenzene (1,2,4-)
Certified	Yes	NJ	SHW07.04074	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Trimethylbenzene (1,3,5-)
Certified	Yes	NJ	SHW07.04080	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Xylenes (total)

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Category: SHW07 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW07.04081	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Xylene (m-)
Certified	Yes	NJ	SHW07.04082	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Xylene (o-)
Certified	Yes	NJ	SHW07.04083	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Xylene (p-)
Certified	Yes	NJ	SHW07.04088	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Allyl chloride
Certified	Yes	NJ	SHW07.04089	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Bromochloromethane
Certified	Yes	NJ	SHW07.04090	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Bromodichloromethane
Certified	Yes	NJ	SHW07.04100	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Bromoform
Certified	Yes	NJ	SHW07.04110	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Bromomethane
Certified	Yes	NJ	SHW07.04111	NPW, SCM	GC/MS, P&T, or Direct Injection, Capillary	[SW-846 8260B]	Cyclohexane
Certified	Yes	NJ	SHW07.04112	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Cyclohexanone
Certified	Yes	NJ	SHW07.04117	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloro-2-butene (cis-1,4-)
Certified	Yes	NJ	SHW07.04120	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Carbon tetrachloride
Certified	Yes	NJ	SHW07.04130	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Chloroethane
Certified	Yes	NJ	SHW07.04140	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Chloroethyl vinyl ether (2-)
Certified	Yes	NJ	SHW07.04150	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Chloroform
Certified	Yes	NJ	SHW07.04160	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Chloromethane
Certified	Yes	NJ	SHW07.04165	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Diethyl ether (Ethyl ether)
Certified	Yes	NJ	SHW07.04170	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloropropene (trans-1,3-)
Certified	Yes	NJ	SHW07.04180	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dibromochloromethane
Certified	Yes	NJ	SHW07.04185	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dibromoethane (1,2-) (EDB)
Certified	Yes	NJ	SHW07.04186	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dibromomethane
Certified	Yes	NJ	SHW07.04187	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dibromo-3-chloropropane (1,2-)
Certified	Yes	NJ	SHW07.04190	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichlorodifluoromethane
Certified	Yes	NJ	SHW07.04200	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloroethane (1,1-)
Certified	Yes	NJ	SHW07.04210	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloroethane (1,2-)
Certified	Yes	NJ	SHW07.04220	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloroethene (1,1-)
Certified	Yes	NJ	SHW07.04230	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloroethene (trans-1,2-)
Certified	Yes	NJ	SHW07.04235	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloroethene (cis-1,2-)
Certified	Yes	NJ	SHW07.04240	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloropropane (1,2-)
Certified	Yes	NJ	SHW07.04241	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloropropane (1,3-)
Certified	Yes	NJ	SHW07.04242	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloropropane (2,2-)
Certified	Yes	NJ	SHW07.04249	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloropropene (1,1-)

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New Jersey Department of Environmental Protection

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Effective as of 11/01/2014 until 06/30/2015

Laboratory Name: PACE ANALYTICAL-DAYTON Laboratory Number: OH007 Activity ID: NLC140004
25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SHW07 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW07.04250	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloropropene (cis-1,3-)
Certified	Yes	NJ	SHW07.04255	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dichloro-2-butene (trans-1,4-)
Certified	Yes	NJ	SHW07.04258	NPW, SCM	GC/MS, P&T, or Direct Injection, Capillary	[SW-846 8260B]	Butanol (1-)
Certified	Yes	NJ	SHW07.04260	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Methylene chloride (Dichloromethane)
Certified	Yes	NJ	SHW07.04265	NPW, SCM	GC/MS, P&T, or Direct Injection, Capillary	[SW-846 8260B]	Nitropropane (2-)
Certified	Yes	NJ	SHW07.04270	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Tetrachloroethane (1,1,2,2-)
Certified	Yes	NJ	SHW07.04280	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Tetrachloroethene
Certified	Yes	NJ	SHW07.04282	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Tetrahydrofuran
Certified	Yes	NJ	SHW07.04290	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Trichloroethane (1,1,1-)
Certified	Yes	NJ	SHW07.04300	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Trichloroethane (1,1,2-)
Certified	Yes	NJ	SHW07.04310	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Trichloroethene
Certified	Yes	NJ	SHW07.04320	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Trichlorofluoromethane
Certified	Yes	NJ	SHW07.04322	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
Certified	Yes	NJ	SHW07.04325	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Trichloropropane (1,2,3-)
Certified	Yes	NJ	SHW07.04327	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Vinyl acetate
Certified	Yes	NJ	SHW07.04330	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Vinyl chloride
Certified	Yes	NJ	SHW07.04340	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Acetone
Certified	Yes	NJ	SHW07.04350	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Carbon disulfide
Certified	Yes	NJ	SHW07.04360	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Butanone (2-) [Methyl ethyl ketone]
Certified	Yes	NJ	SHW07.04365	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Ethyl acetate
Certified	Yes	NJ	SHW07.04367	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Ethyl methacrylate
Certified	Yes	NJ	SHW07.04370	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Hexanone (2-)
Certified	Yes	NJ	SHW07.04371	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Methacrylonitrile
Certified	Yes	NJ	SHW07.04373	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Methyl methacrylate
Certified	Yes	NJ	SHW07.04374	NPW, SCM	GC/MS, P&T, or Direct Injection, Capillary	[SW-846 8260B]	Methyl acetate
Certified	Yes	NJ	SHW07.04375	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Methyl iodide
Certified	Yes	NJ	SHW07.04376	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Iso-butyl alcohol
Certified	Yes	NJ	SHW07.04380	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Pentanone (4-methyl-2-) (MIBK)
Certified	Yes	NJ	SHW07.04385	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Propionitrile
Certified	Yes	NJ	SHW07.04390	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Methyl tert-butyl ether
Certified	Yes	NJ	SHW07.04398	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Acetonitrile
Certified	Yes	NJ	SHW07.04400	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Acrolein

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SHW07 -- Organic Parameters, Chromatography/MS

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Certified	Yes	NJ	SHW07.04410	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Acrylonitrile
Applied	No	NJ	SHW07.04425	NPW, SCM	GC/MS, P&T, or Direct Injection, Capillary	[SW-846 8260B]	Hexane (n-)
Certified	Yes	NJ	SHW07.04500	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Hexachlorobutadiene (1,3-)
Certified	Yes	NJ	SHW07.04535	NPW, SCM	GC/MS, P&T, or Direct Injection, Capillary	[SW-846 8260B]	Methylcyclohexane
Certified	Yes	NJ	SHW07.04540	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Naphthalene
Certified	Yes	NJ	SHW07.04550	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Styrene
Certified	Yes	NJ	SHW07.04560	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Tetrachloroethane (1,1,1,2-)
Certified	Yes	NJ	SHW07.04570	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Trichlorobenzene (1,2,4-)
Certified	Yes	NJ	SHW07.04580	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Nitrobenzene
Certified	Yes	NJ	SHW07.04590	NPW, SCM	GC/MS, P & T or Direct Injection, Capillary	[SW-846 8260B]	Dioxane (1,4-)
Certified	Yes	NJ	SHW07.04665	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Acetophenone
Certified	Yes	NJ	SHW07.04670	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Acetylaminofluorene (2-)
Certified	Yes	NJ	SHW07.04675	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Aminobiphenyl (4-)
Certified	Yes	NJ	SHW07.04680	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Aramite
Certified	Yes	NJ	SHW07.04705	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Chlorobenzilate
Certified	Yes	NJ	SHW07.04755	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dichlorophenol (2,6-)
Certified	Yes	NJ	SHW07.04760	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dimethoate
Certified	Yes	NJ	SHW07.04767	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dimethylaminoazobenzene
Certified	Yes	NJ	SHW07.04770	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dimethylbenz(a)anthracene (7,12-)
Certified	Yes	NJ	SHW07.04775	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dimethyl benzidine (3,3-)
Applied	No	NJ	SHW07.04780	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dinitrobenzene (1,3-)
Certified	Yes	NJ	SHW07.04785	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dinoseb
Certified	Yes	NJ	SHW07.04790	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Disulfoton
Certified	Yes	NJ	SHW07.04795	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Famphur
Certified	Yes	NJ	SHW07.04800	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Hexachlorophene
Certified	Yes	NJ	SHW07.04810	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Isodrin
Certified	Yes	NJ	SHW07.04825	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Kepone
Certified	Yes	NJ	SHW07.04830	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Methanesulfonate (Ethyl-)
Certified	Yes	NJ	SHW07.04835	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Methanesulfonate (Methyl-)
Certified	Yes	NJ	SHW07.04840	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Methapyrilene
Certified	Yes	NJ	SHW07.04845	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Methylcholanthrene (3-)
Certified	Yes	NJ	SHW07.04850	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Napthoquinone (1,4-)

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SHW07 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW07.04855	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Napththylamine (1-)
Certified	Yes	NJ	SHW07.04860	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Napththylamine (2-)
Certified	Yes	NJ	SHW07.04870	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	N-Nitroso-di-n-butylamine
Certified	Yes	NJ	SHW07.04875	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	N-Nitrosomorpholine
Certified	Yes	NJ	SHW07.04880	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	N-Nitrosopiperidine
Certified	Yes	NJ	SHW07.04885	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Parathion
Certified	Yes	NJ	SHW07.04890	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Parathion methyl
Certified	Yes	NJ	SHW07.04895	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Pentachlorobenzene
Certified	Yes	NJ	SHW07.04900	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Pentachloroethane
Certified	Yes	NJ	SHW07.04905	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Pentachloronitrobenzene
Certified	Yes	NJ	SHW07.04910	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Phenacetin
Certified	Yes	NJ	SHW07.04915	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Phenylenediamine (1,4-)
Certified	Yes	NJ	SHW07.04920	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Phenylethylamine (alpha, alpha-Dimethyl)
Certified	Yes	NJ	SHW07.04925	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Phorate
Certified	Yes	NJ	SHW07.04930	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Phosphorothioate (O,O,O-triethyl)
Certified	Yes	NJ	SHW07.04940	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Picoline (2-)
Certified	Yes	NJ	SHW07.04945	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Pronamide
Certified	Yes	NJ	SHW07.04950	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Quinoline -1-Oxide (4-Nitro)
Certified	Yes	NJ	SHW07.04955	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Safrole
Certified	Yes	NJ	SHW07.04960	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Sulfotepp
Certified	Yes	NJ	SHW07.04975	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Tetrachlorobenzene (1,2,4,5-)
Certified	Yes	NJ	SHW07.04980	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Tetrachlorophenol (2,3,4,6-)
Certified	Yes	NJ	SHW07.04985	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Toluidine (2-) (2-Methylaniline)
Certified	Yes	NJ	SHW07.04990	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Toluidine (5-nitro-2-)
Certified	Yes	NJ	SHW07.04995	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Trinitrobenzene (1,3,5-)
Certified	Yes	NJ	SHW07.05004	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	N-Nitrosodiethylamine
Certified	Yes	NJ	SHW07.05005	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	N-Nitrosodimethylamine
Certified	Yes	NJ	SHW07.05006	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	N-Nitroso-di-n-propylamine
Certified	Yes	NJ	SHW07.05010	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	N-Nitrosodiphenylamine
Certified	Yes	NJ	SHW07.05011	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	N-Nitrosomethylethylamine
Certified	Yes	NJ	SHW07.05012	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	N-Nitrosopyrrolidine
Certified	Yes	NJ	SHW07.05020	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Diphenylamine

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Certified	Yes	NJ	SHW07.05030	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Carbazole
Certified	Yes	NJ	SHW07.05038	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Benzidine
Certified	Yes	NJ	SHW07.05040	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dichlorobenzidine (3,3'-)
Certified	Yes	NJ	SHW07.05045	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Diphenylhydrazine (1,2-)
Certified	Yes	NJ	SHW07.05048	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Aniline
Certified	Yes	NJ	SHW07.05050	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Chloroaniline (4-)
Certified	Yes	NJ	SHW07.05060	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Nitroaniline (2-)
Certified	Yes	NJ	SHW07.05062	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Nitroaniline (3-)
Certified	Yes	NJ	SHW07.05063	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Nitroaniline (4-)
Certified	Yes	NJ	SHW07.05070	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Chloronaphthalene (2-)
Certified	Yes	NJ	SHW07.05080	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Hexachlorobenzene
Certified	Yes	NJ	SHW07.05090	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Hexachlorobutadiene (1,3-)
Certified	Yes	NJ	SHW07.05100	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Hexachlorocyclopentadiene
Certified	Yes	NJ	SHW07.05110	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Hexachloroethane
Certified	Yes	NJ	SHW07.05115	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Hexachloropropene
Certified	Yes	NJ	SHW07.05120	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Trichlorobenzene (1,2,4-)
Certified	Yes	NJ	SHW07.05130	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Bis (2-chloroethoxy) methane
Certified	Yes	NJ	SHW07.05132	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Bis (2-chloroethyl) ether
Certified	Yes	NJ	SHW07.05140	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Bis (2-chloroisopropyl) ether
Certified	Yes	NJ	SHW07.05150	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Chlorophenyl-phenyl ether (4-)
Certified	Yes	NJ	SHW07.05160	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Bromophenyl-phenyl ether (4-)
Certified	Yes	NJ	SHW07.05170	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dinitrotoluene (2,4-)
Certified	Yes	NJ	SHW07.05180	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dinitrotoluene (2,6-)
Certified	Yes	NJ	SHW07.05190	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Isophorone
Certified	Yes	NJ	SHW07.05200	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Nitrobenzene
Certified	Yes	NJ	SHW07.05210	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Butylbenzylphthalate
Certified	Yes	NJ	SHW07.05220	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Bis (2-ethylhexyl) phthalate
Certified	Yes	NJ	SHW07.05230	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Diethyl phthalate
Certified	Yes	NJ	SHW07.05240	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dimethyl phthalate
Certified	Yes	NJ	SHW07.05250	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Di-n-butyl phthalate
Certified	Yes	NJ	SHW07.05260	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Di-n-octyl phthalate
Certified	Yes	NJ	SHW07.05270	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Acenaphthene

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New Jersey Department of Environmental Protection

National Environmental Laboratory Accreditation Program

ANNUAL CERTIFIED PARAMETER LIST AND CURRENT STATUS

Effective as of 11/01/2014 until 06/30/2015

Laboratory Name: PACE ANALYTICAL-DAYTON Laboratory Number: OH007 Activity ID: NLC140004
25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SHW07 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW07.05280	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Anthracene
Certified	Yes	NJ	SHW07.05290	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Acenaphthylene
Certified	Yes	NJ	SHW07.05300	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Benzo(a)anthracene
Certified	Yes	NJ	SHW07.05310	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Benzo(a)pyrene
Certified	Yes	NJ	SHW07.05320	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Benzo(b)fluoranthene
Certified	Yes	NJ	SHW07.05330	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Benzo(ghi)perylene
Certified	Yes	NJ	SHW07.05340	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Benzo(k)fluoranthene
Certified	Yes	NJ	SHW07.05350	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Chrysene
Certified	Yes	NJ	SHW07.05360	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dibenzo(a,h)anthracene
Certified	Yes	NJ	SHW07.05370	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Fluoranthene
Certified	Yes	NJ	SHW07.05380	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Fluorene
Certified	Yes	NJ	SHW07.05390	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Indeno(1,2,3-cd)pyrene
Applied	No	NJ	SHW07.05395	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Methylnaphthalene (1-)
Certified	Yes	NJ	SHW07.05400	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Methylnaphthalene (2-)
Certified	Yes	NJ	SHW07.05410	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Naphthalene
Certified	Yes	NJ	SHW07.05420	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Phenanthrene
Certified	Yes	NJ	SHW07.05430	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Pyrene
Certified	Yes	NJ	SHW07.05440	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Methyl phenol (4-chloro-3-)
Certified	Yes	NJ	SHW07.05450	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Chlorophenol (2-)
Certified	Yes	NJ	SHW07.05460	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dichlorophenol (2,4-)
Certified	Yes	NJ	SHW07.05470	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dimethylphenol (2,4-)
Certified	Yes	NJ	SHW07.05480	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dinitrophenol (2,4-)
Certified	Yes	NJ	SHW07.05490	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dinitrophenol (2-methyl-4,6-)
Certified	Yes	NJ	SHW07.05500	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Methylphenol (2-)
Certified	Yes	NJ	SHW07.05510	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Methylphenol (4-)
Certified	Yes	NJ	SHW07.05520	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Nitrophenol (2-)
Certified	Yes	NJ	SHW07.05530	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Nitrophenol (4-)
Certified	Yes	NJ	SHW07.05540	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Pentachlorophenol
Certified	Yes	NJ	SHW07.05550	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Phenol
Certified	Yes	NJ	SHW07.05560	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Trichlorophenol (2,4,5-)
Certified	Yes	NJ	SHW07.05570	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Trichlorophenol (2,4,6-)
Certified	Yes	NJ	SHW07.05590	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Methylphenol (3-)

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SHW07 -- Organic Parameters, Chromatography/MS

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW07.05600	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dibenzofuran
Certified	Yes	NJ	SHW07.05691	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dichlorobenzene (1,2-)
Certified	Yes	NJ	SHW07.05692	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dichlorobenzene (1,3-)
Certified	Yes	NJ	SHW07.05700	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Dichlorobenzene (1,4-)
Applied	No	NJ	SHW07.05705	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Benzaldehyde
Certified	Yes	NJ	SHW07.05710	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Benzoic acid
Certified	Yes	NJ	SHW07.05720	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Benzyl alcohol
Certified	Yes	NJ	SHW07.05725	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Decane (n-)
Certified	Yes	NJ	SHW07.05730	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Octadecane (n-)
Certified	Yes	NJ	SHW07.05750	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Pyridine
Applied	No	NJ	SHW07.05765	NPW, SCM	GC/MS, Extract or Dir Inj, Capillary	[SW-846 8270C]	Caprolactam

Category: SHW09 -- Miscellaneous Parameters

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Applied	No	NJ	SHW09.01500	NPW, SCM	Distillation, Electrode	[SM 4500-NH3 B+D or E (19/20th ed.)]	Ammonia
Applied	No	NJ	SHW09.05000	NPW, SCM	Colorimetric, Automated	[SW-846 9012B]	Cyanide
Applied	No	NJ	SHW09.05200	NPW, SCM	Digestion, Distillation, Electrode	[SM 4500-N Org B or C + NH3 B + NH3 D or E(19/20th ed)]	Kjeldahl nitrogen - total
Applied	No	NJ	SHW09.14000	NPW, SCM	Electrometric	[SW-846 9040C]	pH - waste, >20% water
Applied	No	NJ	SHW09.22000	NPW, SCM	Colorimetric, Auto, 4AAP Distillation	[SW-846 9066]	Phenols

Category: SHW04 -- Inorganic Parameters

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW04.03000	SCM	Acid Digestion, Soil Sediment & Sludge	[SW-846 3050B]	Metals
Certified	Yes	NJ	SHW04.31500	SCM	ICP	[SW-846 6010B]	Manganese
Certified	Yes	NJ	SHW04.33500	SCM	AA, Manual Cold Vapor	[SW-846 7471A]	Mercury - solid waste
Certified	Yes	NJ	SHW04.45000	SCM	ICP	[SW-846 6010B]	Thallium

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25 HOLIDAY DR
ENGLEWOOD, OH 45322

Category: SHW05 -- Organic Parameters, Prep. / Screening

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW05.05110	SCM	Microwave Extraction	[SW-846 3546]	Semivolatile organics

Category: SHW09 -- Miscellaneous Parameters

Status	Eligible to Report NJ Data	State	Code	Matrix	Technique Description	Approved Method	Parameter Description
Certified	Yes	NJ	SHW09.19200	SCM	Spectroscopy	[OTHER Walkley Black]	Total organic carbon (TOC)

Joseph F. Aiello, Manager

KEY: AE = Air and Emissions, BT = Biological Tissues, DW = Drinking Water, NPW = Non-Potable Water, SCM = Solid and Chemical Materials

PACE ANALYTICAL

STANDARD OPERATING PROCEDURE

TITLE: Nitrate & Nitrate Nitrogen

(Supersedes BPL01-NO2NO3 Rev 7 Update 2)

PREPARED BY: _____ 11/18/14

REVIEWED BY: _____ 11-18-14
Date

_____ 11/18/14
QA Manager Date

Brooke Chandler 11/18/14
Technical Director Date

Brooke Chandler 11/18/14
Laboratory Manager Date

Control of Documents Statement

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1.0 SCOPE AND APPLICATION

1.1 This SOP is based on Standard Methods 22nd Edition 4500-NO_3^- F and describes the procedure used to determine the concentration of Nitrite/Nitrate in water by Flow Injection Analysis on the Lachat QC8000.

1.2 The range for this method is 0.1 m/L to 15 mg/L

2.0 METHOD SUMMARY

2.1. A preserved or unpreserved sample is analyzed on the Lachat Q8000 analyzer both through the cadmium column (reduced) and without passing through the cadmium column to determine total nitrite/nitrate and nitrite respectively.

2.2. Excessive amounts of turbidity can clog the reduction column and reduce column efficiency. If the sample is visibly turbid, filter through a 0.45 micrometer membrane filter. Since nitrate-nitrogen is found in a soluble state, prefiltering the sample will not affect the results. Any nitrite present in the sample will cause a positive bias. Compensate for this by analyzing a portion of the sample without passing it through the reduction column and subtracting the result from the nitrate result of the reduced sample.

2.3. For Drinking Water matrices, the maximum contamination level for nitrate is 10 mg/L. The maximum contamination level for nitrite is 1 mg/L. If a water sample is over the maximum limits, notify the project manager so that the client can be notified immediately.

3.0 DEFINITIONS

3.1 Definitions of general terms used in this method are listed in the Quality Assurance Manual.

3.2 Carrier – solution that is the same matrix as the samples being analyzed.

3.3 Nitrate Nitrite Combo: all of the NO_3^- and NO_2 present in the sample.

3.4 Nitrate: NO_3NO_2-NO_2 = NO_3

3.5 Manifold- The reaction module of the FIA analytical system. The manifold is located between the injection valve and the colorimetric detector module. The manifold is where the injected sample aliquot combines and mixes with the carrier stream, and then with the reagents specific to the analytical method. The manifold is constructed of marrow bore tubing, mixing coils, and tubing connectors and may also include a heating block.

4.0 INTERFERENCES

4.1 Residual chlorine can interfere by oxidizing the cadmium column.

4.2 Low results would be obtained for samples that contain high concentrations of iron, copper, or other metals. In this method EDTA is added to the buffer to reduce this interference.

4.3 Samples that contain large concentrations of oil and grease will coat the surface of the cadmium. Pre-extracting the sample with an organic solvent eliminates this interference.

4.4 Sample turbidity may interfere. Turbidity can be removed by filtration prior to analysis.

5.0 HEALTH AND SAFETY

5.1 The toxicity or carcinogenicity of each reagent used in this method has not been fully established. Each chemical must be regarded as a potential health hazard and exposure to these chemicals must be minimized.

5.2 Each chemical has a Material Safety Data Sheet on file in the hallway of the 1st floor. Protective eyewear, lab coat or apron and protective gloves must be worn at all times.

5.3 The following chemicals have the potential to be highly toxic or hazardous, for detailed explanations consult the MSDS.

5.3.1 Potassium Nitrate: Strong Oxidizer. Contact with other materials may cause fire. Harmful if swallowed, inhaled or absorbed through skin. Causes irritation to skin, eyes and respiratory tract.

5.3.2 Sodium Nitrate: Strong Oxidizer. Contact with other materials may cause fire. Harmful if swallowed, inhaled or absorbed through skin. Causes irritation to skin, eyes and respiratory tract.

5.3.3 Sodium Nitrite: Strong Oxidizer. Contact with other materials may cause fire. Heat, shock, or contact with other material may cause fire or explosive decomposition. Harmful if swallowed, inhaled or absorbed through skin. Causes irritation to skin, eyes and respiratory tract.

5.3.4 Cadmium: Harmful if swallowed or inhaled. Note* Reported as causing cancer in laboratory animals. Avoid contact with eyes, skin, clothing, and avoid breathing dust. Keep in a tightly closed container. Use with adequate ventilation, wash hands thoroughly after handling.

5.3.5 Concentrated Phosphoric acid (H_3P0_4) can cause severe burns and react violently with water. Add cautiously and always work with Phosphoric acid (H_3P0_4) under a safety hood to avoid inhalation. If a spill does occur, neutralize the spill with the acid spill kit (located in a white box under the workbench with the balance on it.) Keep concentrated Phosphoric acid (H_3P0_4) in a tightly closed container. Store in a corrosion proof area (located on the left hand side of hood two in room 121.) When disposing of concentrated Phosphoric acid (H_3P0_4), add the acid to a volume of water (minimum of one liter). Diluted solutions of sulfuric acid can be disposed into a sink and flushed with water for at least one minute.

5.3.6 Hydrochloric acid can cause severe burns and react violently with water. Add cautiously and always work with hydrochloric acid under a safety hood to avoid inhalation. If a spill does occur, neutralize the spill with the acid spill kit (located in a white box under the workbench with the balance on it.) Keep concentrated hydrochloric acid in a tightly closed container. Store in a corrosion proof area (located on the left hand side of hood two in room 121.) When disposing of concentrated hydrochloric acid, add the acid to a volume of water (minimum of one liter). Diluted solutions of hydrochloric acid can be disposed into a sink and flushed with water for at least one minute.

5.3.7 Ammonium Hydroxide can cause severe burns and react violently with water. Add cautiously and always work with Ammonium Hydroxide under a safety hood to avoid inhalation. If a spill does occur, neutralize the spill with the base spill kit (located in a white box under the work bench with the balance on it.) Keep concentrated Ammonium Hydroxide in a tightly closed container. Store in a corrosion proof area (located on the left hand side of hood two in room 121.) When disposing of concentrated Ammonium Hydroxide, add the base to a volume of water (minimum of one liter). Diluted solutions of Ammonium Hydroxide can be disposed into a sink and flushed with water for at least one minute.

6.0 EQUIPMENT AND SUPPLIES

6.1 Balance - analytical, capable of accurately weighing to the nearest 0.0001g covered by an annual service contract and placed on stone balance table or stone slab.

6.2 Graduate cylinder class “A” –various sizes

6.3 Disposable plastic pipettes

6.4 Erlenmeyer flask

6.5 Beakers of various sizes

6.6 Class “A” Volumetric flasks – various sizes

6.7 Volumetric pipettes – various sizes

6.8 Micropipettes (Volume delivery ranges of 100 µL to 1000µL and 10 µL to 100 µL) with disposable plastic tips.

6.9 Plastic and glass funnels

6.10 Disposable pipette

6.11 Pipette bulbs

6.12 Solution dispenser bottles

6.13 Plastic beaker (50 mL capacity)

6.14 Lachat Instruments Q8500 Flow Injection Analyzer System consisting of:

6.14.1 QC8500 core unit

6.14.2 XYZ-autosampler

6.14.3 Reagent Pump: RP-150 Series

6.14.4 Powerspec computer equipped with Windows 2000 and Lachat Instruments software

6.14.5 Pump and transmission tubing, as required for pump and manifold.

6.14.6 Nitrate-Nitrite chemistry manifold

6.14.7 Six port injection valve, with 135 cm sample loop

6.14.8 Colorimeter detector, with 10mm path length

6.14.9 520 nm filter

6.15 Magnetic stir plates and magnetic stir bars, retrievers

6.16 pH strips that provide a range of 0-14

6.17 #1 small Whatman Filters

6.18 Glass Sample Tubes, 12 X 75mm

6.19 Soil spatulas/ spoonulas

6.20 1.0mL class "A" glass syringe

6.21 Para-film

6.23 Plastic Syringe-10 cc

6.24 Drying oven-capable of maintaining 105°C for 4 hours

6.25 Dessicator, drying agent

6.26 VOA vial

6.27 pH probe with built in ATC, pH meter

6.28 Centrifuge tubes, 50mL with caps

6.29 Centrifuge-capable of spinning up to 15 minutes.

6.30 Graduated cylinders 25 ml class A

6.31 150 mL beakers

7.0 REAGENTS AND STANDARDS

Note: All reagents preparation must be documented in the Reagent preparation logbook. All reagents are stored at room temperature, unless otherwise noted. Note: All reagents must be made from Nitrate-Nitrite –free reagent water (deionized or DI water)

7.1 Potassium Nitrate: ACS grade. Expires 6 years from the date opened.

7.1.1 Dry potassium nitrate (KNO_3) in a 105°C for 4 hrs on a watch-glass. Once dried, store in 40 mL VOA vial in a dessicator. Dried reagent expires after one year.

7.2 Chloroform ACS grade: Expires 6 years from the date opened.

7.3 Potassium Nitrate Stock solution (100 mg/L): Dissolve 0.7218 grams of dried anhydrous potassium nitrate (KNO_3) in DI water and dilute to 1.0 liter in a volumetric flask. This solution is stable for 6 months if preserved with 2.0 mL of chloroform per liter and kept under refrigeration when not in use.

7.4 Cadmium Columns purchased commercially in a pre-packed column or packed by the lab. Use the manufacture's expiration date. See section 14.0 for column disposal procedure.

7.5 Copper Sulfate($CuSO_4$*$5H_2O$): ACS grade. Expires 6 years from the date opened.

7.6 Copper Sulfate - (2% W/v): Dissolve 2 grams of copper sulfate ($CuSO_4$*$5H_2O$) in a 100 mL in a volumetric flask with DI water, dilute to mark. Invert to mix thoroughly. Solution expire 6 months from the date prepared.

7.7 Hydrochloric Acid (HCl): ACS grade. Expires 6 years from the date opened.

7.8 Ammonium Hydroxide (NH_4OH): ACS grade. Expires 6 years from the date opened.

7.9 Disodium ethylene- diamine-tetracetate (EDTA): Expires 6 years from the date opened.

7.10 Sodium Hydroxide (NaOH): ACS grade: Expires 6 years from the date opened.

7.11 15 N Sodium Hydroxide: In a 1 liter container, add 150 g NaOH very slowly to 250mL of DI water. **CAUTION: The solution will get very hot, use a water bath.** Mix until dissolved. Cool and store in a plastic bottle. Expires 6 months after the date prepared.

7.12 Ammonium Chloride/EDTA buffer, pH 8.5: in a fume hood, in a 1 L volumetric flask add 500 mL DI water, 105 mL concentrated HCl, 95 mL NH_4OH and 1.0 gram disodium ethylene- diamine-tetracetate (EDTA) ($C_{10}H_{14}O_8N_2Na_2$*$2H_2O$). Dilute to 1 liter with DI water. Take the pH of the buffer (section 10.0). Adjust the pH to 8.5-8.6 with concentrated 15 N Sodium Hydroxide (NaOH). Back adjust with concentrated HCl if the pH is over 8.6. Store in the refrigerator at 2-5°C. Expires 30 days from the date prepared. **CAUTION: Prepare under fume hood.**

7.13 Sulfanilamide ACS grade: Expires 6 years from the date opened.

7.14 N (1 naphthyl) - ethylenediamine dihydrochloride ACS grade: Expires 6 years from the date opened.

7.15 Phosphoric Acid ACS grade: Expires 6 years from the date opened.

7.16 Color Reagent: Dissolve 40 grams Sulfanilamide (NH_2*C_6H_4*SO_2*NH_2) and 1.0 gram N (1 naphthyl) - ethylenediamine dihydrochloride (1-$C_{10}H_7NHCH_2CH_2NH_2$*2HCl) in a mixture of 100 mL concentrate Phosphoric acid (H_3P0_4, 85%) and 800 mL distilled water. Dilute to 1000 mL in a volumetric flask.

Keep in an amber glass container, refrigerate at 2-5°C when not in use and discard after 1 month.

7.17 Sodium Nitrite ACS grade: Expires 6 years from the date opened.

7.18 Sodium Nitrite Stock Solution: (100 mg/L as N): Dissolve 0.4929 grams of Sodium Nitrite ($NaNO_2$) in DI water. Dilute to 1.0 liter in a volumetric flask with DI water. Expires 6 months from the date prepared if preserved with 2.0 mL chloroform per liter and kept under refrigeration at 2-5°C when not in use.

7.19 1.0 N Hydrochloric Acid solution: Add 8.3 ml of concentrated HCL to 100ml volumetric flask and dilute to 100ml with DI water. Solution expires one year from date prepared.

7.20 pH Buffers ACS grade- pH buffers 7,4,10. Expires 6 months from the date opened.

7.21 Standard Preparation for NO_2NO_3 and NO_3

7.21.1 Prepare the working standards as follows:

Working (Calibration) Standards - NO_2NO_3 and NO_3

mg NO_3N/L or NO_2N/L	*ml of Working Stock Std* in 100 ml Vol. flask*
15.0	15.0
10.0	10.0
5.0	5.0
1.0	1.0
0.8**	0.8
0.6**	0.6
0.4**	0.4
0.2**	0.2
0.1**	0.1

* Working Stock Standard listed in section 7.3 (100 mg NO_3N/L).
** Use a micropipette to make up the standards in the concentration range of 0.8-0.10 mg/L

7.22 Standard Preparation for NO_2

7.22.1 Prepare the working standards as follows:

Working (Calibration) Standards - NO_2

mg NO_2N/L	*ml of Working Stock Std* in 100 ml Vol. flask*
10.0	10.0
5.0	5.0
1.0	1.0
0.8**	0.8
0.6**	0.6
0.4**	0.4
0.2**	0.2
0.1**	0.1

* Working Stock Standard listed in section 7.18 (100 mg NO_2N/L).
** Use a micropipette to make up the standards in the concentration range of 0.8-0.10 mg/L

7.23 The NO_2NO_3 and NO_3 working standards expire 30 days from the date prepared. The standard must be kept in the refrigerator between 2-5°C in centrifuge tubes until needed for use.

7.24 The NO2 curve has been shown to be good for 48 hours.

7.25 Ascorbic Acid ACS grade-expires 6 years from the date opened.

7.26 Sodium Thiosulfate ACS grade-expires 6 years from the date opened.

7.27 10% Sodium Thiosulfate Solution: Dissolve 25 grams of sodium thiosulfate into a 1L flask containing ~500mL of DiH2O and bring to volume with DiH2O. Solution good for 6 months from date prepared.

7.28 DPD Total Chlorine packet-purchased commercially. Expire per manufacturer's instructions.

8.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

8.1 Collect in a glass or plastic container (125 - 1000 mL)

8.2 Nitrite will be oxidized by air in a few days. Nitrites must be unpreserved. Maximum holding time is 48 hours for nitrite, unpreserved nitrate and nitrate/nitrite combo.

8.3 Nitrate and nitrate/nitrite combo can be preserved with concentrated H_2S0_4 to obtain a pH of less than 2 and refrigerate at 2 to 5°C. (2.0 mL of concentrated H_2S0_4 per liter will produce the proper pH conditions.) Preserved nitrate and nitrate/nitrite combo have maximum holding time of 28 days.

8.4 If a sample is received that does not meet the above criteria, inform Project Management and do not analyze the sample.

9.0 QUALITY CONTROL/QUALITY ASSURANCE

9.1 NO_2NO_3 and NO_3

9.1.1 A Method Blank is to be analyzed at the beginning of the run and with each batch of no more than 20 samples. The method blank is DI water. Pour DI water into the 12 X 75mm glass sample tube and follow the procedure in section 11.0. The method blank must be below 0.05ppm (half the RL). If the method blank recoveries are greater than the half the RL then refer to table 17-1. The current MDL can be found in the Element LIMS.

9.1.2 A CCV is analyzed with each batch of up to 20 samples. Recoveries for the CCV must be within the limits 90 - 110% of the true value. Follow section 7.21.1 for instructions on how to make up a 5.0 ppm NO_2NO_3 and NO_3 standard. Follow the procedure in section 11.0 once the CCV is made.

9.1.3 A duplicate sample is to be analyzed for each batch of 20 samples. The RPD of duplicate samples must be within ± 10%.

9.1.4 A Matrix Spike/Matrix Spike Duplicate sample is to be analyzed with each batch of 20 samples. A Matrix Spike/Matrix Spike Duplicate is made by adding 5 mL of sample to a 12 X 75mm glass sample tube. Add 0.100 mg/L of Potassium Nitrate Stock solution (7.3) to the sample in the tube. The recoveries must be 90-110%. If the Matrix Spike/Matrix Spike Duplicate is outside of those limits refer to table 17-1.

9.1.5 The LCS is prepared for Nitrate-Nitrite using a second source nutrient purchase commercially from Phenova. Nutrient must be made per manufacturer's instructions. Use the manufacturer's expiration date. The LCS must be analyzed at the beginning and end of every batch of 20 samples. The recoveries for the LCS must be between 90-110%. If the LCS recoveries are outside of that limits refer to table 17-1.

9.1.6 The column efficiency needs to be checked prior sample analysis. The column efficiency is made by adding 15mL of Sodium Nitrite stock solution into 100 mL of DI water. Analyze the sample according to section 11.0. If the column efficiency is less than 90% or greater than

110%, then the column needs to be regenerated according to the procedure in section 10.0 or the column needs to be replaced.

9.2 NO_2

9.2.1 A Method Blank is to be analyzed at the beginning of the run and with each batch of no more than 20 samples. The method blank is DI water. Pour DI water into the 12 X 75mm glass sample tube and follow the procedure in section 11.0. The method blank must be below the half the RL. If the method blank recoveries are greater than the half the RL then refer to table 17-1. The most current MDL can be found in the Element LIMS.

9.2.2 A CCV is analyzed with each batch of up to 20 samples. Recoveries for the CCV must be within the limits 90 - 110% of the true value; follow section 7.22.1 for instructions on how to make up a 1.0 ppm NO_2 standard. Follow the procedure in section 11.0 once the CCV is made.

9.2.3 A duplicate sample is to be analyzed for each batch of 20 samples. The RPD of duplicate samples must be within limits of ± 10%.

9.2.4 A Matrix Spike/Matrix Spike duplicate sample pair is to be analyzed with each batch of 20 samples. A Matrix Spike/Matrix Spike Duplicate is made by adding 5 mL of sample to a 12 X 75mm glass sample tube. Add 0.100 mg/L of Sodium Nitrite Stock solution (7.3) to the sample in the tube. The recoveries must be 90-110%. If the Matrix Spike/Matrix Spike Duplicate is outside of those limits refer to table 17-1.

9.1.5 The LCS is prepared for Nitrate-Nitrite using a second source nutrient purchase commercially from Phenova. Nutrient must be made per manufacturer's instructions. Use the manufacturer's expiration date. The LCS must be analyzed at the beginning and end of every batch of 20 samples. The recoveries for the LCS must be between 90-110%. If the LCS recoveries are outside of that limits refer to table 17-1.

9.3 Manual Dilution Factor (MDF)

9.3.1 If a sample concentration is greater than the highest standard of the calibration curve, the sample must be diluted with DI water. Dilute the sample with DI water until the concentration is below the highest standard of the curve.

10.0 CALIBRATION AND STANDARDIZATION

10.1 Check to see that the analytical balance has been inspected within the last year and the daily check has been conducted. If either of these has not been completed, notify your supervisor before using.

10.2 Check to see that the automatic pipettor has been calibrated for the quarter and the daily verification has been performed. If either of these has not been completed, notify your supervisor before using.

10.3 The pH meter must be calibrated before any samples are analyzed on the meter each day.

10.3.1 Clean the pH probe with DI water.

10.3.2 Place approximately 50 ml of 7.0 buffer in a plastic beaker. Stir the buffer on the magnetic stirrer. Place the probe in the buffer and push the calibrate button. Allow the machine to stabilize, record in the pH calibration logbook.

10.3.3 Place approximately 50 ml of 4.0 buffer in a plastic beaker. Stir the buffer on the magnetic stirrer. Place the probe in the buffer and push the calibrate button. Allow the machine to stabilize, record in the pH calibration logbook.

10.3.4 Place approximately 50 ml of 10.0 buffer in a plastic beaker. Stir the buffer on the magnetic stirrer. Place the probe in the buffer and push the calibrate button. Allow the machine to stabilize, record in the pH calibration logbook.

10.3.5 The meter will generate a slope. The slope must be between 95-105%. Record the slope in the pH calibration logbook.

10.4 Column Regeneration

10.4.1 Using a 10cc plastic syringe fitted with 0.040 PVC tubing and short 0.034 polyethlene extension. Flush the column using the following solutions.

10.4.1.1 Flush the column with 20 mL of DI water.

10.4.1.2 Flush with 15 mL of 1.0 N HCL solution. The HCL may cause pitting of the cadmium column reactor interior surface if left in the column for longer than a few seconds. Proceed to the next step quickly.

10.4.1.3 Flush with 20 mL of DI water.

10.4.1.4 Slowly flush the column with 10 cc of 2% copper sulfate solution.(7.6). Repeat. Precipitated copper may be observed exiting the reactor (black particles).

10.4.1.5 Flush with at least 20 mL of DI water. Flush with DI water until no more precipitated copper is flushed from the reactor. This requires a forceful flush. Repeat 2-3 times.

10.5 Place all reagents lines and sampler wash lines in DI water. Allow DI water to flush the manifold for approximately 10 minutes. During this time, check for leaks and smooth flow. Keep the cadmium column off during DI water flush.

10.6 On the Omnion® data system, all of the Nitrate-Nitrite working calibration standards and samples to be analyzed for NO_2NO_3 ,NO_3 or NO_2 must be entered into the sample tray worksheet. The calibration standards are entered in the top of the worksheet and are highlighted in green. Included are the calibration standard concentrations and the rack position for each standard.

10.7 The NO_2NO_3 ,NO_3 or NO_2 working calibration standards are also in the analyte table, which is part of the method file saved. The analyte table will remain the same unless changed by the analyst.

10.8 Initiate the carrier stream by placing the reagent transmission lines into the appropriate reagent bottles. Allow the system to equilibrate until a stable baseline is achieved. This will take approximately 4 minutes. **FOR NO_2NO_3, NO_3 ONLY** After 4 minutes, turn the cadmium column on and run reagent through manifold for an additional 3 minutes. Leave the column off for NO2 analysis.

10.9 The Lachat Quickchem® FIA +8500 Ion analyzer must be calibrated prior to NO_2NO_3 ,NO_3 or NO_2 analysis of a batch of samples. The Omnion® data system is set up to carry out calibration at the beginning of every sample analysis.

10.10 A minimum of six standards (not including the reagent/calibration blank) must be used for calibration.

10.10.1 For each calibration standard and the reagent/calibration blank, transfer an aliquot of the solution to a labeled, plastic centrifuge tube (50-mL). Place the calibration standards in the calibration standards rack, located at the back of the automated sampler. The positions of the standards rack are labeled 1 through 16.

10.10.2 Arrange the calibration standards in order of decreasing concentration, starting at position 1 on the standards rack. The reagent/calibration blank must be placed after the calibration working standard with the lowest concentration.

10.11 Place the samples and QC samples in the appropriate locations. Samples are placed in the sample trays at the front of the automated sampler. Calibration standards are placed in the standards rack.

10.12 To begin calibration, click on **Start Run** in the menu bar of the Omnion® data system.

10.13 The FIA instrument will inject the calibration standards onto the reaction manifold. For each calibration standard, the Omnion® data system will associate the instrument's detector response (peak area corresponding to color intensity) with the known concentration for the standard.

10.14 To review the standard curve, click on the **Review** icon in the menu bar of the Omnion® data system.

10.14.1 The review screen will display the peak area, nominal concentration, and % residual for each calibration standard and the reagent/calibration blank.

10.14.2 Below, the results for the standards, the concentration equation and correlation coefficient, "r", are displayed.

10.14.3 The % Residual for a calibration standard is determined by plugging the standard's peak area into the concentration equation. The resulting concentration for the standard is used to determine percent recovery (measured concentration/ known concentration * 100).

10.14.3.1 The % Residual is the difference between the calculated percent recovery and the expected percent recovery (100%). Therefore, if the standard has a percent recovery of 98%, then the corresponding % residual would be + 2.0%

11.0 PROCEDURE

11.1 Computer Set-Up for NO_2NO_3 ,NO_3 or NO_2

11.1.1 The QuickChem® Method parameters and setup is already inputted into the data system. For more information and/or clarification, refer to Lachat instruments' Omnion Software Manual, the QuickChem® method or department Supervisor.

11.1.2 Turn the power on for the FIA 8500 Analyzer (power switch is located on left side of the analyzer) and the autosampler (power switch is located on the back right side).

11.1.3 To start the Omnion® system, double-click on the *Omnion FIA* icon on the desktop of the Lachat computer.

11.1.4 The Omnion® FIA Main Menu will appear on the screen

11.1.5 Click on the Open icon at the top of the screen or go to File, then to Open Method in order to select method needed. You can also scroll through file handler and double click on the file name. The method generally used for NO_2NO_3, NO_3 or NO_2 analyses is the last analytical run in the NO_2NO_3 method folder.

11.1.6 Enter the new calibration numbers, quality control numbers, and sample numbers into the worksheet. Make sure that the cup numbers, sample ID, manual dilution factor and sample type (e.g., cal standard, unknown sample, spiked sample, or sample duplicate) are correct.

11.1.8 For more information and/or clarification on the software, refer to Omnion FIA software User manual.

11.2 NO_2NO_3 ,NO_3 or NO_2 Analysis using the Lachat QuickChem® FIA+ 8500 Series

11.2.1 Prior to sample analysis, the two containers of DI water (one for reagent lines and one for sampler rinse line) must be rinsed and filled with fresh DI water. Tighten all reagent lines to pump with platens. Return rinse line to rinse container.

11.2.2 Put all the reagent lines in DI water for approximately 8 mins. Turn on the peristaltic pump by pressing the green button located on the pump. Pump DI water through the reagent lines and manifold tubing in order to check for leaks and smooth flow. If there is a leak or flow problem, stop the peristaltic pump and refer to Lachat instruments' Troubleshooting Guide. If there are no leaks or flow problems, proceed with the analysis.

11.2.2.1 Check the volume of reagent in each of the reagent bottles. If there is not sufficient volume for the sample analysis, prepare and add additional reagent. Mix all reagents well prior to use.

11.2.3 While running DI water through the manifold, the QC standards and samples can be loaded into the standards rack and the sample tray.

11.2.4 The standard rack is located at the rear of the sampler (there are 16 numbered positions for the standards.) The calibration standards and reagent/calibration blank are placed in locations 1 through 8 (highest

calibration standard in location 1 and reagent/calibration blank in location 9). Verify the location of the calibration standards in the tray worksheet.

11.2.5 For each sample, verify the location of the sample using the sample tray worksheet.

11.2.6 Once the QC standards and samples have been loaded, put the reagent lines in to the reagent bottles.

11.2.7 When the reagent lines have been placed into the reagent bottles, cover the bottle tops with parafilm. Run for 4 minutes. Turn column on and run for 3 min.

11.2.8 Go back to the computer and click on the Start button.

11.2.9 The sampler will move to the first calibration standard and begin the calibration process. Once the system has completed injecting the calibration standards, the calibration curve will be analyzed.

11.2.10 Following calibration, the QC standards will be injected and analyzed. The analyst must determine if the calibration and QC standards meet the criteria that were established in section 9.0.

11.2.11 When analysis of the QC standards is complete and has acceptable results, the system will begin analysis of the samples located in the sample trays. Samples will be analyzed in the order shown on the sample tray worksheet.

11.2.12 The sample tray worksheet may be accessed at any time during the sample analysis. The tray may be edited during the sample run in order to reanalyze a sample or add a sample dilution. Add the sample ID to the end of the current sample tray (and edit cup number, if necessary). For sample dilutions, enter the dilution factor under the column titled MDF.

11.2.13 If a sample is over the highest point in the calibration curve, the sample needs to be diluted using section 9.3.

11.2.14 During sample analysis, a runtime report will be displayed on the right side of the computer display. This report displays the basic information and analyte concentrations for QC standards and samples. The Runtime report is continuously updated as every sample is analyzed.

11.2.15 While the sample analysis is proceeding, the FIA peaks are displayed on the bottom of the computer screen.

11.2.16 Groups of peaks, or individual peaks, may be selected and highlighted by using the computer's mouse device. Click the left button on the mouse, hold and drag the shaded box on the computer's peak display until it encompasses all of the desired peaks.

11.2.17 Once the last sample and QC standard have been injected and analyzed, the runtime report will indicate that the sample tray run is complete.

11.2.18 Turn the column off after NO_2NO_3 ,NO_3 analysis.

11.2.19 Transfer reagent transmission lines to the container of DI water.

11.2.20 Allow the DI water to be pumped through the manifold for approximately 5 minutes. Then remove the reagent transmission lines from the water and allow the pump to move air through the manifold until all the water has left the manifold, which should take approximately 8 minutes.

11.2.21 When all of the transmission lines have been purged of water, release each of the pump platens. Turn off the peristaltic pump.

11.2.22 Cap all of the calibration standards, the reagent/calibration blank and reagents and return to refrigerator.

11.2.23 In the Omnion® FIA system, print a custom report that includes the calibration report.

11.2.24 Review the raw data and the peak display to check for peak anomalies, analyte concentrations above the calibration range, carryover, etc. Verify that the QC results are within acceptance limits.

11.3 Sample Pretreatment and Analysis:

11.3.1 Check the pH and Chlorine of NO2NO3 water sample.

11.3.1.1 Test the pH of the sample by placing a pH strip into a well mixed sample. Compare the pH strip to the pH comparator chart on the front of the pH strip package. The pH must be less than 2 for NO_2NO_3 NO_3. If the sample is outside of this range, project management must be notified and data must be qualified in LIMS .

11.3.1.2 Test the Chlorine of the sample by placing a Chlorine strip into a well mixed sample. Compare the Chlorine strip to the Chlorine comparator chart on the front of the Chlorine strip package. The Chlorine must be absent for NO_2NO_3 NO_3. If residual chlorine is present, project management must be

notified, data must be qualified in LIMS, and the sample must be treated.

11.3.1.2.1 Treat the sample by adding a small aliquot of 10% Sodium Thiosulfate Solution (7.27). Swirl the sample, and check the residual chlorine again. Repeat until the sample is absent of residual chlorine.
Note: For Drinking Water Matrix samples, use Ascorbic Acid instead of Sodium Thiosulfate.

11.3.2 Place calibration standards, column efficiency sample (for NO_2/NO_3 only - a 15.0 ppm NO_2 std.) blanks, control standards in the sampler tray, followed by samples, duplicates, standards, and spikes.

11.3.3 Soil sample for NO_2NO_3, NO_3 or NO_2 analysis, weigh out 5 grams for solid sludge / soils or 10 grams for liquid sludge / soils. Add the weighed out aliquot into a 125 mL Erlenmeyer flask. Add DI water until the final volume is 50 mL.

11.3.3.1 Mix sludge / water mixture on a stir plate for approximately 5 minutes or until well mixed.

11.3.3.2 Pour the well mixed slurry into a labeled plastic centrifuge tube.

11.3.3.3 Centrifuge for approximately 5-10 minutes. The sludge must be separated into a solid layer and a liquid layer.

11.3.3.4 Filter the liquid layer into a 13 X 100 mm glass sample tube.

11.3.4 Once the last sample and QC standard have been injected and analyzed, the runtime report will indicate that the sample tray run is complete.

11.3.5 Turn the column off after NO_2NO_3, NO_3 analysis.

11.3.6 Transfer reagent transmission lines to the container of DI water.

11.3.7 Allow the DI water to be pumped through the manifold for approximately 8 minutes. Then remove the reagent transmission lines from the water and allow the pump to move air through the manifold until all the water has left the manifold, which should take approximately 5 minutes.

11.3.8 When all of the transmission lines have been purged of water, release each of the pump platens. Turn off the peristaltic pump.

11.3.9 Cap all of the calibration standards, the reagent/calibration blank and reagents and return to refrigerator.

11.3.10 In the Omnion® FIA system, print a custom report that includes the calibration report.

11.3.11 Review the raw data and the peak display to check for peak anomalies, analyte concentrations above the calibration range, carryover, etc. Verify that the QC results are within acceptance limits.

12.0 DATA ANALYSIS AND CALCULATIONS

12.1 Percent Recovery:

% Recovery = (calculated value / theoretical value) x 100%

12.2 Percent Relative Percent Difference (%RPD)

$$\% \text{ RPD} = \frac{(V_1 - V_2)}{(V_1 + V_2)/2}$$

where:

RPD = Relative Percent Difference
V_1 = Observed Value of sample
V_2 = Observed Value of Duplicate Sample

12.3 Matrix Spike Recovery:

$$R = \frac{C_s - C}{S} \times 100\%$$

where:

R = Percent Recovery
C_s = Fortified Sample Concentration
C = Sample background concentration
S = Concentration equivalent to added analyte

12.4 Column Efficiency Check

% Efficiency = mg/L NO_3 / mg/L NO_2 x 100

13.0 METHOD PERFORMANCE

13.1 A method detection study is conducted annually to determine the Method Detection Limit (MDL). This study is based on a minimum of seven samples.

13.2 The soil method has been modified. The procedure to follow for sludges is found in section 11.0.

14.0 POLLUTION PREVENTION

14.1 Standards should be prepared in volumes consistent with laboratory use to minimize the volume of expired standards to be disposed.

14.2 Any acids used in this procedure need to be neutralized prior to be disposal.

15.0 WASTE MANAGEMENT

15.1 The Environmental Protection Agency (USEPA) requires that laboratory waste management practice be conducted consistent with all applicable rules and regulations. Excess reagents, samples and method process wastes should be characterized and disposed of in an acceptable manner. The agency urges laboratories to protect the air, water, and land by minimizing and controlling all releases from hoods, and bench operations, complying with the letter and spirit of any waste discharge permit and regulations, and by complying with all solid and hazardous waste regulations, particularly the hazardous waste identification rules and land disposal restrictions. For further information on waste management consult the “Waste Management Manual for Laboratory Personnel,” available from the American Chemical Society at the address listed in Section 13.4.

16.0 REFERENCES

16.1 U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983, Method 335.4.

16.2 Guideline and Format for EMSL-Cincinnati Methods. EPA-600/8-83-020, August 1983.

16.3 Standard Methods, For the Examination of Water and Waste Water, 22nd ed. Revised 2012, Method 4500-NO3N.

16.4 American Chemical Society, Waste Management Manual for Laboratory Personnel, Subcommittee on Environmental Analytical Chemistry, 1155 16th St. NW, Washington, DC 20036.

16.5 Lachat Instruments Q8000 Flow Injection Analysis Method #10-115-01-1-E

16.6 Belmont Labs, Quality Assurance Manual, Quality Assurance/Quality Control Program, Current Revision.

16.6 Belmont Labs, Pipettor Calibration Standard Operating Procedure, Quality Assurance/ Quality Control program, BPL01-Pipettor Current Revision.

16.7 National Environmental Laboratory Accreditation Conference Quality Systems, Approved June 5, 2003, Effective July 1, 2005

16.8 Belmont Labs, Glassware Cleaning Standard Operating Procedure, Quality Assurance/Quality Control program, BPL01-Glassware Current Revision.

17.0 DATA VALIDATION, TABLES, DIAGRAMS & FLOW CHARTS

17.1 Bench Review:

17.1.1 The Analyst is responsible for completing the run logbook and maintaining all standards and analysis data in a retrievable, traceable fashion.

17.1.2 The Analyst is responsible for verifying the QA/QC parameters detailed in Section 9.0 are within acceptance limits.

17.1.3 The Analyst is responsible for filing a non-compliance report. A non-conformance is defined as the failure of a sample or analysis to meet a specified requirement of this SOP.

17.2 Secondary Review

17.2.1 The reviewer must verify that all of the quality control measures are within acceptable limits. This includes LCS, CCV, and sample RPD.

17.2.2 If any data is out of control, review the related non-compliance to see that they have been adequately addressed. If a non-compliance has not been initiated, notify the QA Manager and/or Laboratory Manager for guidance. non-compliance must be complete as detailed in Table 17-1.

17.2.3 Verify that the results have been accurately entered into LIMS.

SOP Revision Summary of Changes

Section of the SOP	Changes Made or Added	Reason for Change	REV NUM
9.2.4, 9.1.4	Added MSD	Internal Audit Finding	0
Table 17-1	Added MSD and changed method blank requirements to be less than the half the RL	Internal Audit Finding	0
9.1.1, 9.2.1	Changed acceptable limits to be less than the half the RL	Internal Audit	0

		Finding	
16.0	Updated References	Revision Update	0
1.1	Updated Method Reference	Revision Update	0
13.3	Removed Section 13.3	No Longer Relevant	0
9.1, 9.2	Changed the LCS to a second source and the CCV to the primary source. Eliminated the need for a high and low Standard	Internal Audit Finding	0
11.1.3.2	Added section requiring Chlorine testing	2013 Internal Audit Finding	0

Table 17-1 Summary of Internal Quality Control Procedures

QC Element	Frequency	Acceptance Criteria	Corrective Action
Method Blank	One at beginning of batch, one per batch of no more than 20 samples	Control Limits, refer to Section 9	1 Check for calculation errors 2 Reanalyze blank, if value is still above MDL, use alternate source of blank 3 Reanalyze blank and samples 4 File a nonconformance report and report to management.
Laboratory Control Sample (LCS)	One per batch of no more than 20 samples	Control Limits, refer to Section 9	1 Check for calculation errors 2 Reanalyze the sample 3 Re-prepare and reanalyze the sample if necessary 4 File a nonconformance report and report to management.
Continuing Calibration Standard (CCV)	One at beginning of batch, one at end of batch, one per batch of no more than 20 samples	Control Limits, refer to Section 9	1 Check for calculation errors 2 Reanalyze the sample 3 Recalibrate and reanalyze 4 Assess impact on data File a nonconformance report and report to management.
Sample Duplicate	One per batch of no more than 20 samples	Control Limits, refer to Section 9	1 Check for calculation errors 2 Recalculate RPD 3 Reanalyze sample 4 File a nonconformance report and report to management.
Matrix Spike/Matrix Spike Duplicate	One pair per batch of no more than 20 samples	Control Limits, refer to Section 9	1 Check for calculation errors 2 Check for correct added analyte 3 Reanalyze both sample and spiked sample 4 File a nonconformance report and report to management.

Table 17.2

INFORMATION FOR THE

LACHAT INSTRUMENTSQC8500

FLOW INJECTION ANALYZER SYSTEM

Controlled copy: Electronic copy

TITLE: Total Kjeldahl Nitrogen by Flow Injection Analysis

SOP NUMBER: BPL01-TKN-L

PREPARED BY: Burke Chandler 11/15/11
Date

REVIEWED BY: Chris Parsons 11/15/11
Laboratory Manager Date

11/15/11
QA Manager Date

SOP CONTROL NO.: _____

SOP Revision Summary

Created – April 20, 2009

Updated 1– November 8, 2011 (See Section 17.0 for a list of changes)

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1.0 SCOPE AND APPLICATION

1.1 This SOP is based on USEPA Method 351.2. Revision 2.0, August 1993 (for water samples) and Standards Methods 4500Norg D (for soil samples) which describes the preparation and analysis of Total Kjeldahl Nitrogen (TKN) by Flow Injection Analysis on the Lachat QC8000. It is not intended to replace or diminish the use of the Lachat QC8000 operating instructions. Those operating instructions contain additional information regarding the proper optimization of instrument performance and for use in other applications.

1.2 This method covers the determination of total kjeldahl nitrogen in surface water, saline water, domestic and industrial waste, sludge and soils. The method herein describes the procedure that converts nitrogen components of biological origin to ammonia.

1.3 The applicable range is 0.5-40mg/L TKN.

2.0 METHOD SUMMARY

2.1 Total kjeldahl nitrogen is the sum of free-ammonia and organic nitrogen compounds which are converted to ammonium sulfate under the conditions of digestion.

2.2 Samples are to be digested prior to analysis by flow injection.

2.3 A portion of an acid digested sample is injected into the chemistry manifold where the pH is controlled by raising it to a known pH, basic pH by neutralization with a concentrated buffer. This neutralization converts the ammonium cation to ammonia and also prevents undue influence of the acid matrix on the pH sensitive color reaction.

2.4 The ammonia thus produced is heated with salicylate and hypochlorite to produce blue color, which is proportional to the ammonia concentration. Adding sodium nitroprusside intensifies the color. The presence of EDTA as the buffer prevents precipitation of calcium and magnesium.

3.0 DEFINITIONS

3.1 Definitions of general terms used in this method are listed in the Quality Assurance Manual.

3.2 Carrier – solution that is the same matrix as the samples being analyzed.

3.3 Cold fingers- glassware pieces that are mounted onto the tops of the digestion tubes prior to the second stage of TKN digestion. Cold fingers act as cooling condensing surfaces, allowing atmospheric pressure inside the digestion tubes.

3.4 Manifold- The reaction module of the FIA analytical system. The manifold is located between the injection valve and the colorimetric detector module. The manifold is where the injected sample aliquot combines and mixes with the carrier stream, and then with the reagents specific to the analytical method. The manifold is constructed of marrow bore tubing, mixing coils, and tubing connectors and may also include a heating block.

4.0 INTERFERENCES

4.1 Sample turbidity and color may interfere with this method. Turbidity must be removed by filtration prior to analysis. Sample color may be corrected for by running the samples through the manifold with and without color formation.

4.2 High nitrate concentrations (10X or more than the TKN level) results in low TKN value.

4.3 Method interferences may be caused by contaminants in the reagent water, reagents, glassware, and other sample processing apparatus that bias analyte response.

4.4 Sample must not consume more than 10% of the sulfuric acid during the digestion. The buffer will accommodate a range of 4.5-5.0% H_2SO_4 in the diluted digestion sample with no change in signal intensity.

4.5 Some problems with baseline interference have been found to be associated with the age and concentrations of the salicylate-nitroprusside solution. Prepare fresh monthly.

4.6 Sulfuric acid collects ammonia from the atmosphere easily. Ensure all reagents bottles are capped tightly.

5.0 HEALTH AND SAFETY

5.1 The toxicity or carcinogenicity of each reagent used in this method has not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these chemicals should be minimized.

5.2 Each chemical has a Material Safety Data Sheet (MSDS) on file. Protective eyewear, lab coat or apron and protective gloves must be worn at all times.

5.3 The following chemicals have the potential to be highly toxic or hazardous. For detailed explanations consult the MSDS.

5.3.1 Mercuric Oxide is toxic and is a known carcinogen. TKN digestion solution contains mercury. During analysis, the LACHAT waste line must be put in the waste container that has been clearly labeled TKN WASTE. All digested samples, standards and unused digestion solution must be disposed in a bottle that has been clearly labeled TKN WASTE. Bottles that are filled with mercury contaminated TKN waste must be taken to the mercury waste barrel (located outside of the building in a fenced area that is locked, QA manager has the combination to the lock) If a mercury spill happens in the lab, mercury spill kits are located in the cabinet in room 120. Follow manufacturer's instructions for the spill kit. Notify supervisor if a mercury spill occurs.

5.3.2 Concentrated Sulfuric Acid (H_2SO_4) can cause severe burns and react violently with water. Add cautiously and always work with sulfuric acid under a safety hood to avoid inhalation. If a spill does occur, neutralize the spill with the acid spill kit (located in a white box under the workbench with the balance on it.) Keep bottles

of concentrated sulfuric acid tightly closed container. Store in a corrosion proof area (located on the left hand side of hood two in room 121.) When disposing of concentrated sulfuric acid, add the acid to a volume of water (minimum of one liter). Diluted solutions of sulfuric acid can be disposed into a sink and flushed with water for at least one minute.

5.3.3 Sodium hypochlorite (Clorox) can cause substantial but temporary eye injury and may irritate skin. If a small spill occurs, wash residual down the sink. Sodium Hypochlorite is not compatible with acids.

5.3.4 Sodium nitroprusside is toxic. Wear all PPE equipment when working with the material.

5.3.5 The method requires the use of heat stable Hengar granules or Teflon boiling chips during digestion. Glass beads must not be used as they do not effectively prevent superheating and dangerous explosive vaporization ("bumping) can occur.

6.0 EQUIPMENT AND SUPPLIES

6.1 Digestion Apparatus

6.1.1 Block Digestor-46 (BD-46)

6.1.2 Digestion and coldfinger racks (2 of each)

6.1.3 Digestion Tubes- 50mL , flat-bottomed

6.1.4 Cold-fingers

6.1.5 Graduated cylinder class A 25mL

6.1.6 Disposable plastic pipettes

6.1.7 Centrifuge tubes, 50mL with caps

6.1.8 Hengar granules

6.2 Lachat Instruments Q8000 Flow Injection Analyzer System consisting of:

6.2.1 QC8000 core unit

6.2.2 XYZ-autosampler

6.2.3 Wilson-Marlowe pump

6.2.4 Powerspec computer equipped with Windows 2000 and Lachat Instruments software

6.2.5 Pump and transmission tubing, as required for pump and manifold.

6.2.6 Total Kjeldahl nitrogen chemistry manifold

6.2.7 Six port injection valve, with 30.5 cm sample loop

6.2.8 Colorimeter detector, with 10mm path length

6.2.9 660 nm filter

6.2.10 Heating unit (using the 650 cm heater block) temperature controlled at 60°C

6.3 Glassware - Volumetric flasks, graduated cylinders and volumetric pipettes.

6.4 Micropipettes ((Volume delivery ranges of 100 to 1000µL) with disposable plastic tips).

6.5 Balance: Ohaus, readable to two decimal places (e.g., 0.01g)

6.6 Analytical balance: Mettler balance readable to four decimal places (0.0001g)

6.7 Magnetic stir plates and magnetic stir bars

6.8 pH strips that provide a range of 0-14

6.9 Drying Oven

6.10 Desiccator with color-indicating desiccant

6.11 #1 small Whatman Filters

6.12 Sample cups, 12 X 75mm

6.13 Plastic funnels

6.14 Centrifuge tubes

6.15 Antifoam

7.0 REAGENTS AND STANDARDS

Note: All reagents preparation must be documented in the Reagent preparation logbook. All reagents are stored at room temperature. Note: All reagents must be made from ammonia –free reagent water (deionized or DI water)

7.1 Mercuric Sulfate Solution: To a 100 mL volumetric flask, add approximately 40 mL D.I.H2O and 10.0 mL concentrated Sulfuric Acid (H2SO4). Then add 8.0 g red mercuric oxide (HgO). Stir until dissolved. Dilute to the mark, inverting to mix. Warming the solution while stirring may be required to dissolve the mercuric oxide. This solution expires six months from the date prepared.

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7.2 Digestion Solution: In a 1 L volumetric flask containing approximately 700 mL DI H2O, add 133.0 g potassium sulfate (K2SO4) and 200 mL concentrated sulfuric acid (H2SO4). Add 25.0 mL Mercuric Sulfate solution (7.1). Dilute to the mark with DI water and invert to

mix. This solution expires six months from the date prepared. ****Caution this solution gets very warm and must be cooled in a water bath.**

7.3 Buffer: In a 1 L volumetric flask containing 900 mL DI H2O, completely dissolve 35.0 g sodium phosphate dibasic heptahydrate (Na2HPO4.7H2O). Add 20.0 g disodium EDTA (ethylenediaminetetracetic acid disodium salt). The EDTA will not dissolve but will form a turbid solution. Add 50 g sodium hydroxide (NaOH). Stir or shake until dissolved. This solution expires six months from the date prepared.

7.4 Sodium Hydroxide (0.8N): In a 1 L volumetric flask containing approximately 800 mL DI H2O, dissolve 32 g sodium hydroxide (NaOH). Dilute to the mark and stir or shake to mix. This solution expires six month from the date prepared.

7.5 Salicylate Nitroprusside: In a 1 L volumetric flask containing approximately 800 mL DI H2O, dissolve 150.0 g sodium salicylate and 1.00 g sodium nirtoprusside. Dilute to the mark and stir or shake to mix. Store in dark bottle. Prepare fresh monthly.

7.6 Carrier/Diluent: In a 1 L volumetric flask contain approximately 900 mL DI H2O, add 31.7 g potassium sulfate (K2SO4) and 40 mL concentrated sulfuric acid (H2SO4). When completely dissolved, dilute to the mark and stir or shake to mix. This solution expires six months from the date prepared.

7.7 Hypochlorite solution: In 100ml volumetric flask, add 6ml of Clorox© Bleach and dilute to mark with DI water. Invert to mix. Prepare fresh daily.

7.8 Stock TKN Standard (1000 mg/L): In a 1 L volumetric flask, dissolve 2.1429 gm urea in approximately 800 mL DI water. Dilute to the mark and invert to mix. This solution expires six months from the prepared date.

7.9 Intermediate TKN standard (100 mg/L): Dilute 10 mL of stock TKN standard to 100 mL in a volumetric flask with DI water. Prepare fresh each time a curve is made.

7.10 5 N HCl solution: In a 1000 mL volumetric flask, dilute 415mL of concentrated HCl with 585mL of DI water. This solution expires six months from the date prepared.

8.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

8.1 TKN samples are collected in 125-500 ml plastic bottles containing H_2SO_4. Samples must be preserved by addition of 1:1 H_2SO_4 to pH < 2 at the time of collection. If the sample is not a pH of less than 2, notify the PM and flag the data that is entered in LIMS with a P.

8.2 The holding time for this test is 28 days and samples are stored at 4˚C until analysis. If the sample exceeds 28 days notify the PM and flag the data with a “H” flag.

8.3 See Sample Archiving and Disposal for the procedure are how the samples are handled after analysis.

9.0 QUALITY CONTROL/QUALITY ASSURANCE

9.1 Calibration Standards:

9.1.1 Use Class A volumetric pipettes and 100mL volumetric flasks to prepare a series of calibration standards. All standards are diluted with Di Water. Prepare fresh weekly or as needed.

9.1.2 Preparation of **working standards**: *(Please note these standards are prepared from the intermediate solution (see section 7.9)) A minimum of six standard must be prepared.*

Conc.of NH3N (mg/L)	mL Int. standard / 100 mL vol.flask
40.0	40.0
20.0	20.0
10.0	10.0
5.0	5.0
2.0	2.0
1.0	1.0
0.5	0.5

9.2 Laboratory Control Sample (LCS)

9.2.1 The Laboratory Control Samples for TKN is the analysis of standards from the calibration curve. LCS1 is the analysis of the standard with a concentration of 5.0 mg/L and LCS2 is the analysis of the standard with a concentration of 10.0 mg/L. These standards are made according to section 9.1.2. The LCS limits must be within the range of 88-132%. If the recovery is outside of the acceptable limits, see table 17-1.

9.3 Continuing Calibration Verification Standard (CCV)

9.3.1 CCVs are prepared for TKN digestion using nutrients samples that were purchased commercially from APG (Analytical Product Group) nutrients #3 & #4 or Wibby Nutrients 2. Follow the manufacturer's directions for preparation and certified TKN concentration. In general, 10ml of the purchased nutrients is transferred with a volumetric pipette to 1000ml volumetric flask filled with approximately 900mL of water. Bring the flask to volume with DI water; mix the solution by inverting the volumetric flask a minimum of three times. The sample is now ready for analysis. The purchased nutrient must be stored at 4ºC and expires one week after made.

9.3.2 Once the purchased TKN nutrient has been prepared according the manufacturer's instruction, analyze the sample according to the procedure found in section 11.0. The CCV limits must be within the range of 64-136%. If the recovery is outside of the acceptable limits, see table 17-1

9.3.3 The CCV is the second source verification for the standard curve. Thus the CCV is used for the independent calibration verification (ICV).

9.4 A Method Blank is to be analyzed at the beginning of the run and with each batch of no more than 20 samples. All method blanks are prepared by adding 25 ml of DI water and 5.0 ml of digestion solution into a digestion tube. The method blank is then treated the same way as a water sample. The method blank must be less than 0.5ppm. If the blank is greater than 0.5 ppm see table 17-1

9.5 A Reagent/Calibration Blank is to be analyzed at the beginning and end of the run. The reagent/calibration blank is DI water with no standard added and is treated the same as the calibration standards. The reagent/calibration blank must be less than 0.5ppm. If the blank is greater than 0.5 ppm see table 17-1

9.6 A Duplicat**e** sample is to be analyzed for each batch of 20 samples. The RPD of duplicate samples should be within 25% of each other. If the RPD is greater than 25% please see table 17-1

9.7 Manual Dilution Factor (MDF)

9.7.1 If sample concentrations are greater than the highest standard, the digested sample must be diluted with carrier (reagent 7.6). Dilute the sample with carrier (reagent 7.6) until the concentration is below the highest standard of the curve.

9.8 The instrument must be calibrated before each run and the 'r' value must be equal to or better than 0.998. If this requirement is not met, the run can not proceed any further. The instrument must be recalibrated. See table 17-1

10.0 CALIBRATION AND STANDARDIZATION

10.1 Check to see that the analytical balance has been inspected within the last year and the daily check has been conducted. If either of these has not been completed, notify your supervisor before using.

10.2 Check to see that the automatic pipettor has been calibrated for the quarter and the daily verification has been performed. If either of these has not been completed, notify your supervisor before using.

10.3 Prior to calibration, all calibration standards, digested standards and blanks, and digested samples must be at room temperature.

10.4 Place the reagent lines in Di water for 5 minutes. Turn on the peristaltic pump by pressing the green button located on the pump. Pump DI water through the reagent lines and manifold tubing in order to check for leaks and smooth flow. If there is a leak or flow problem, stop the peristaltic pump and refer to Lachat instruments' Troubleshooting Guide. Proceed with the calibration if there are no leaks or flow problems.

10.5 Allow DI water to flush the manifold for approximately 10 minutes. This will allow the heating coil on the manifold of the FIA+ 8000 to stabilize to a temperature of 60 ºC. During this time, check for leaks and smooth flow.

10.6 On the Omnion® data system, all of the TKN working calibration standards and digested samples to be analyzed for TKN must be entered on the sample tray worksheet. The calibration standards are entered in the top of the worksheet and are highlighted in blue.

Included are the calibration standards concentrations and the standard rack position for each standard.

10.6.1 The TKN working calibration standards are also in the analyte table, which is part of the method file saved. The analyte table will remain the same unless changed by the analyst.

10.7 Reference section 11.24 before proceeding for complete instructions on the use of the Latchet system.

10.8 When the temperature of the heating coil reaches 60 ºC, initiate the carrier stream by placing the reagent transmission lines into the appropriate reagent bottles. Allow the system to equilibrate until a stable baseline is achieved.

10.9 The Lachat Quickchem® FIA +8000 Ion analyzer must be calibrated prior to TKN analysis of a batch of digested samples. The Omnion® data system is set up to carry out calibration at the beginning of every sample analysis.

10.10 A minimum of six standards (not including the reagent/calibration blank) must be used for calibration.

10.10.1 For each calibration standard and the reagent/calibration blank, transfer an aliquot of the solution to a labeled, plastic centrifuge tube (50-mL). Place the calibration standards in the calibration standards rack, located at the back of the automated sampler. The positions of the standards rack are labeled 1 through 16.

10.10.2 Arrange the calibration standards in order of decreasing concentration, starting at position 1 on the standards rack. The reagent/calibration blank should be placed after the calibration working standard with the lowest concentration.

10.11 Place the digested samples and QC samples in the appropriate locations. Samples are placed in the sample trays at the front of the automated sampler. Digested Calibration standards are placed in the standards rack.

10.12 To begin calibration, click on **Start Run** in the menu bar of the Omnion® data system.

10.13 The FIA instrument will inject the calibration standards onto the reaction manifold. For each calibration standard, the Omnion® data system will associate the instrument's detector response (peak area corresponding to color intensity) with the known concentration for the standard.

10.14 To review the standard curve, click on the **Review** icon in the menu bar of the Omnion® data system.

10.14.1 The review screen will display the peak area, nominal concentration, and % Residual for each calibration standard and the reagent/calibration blank.

10.14.2 Below the results for the standards, the concentration equation and correlation coefficient, r, are displayed.

10.14.3 The % Residual for a calibration standard is determined by plugging the standard's peak area into the concentration equation. The resulting concentration for the standard is used to determine percent recovery (measured concentration/ known concentration * 100).

10.14.3.1 The % Residual is the difference between the calculated percent recovery and the expected percent recovery (100%). Therefore, if the standard has a percent recovery of 98%, then the corresponding % residual would be + 2.0%

11.0 PROCEDURE

11.1 Block Digestor (BD-46 Controller panel setup)

11.1.1 Set the block controller panel thumbwheel switches to the following settings: Program 1 set at 160°C for 60 minutes and Program 2 set at 380 °C for 90 minutes.

11.1.2 Turn Power switch, located at the rear of the right panel of the digestion block, to the on position.

11.1.3 Turn the ON/Standby switch on the control panel to ON and allow the digestion block to preheat to 160°C. Preheating the block generally requires 20 to 30 minutes. When the proper temperature has been reached, the first red light will be lit.

11.1.4 For further information regarding the block digestor, please refer to *the BD-46 Block Digestor's Installation and User's Guide l*ocated in room 121.

11.2 Samples and QC samples must be digested, using the BD-46 digestion block, prior to TKN analysis.

11.2.1 A digestion batch can consist of up to 46 digestion tubes (the capacity of the BD-46).

11.2.2 Each digestion tube should be assigned a specific water sample or QC sample. Label the tube with the sample identification number for each sample to be digested, and the QC samples to be digested.

11.3 Each batch of 20 samples must include a method blank, CCV-1, CCV-2, and a duplicate. The calibration curve must be digested once a week.

11.4 Add 4 to 6 Hengar granules to each digestion tube. The granules should be spread evenly over the bottom of the digestion tube.

11.4.1 For water and wastewater samples, add 25.0 ml sample and 5.0 ml of digestion solution to the digestion tube. Reconstitute using DI water to a final volume of 25.0 mL after digestion.

11.4.2 For liquid sludge samples, add approximately 1.0 g sample, 5-10 ml D.I.H2O and 20ml of digestion solution to the digestion tube. Reconstitute with DI water to a final volume of 100 mL after digestion.

11.4.3 For solid sludge samples, add approximately 0.25 g sample, 5-10 mL D.I.H2O and 20ml of digestion solution to the digestion tube. Reconstitute with DI water to a final volume of 100 mL after digestion.

11.5 Place the digestion tube into the appropriate slot of the digestion tube holding rack.

11.6 Check that the tubes are dry on the outside surfaces. If the tubes are wet, they may shatter when placed into the hot block.

11.7 Transfer the digestion tube rack to the preheated digestion block (located in the fume hood). **Slowly** lower each holding rack onto the digestion block. If only one rack is used, place the empty rack on the block to help maintain the temperature.

11.8 Start program1 of the digestion process by pressing the green button on the block controller, with program 1 set at the initial heating stage.

11.8.1 Program 1 of the digestion process is set such that the water in each sample or standard will boil off from the digestion tubes.

11.9 During program 1, closely monitor the samples to ensure they are boiling evenly. If a portion of a sample boils out of digestion tube ("boil over"), note the sample that boiled over, and re-digest the sample in the next digestion batch.

11.10 Boiling over of a water sample during TKN digestion may be due to the sample, or to the Hengar granules being spread unevenly over the bottom of the digestion tube. Environmental samples with high organic content are very susceptible to boiling over and generally require dilution prior to the TKN digestion. The use of anti-form in soil and sludge samples may prevent boil over.

11.11 When stage 1 of the digestion process ends, after approximately 60 minutes, the buzzer on the digestion bock control will sound. Following stage 1, each digestion tube will contain approximately 1ml of digestion solution, although a small amount of water may also remain.

11.12 Place the cold fingers in the rack corresponding to the positions of the digestion tubes. Place the cold fingers rack on top of the rack of digestion tubes. Be sure that each cold finger is inside a digestion tube.

11.13 Initiate stage 2 of the digestion process by pressing the green button. (Note: the buzzer will continue to sound until the green button is pressed.) The yellow light on the digestion block control will be lit.

11.14 During stage 2 of the digestion process, the samples will continue to digest for 90 minutes at the temperature of 380 °C. This time includes the ramp time for the block temperature to increase to 380 °C. The temperature of the block must be maintained at 380°C for a minimum for 30 minutes.

11.15 After stage 2 of the sample digestion is complete, the buzzer will sound for several seconds and the final red light will be lit. Turn the switch on the control panel to Standby, and the power switch on the side of the digestion block to OFF.

11.16 Remove the cold finger holding rack from the top of the digestion tubes. Place the cold finger to side. CAUTION: the rack is very hot!

11.17 Remove the rack of digestion tubes and place in metal rack to cool. Allow the digestion tube to cool for approximately 5 minutes. CAUTION: During cooling, the digestion tubes are very hot and emit sulfuric acid fumes, so they must remain under a fume hood.

11.18 The top of the digestion tubes will be cool enough to handle, but the digested solution at the bottom of the tubes will remain hot.

11.19 For each digestion tube, add approximately 15mL of DI water to the tube. Mix the digested solution well. Pour the digestion solution and water into the appropriate volumetric flask. Add another 5mL of DI water to the digestion tube to collect any residual digestion solution. Pour the residual into the appropriate volumetric flask. Dilute volumetric flask to final volume with DI water.

11.20 If a digestion tube cools too much, then the digested solution may begin to gel. If this occurs, the digested sample and DI water may need extensive mixing. If the DI water has not been added to the digestion tube, a tube in which gel has formed may be placed briefly in the digestion block. The heat of the block will return the gel to solution. A glass rod may also be used to mix the sample.

11.21 Digested samples and QC standards must be allowed to cool prior to TKN analysis. In addition to cooling, this allows any particulate to settle to the bottom of the volumetric flask.

11.22 If possible, analyze for TKN on the same day as digestion. However, digested samples may be held at room temperature for a maximum time of 4 days prior to analysis, if capped tightly.

11.23 Computer Set-Up for TKN

11.23.1 The QuickChem® Method parameters and setup will be already input into the data system. For more information and/or clarification, please refer to Lachat instruments' Omnion Software Manual, the QuickChem® method or department Supervisor.

11.23.2 Turn the power on for the FIA 8000 Analyzer (power switch is located on left side of the analyzer), the peristaltic pump, and the autosampler.

11.23.3 To start the Omnion® system, double-click on the *Omnion FIA* icon on the desktop of the Lachat computer.

11.23.4 The Omnion® FIA Main Menu will appear on the screen

11.23.5 Click on the Open icon at the top of the screen or go to File then to Open Method in order to select method needed; or scroll through file handler and

double click on the file name. The method generally used for TKN analyses is the last analytical run in the TKN method folder.

11.23.6 Enter new calibration numbers, quality control numbers, and sample numbers into the worksheet. Make sure that the cup numbers, sample ID, MDF and sample type (e.g., cal standard, unknown sample, spiked sample, or sample duplicate) are correct.

11.23.7 Once worksheet is complete, click on FILE then on EXPORT WORKSHEET DATA.

11.23.8 For more information and/or clarification on the software refer to Omnion FIA software User manual.

11.24 Total Kjeldahl Nitrogen Analysis using the Lachat QuickChem® FIA+ 8000 Series

11.24.1 Prior to sample analysis, the two containers of DI water (one for reagent lines and one for sampler rinse line) must be rinsed and filled with fresh DI water.

11.24.2 Place the reagent lines in 5 N HCL (section 7.10) for 5 minutes. Turn on the peristaltic pump by pressing the green button located on the pump. Pump 5 N HCL through the reagent lines and manifold tubing in order to check for leaks and smooth flow. If there is a leak or flow problem, stop the peristaltic pump and refer to Lachat instruments' Troubleshooting Guide. If there are no leaks or flow problems, proceed to 11.24.3.

11.24.3 Put all the reagent lines in DI water for approximately 8 mins.

11.24.3.1 Check the volume of reagent in each of the reagent bottles. If there is not sufficient volume for the sample analysis, prepare and add additional reagent. Mix all reagents well prior to use.

11.24.4 While running DI water through the manifold, the QC standards and digested samples can be loaded into the standards rack and the sample tray.

11.24.5 The standard rack is located at the rear of the sampler (there are 16 numbered positions for the standards.) The calibration standards and reagent/calibration blank are placed in locations 1 through 8 (highest calibration standard in location 1 and reagent/calibration blank in location 8. The location of the calibration standards may be verified in the tray worksheet.

11.24.6 For each digested sample, verify the location of the sample using the sample tray worksheet.

11.24.7 Once the QC standards and samples have been loaded, and the heating coil temperature has stabilized to 60 °C, the reagent lines may be added to the reagent bottles.

11.24.8 **CAUTION:** If the salicyate-nitroprusside reagent is merged with a sample containing sulfuric acid in the absence of the buffer solution, the salicylate-nitroprusside reagent will precipitate. It is EXTREMELY IMPORTANT when putting the manifold lines into the reagents that the analyst primes the system

by first placing BUFFER transmission line into the buffer and pumping the solution through the manifold for 3 minute. The remainder of the transmission lines may then be placed into the proper reagents.

11.24.9 Place each of the remaining reagent transmission lines, into the appropriate reagent bottle.

11.24.10 If a white precipitate does form within the manifold tubing, the pH is too low. Immediately stop the pump and replace all of the affected manifold tubing. Check the concentration of the sulfuric acid and the buffer solution before restarting the system.

11.24.11 When the reagent lines have been placed into the reagent bottles, cover the bottle tops with a reagent lid or parafilm.

11.24.12 At this point, the waste line must be in the Mercury Waste container.

11.24.13 Go back to the computer and click on the Start button.

11.24.14 The sampler arm will move to the first calibration standard and begin the calibration process. Once the system has completed injecting the calibration standards, the calibration curve will be analyzed.

11.24.15 Following calibration, the QC standards will be injected and analyzed. The analyst should determine if the calibration and QC standards meet the criteria that were established in section 9.0.

11.24.16 When analysis of the QC standards is complete and has acceptable results, the system will begin analysis of the samples located in the sample trays. Samples will be analyzed in the order shown on the sample tray worksheet.

11.24.17 The sample tray worksheet may be accessed at any time during the sample analysis. The tray may be edited during the sample run in order to reanalyze a sample or add a sample dilution. Add the sample ID to the end of the current sample tray (and edit cup number, is necessary). For sample dilutions, enter the dilution factor under the column titled MDF.

11.24.18 If a sample is over the highest point in the calibration curve, the sample needs to be diluted. Follow section 9.8 on making the dilution

11.24.19 During sample analysis, a runtime report will be displayed on the right side of the computer display. This report displays the basic information and analyte concentrations for QC standards and samples. The Runtime report is continuously update as every sample is analyzed.

11.24.20 While the sample analysis is proceeding, the FIA peaks are displayed on the bottom of the computer screen.

11.24.21 Groups of peaks, or individual peaks, may be selected and highlighted by using the computer's mouse device. Click the left button on the mouse, hold and drag the shaded box on the computer's peak display until it encompasses all of the desired peaks.

11.24.22 Once the last sample and QC standard has been injected and analyzed, the runtime report will indicate that the sample tray run is complete.

11.24.23 Remove the Salicyate-Nitroprusside transmission line from the reagent bottle, and place it in the container of DI water used for reagent lines. Allow the salicylate-nitroprusside line to flush for approximately 3 minutes.

11.24.24 Once the salicyate-nitroprusside transmission line has been flushed, the remaining reagent transmission lines may be transferred to the container of DI water. The waste line can also be removed from the Mercury waste and put into the sink.

11.24.25 Allow the DI water to be pumped through the manifold for approximately 5 minutes. Then remove the reagent transmission lines from the water and allow the pump to move air through the manifold until all the water has left the manifold, which should take approximately 8 minutes.

11.24.26 When all of the transmission lines have been purged, release each of the pump tubes cartridges. Turn off the peristaltic pump.

11.25.27 Cap all of the calibration standards and the reagent/calibration blank. Discard all digested samples and QC standard in a container clearly marked mercury (TKN) waste.

11.25.28 In the Omnion® FIA system, print a custom report that includes the calibration report.

11.26.29 Review the raw data and the peak display to check for peak anomalies, analyte concentrations above the calibration range, carryover, etc. Verify that the QC results are within acceptance limits.

12.0 DATA ANALYSIS AND CALCULATIONS

12.1 Percent Recovery:

% Recovery = (Calculated value / Theoretical value) X 100%

12.2 Percent Relative Percent Difference (%RPD)

$$\% \text{ RPD} = \frac{(V_1 + V_2)}{[(V_1 + V_2)/2]} \times 100$$

where:

RPD = Relative Percent Difference
V_1 = Observed Value of sample
V_2 = Observed Value of Duplicate Sample

12.3 Calculation of Total Organic Nitrogen (TON)

Total Kjedahl Nitrogen mg/L – Ammonia mg/L = Total Organic Nitrogen

12.4 Calculation of Total Nitrogen

Total Kjedahl Nitrogen mg/L + Nitrate-Nitrite-Nitrogen mg/L = Total Nitrogen mg/L

12.5 Calculation of Total Inorganic Nitrogen (TIN)

Total Nitrogen (mg/L) – Total Organic Nitrogen (mg/L) = Total Inorganic Nitrogen (mg/L)

12.6 Matrix Spike Recovery:

$$R = \frac{C_s - C}{S} \times 100\%$$

where:

R = Percent Recovery
C_s = Fortified Sample Concentration
C = Sample background concentration
S = Concentration equivalent to added analyte

13.0 METHOD PERFORMANCE

13.1 A method detection study is conducted annually to determine the Method Detection Limit (MDL). This study is based on a minimum of seven samples.

13.2 Each analyst conducting this analysis after being trained is required to fill out a Continuing Demonstration of Capability (CDC) every year.

13.3 Modification from the reference method

13.3.1 The upper and control limits used are generated in-house.

13.3.2 An Instrument Performance Check Solution (IPC) is not being analyzed at a frequency listed in the method. A Continuing Calibration Verification Check (CCV) is analyzed after the calibration curve, after every 20 samples and at the end of the run. The % recovery is in-house generated.

14.0 POLLUTION PREVENTION

14.1 Standards should be prepared in volumes consistent with laboratory use to minimize the volume of expired standards to be disposed.

14.2 Any acids used in this procedure needs to be neutralized prior to be disposal.

14.3 All waste that contains mercury must be placed in the mercury disposal drum located in the waste storage area.

15.0 WASTE MANAGEMENT

15.1 The Environmental Protection Agency (USEPA) requires that laboratory waste management practice be conducted consistent with all applicable rules and regulations. Excess reagents, samples and method process wastes should be characterized and disposed of in an acceptable manner. The agency urges laboratories to protect the air, water, and land by minimizing and controlling all releases from hoods, and bench operations, complying with the letter and spirit of any waste discharge permit and regulations, and by complying with all solid and hazardous waste regulations, particularly the hazardous waste identification rules and land disposal restrictions. For further information on waste management consult the "Waste Management Manual for Laboratory Personnel," available from the American Chemical Society at the address listed in Section 16.4.

16.0 REFERENCES

16.1 U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983, Method 365.1.

16.2 American Chemical Society, Waste Management Manual for Laboratory Personnel, subcommittee on Environmental Analytical Chemistry, 1155 16th St. NW, Washington, DC 20036.

16.3 Belmont Labs, Quality Assurance Manual, Quality Assurance/Quality Control Program, Revision Twenty First, May 6, 2011.

16.5 Belmont Labs, Pipettor Calibration Standard Operating Procedure, Quality Assurance/ Quality Control program, BPL01-Pipettor Rev. No.:2 Update 2, August 9, 2011

16.6 Belmont Labs, Glassware Cleaning Standard Operating Procedure, Quality Assurance/Quality Control program, BPL01-Glassware Rev. No.:3 Update 2, August 9, 2011

16.7 Belmont Labs, Sample Homogenization Standard Operating Procedure, Quality Assurance/Quality Control Program BPL01_Sample Homogenization Rev. No. 1 Update 1, August 9th 2011.

16.8 Belmont Labs, Procedure for Checking Balance Procedure, Quality Assurance/Quality Control program Rev. 1 September 22, 2011

16.9 Belmont Labs, Procedure for issuing Non Conformance/ Corrective Action, Quality Assurance/Quality Control program Rev. 2 September 22, 2011

17.0 DATA VALIDATION, TABLES, DIAGRAMS, & FLOW CHARTS

17.1 Bench Review:

17.1.1 The Analyst is responsible for completing the run logbook and maintaining all standards and analysis data in a retrievable, traceable fashion.

17.1.2 The Analyst is responsible for verifying the QA/QC parameters detailed in Section 9.0 and table 17-2 are within acceptance limits.

17.2 Secondary Review

17.2.1 The reviewer must verify that all of the quality control measures are within acceptable limits. This includes MBLK,LCS, CCV, and sample RPD.

17.2.2 Verify that all data sheets have been filled out properly. Verify that all QC requirements are met per this SOP. If there was an issue that pertained to this analysis the analyst must follow the steps in this SOP, otherwise needs supervisor approval and there should be an NCMR filed.

17.2.3 Verify that the results have been accurately entered into LIMS.

17.3 Changes for Update 1

17.3.1 QC limits have been updated

17.3.2 Reference section has been updated.

17.3.3 Table 17-2 had been updated.

Table 17.1 Control Limits

Sample Type	% Recovery Limits
Initial Calibration Curve	R $\geq$ 0.998
Initial CCV	64-136
Method Blank	Less than Reporting Limit
LSC	88-132
CCV	64-136
Sample Duplicate	RPD $\leq$ 25%

Table 17-2 Summary of Internal Quality Control Procedures

QC Element	Frequency	Acceptance Criteria	Corrective Action
Method Blank	One at beginning of batch, one per batch of no more than 20 samples	Control Limits, refer to Section 17.2	1. If MB is >0.0.5 reanalyze blank, if value is still above RL, Continue with analysis until run is complete. 2. Report samples that are BDL with a qualifier stating that the MB failed high however samples were BDL. 3. If two digested method blanks fail in a row. File a NCMR. See 16.9 for information on filing a NCMR.
Laboratory Control Sample (LCS)	One per batch of no more than 20 samples	Control Limits, refer to Section 17.2	1. Check for calculation errors 2. Recalibrate and reanalyze the LCS. 3. In order to report data 1 LCS and the ending CCV must be within limits. 4. If the ending CCV fails along with the LCS do not report the data, digest samples and QC again. 5. If the LCSs fails two times in a row. Then file a NCMR. See 16.9 for information on filing a NCMR.
Continuing Calibration Standard (CCV)	One at beginning of batch, one at end of batch, one per batch of no more than 20 samples	Control Limits, refer to Section 17.2	1. Check for calculation errors 2. Reanalyze CCV. 3. If the beginning CCV fails, LCS1 and LCS2 must past limits. Enter data and qualify CCV1. 4. Check the certificate of analysis to ensure true value of CCV is correct. 5. Check standard prep log to ensure that CCV was made correctly. 6. If ending CCV fails then the batch must be digested again. Data can't be reported. 7. If the CCV fails two times in a row. Then file a NCMR. See 16.9 for information on filing a NCMR
Sample Duplicate	One per batch of no more than 20 samples	Control Limits, refer to Section 17.2	1. Check for calculation errors 2. Recalculate RPD 3. Reanalyze sample 4. If the RPD is outside of control limits, and the reason for the deviation can be determined (contamination, incomplete digestion, etc) and the data is within historical data. Report the result that match historical data and make a comment on data sheet about what happened with the duplicate result. 5. If the sample and duplicate RPD is outside of control limits and the reason can't be determined, rerun the sample and report the result that is confirmed with reanalysis. 6. If a sample a duplicate result that is within control limits. See supervisor.

Table 17.3

INFORMATION FOR THE

LACHAT INSTRUMENTS Q8000

FLOW INJECTION ANALYZER SYSTEM

17.2. DATA PARAMETERS FOR THE QUIKCHEM 8000

The timing values listed below are approximate and will need to be optimized using graphical events programming.

Sample throughput:	80 samples/hour; 45 s/sample
Pump speed:	35
Cycle Period:	45 s

Analyte data:

Peak Base Width: 39 s

% Width Tolerance: 100

Threshold: 8000

Inject to Peak Start: 42 s

Chemistry: Direct

Calibration Data:

Levels	1	2	3	4	5	6	7
Concentrations mg N/L	~~20.00~~ 25.0	10.00	5.00	2.00	1.00	0.50	0.00

0.20 & 0.10

Calibration Fit Type: 1st Order Polynomial

Weighting Method: None

Sampler Timing:

Min. Probe in Wash Period: 9 s

Probe in Sample Period: 25 s

Valve Timing:

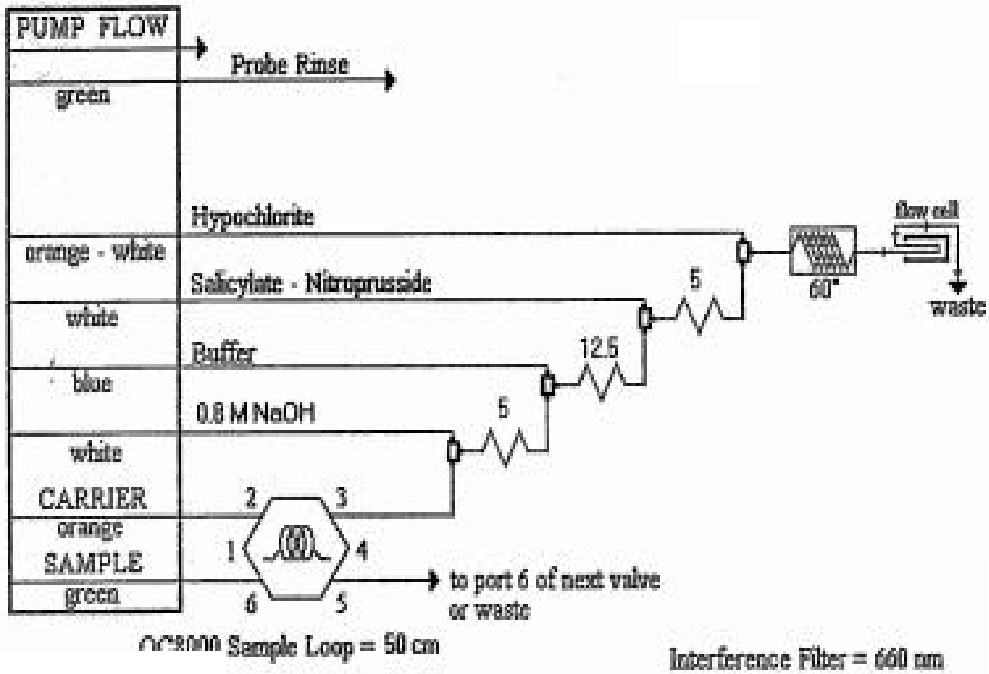
Load Period: 20 s

Inject Period: 25 s

Load Time: 0.0 s

17. TABLE, DIAGRAMS, FLOWCHARTS, AND VALIDATION DATA

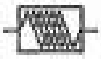
17.1. TOTAL KJELDAHL NITROGEN MANIFOLD DIAGRAM:



CARRIER is helium degassed water.

5 is 70 cm of tubing on a 4.5 cm coil support

12.5 is 255 cm of tubing on a 12.5 cm coil support

Apparatus: Standard valve, flow cell, and detector head modules are used. The  shows **650 cm of heated tubing**. All manifold tubing is **0.8 mm (0.032 in) i.d.** This is **5.2 uL/cm**.

MANIFOLD DIAGRAM REVISION DATE: 5 August 1995 KLW

PACE ANALYTICAL

STANDARD OPERATING PROCEDURE

TITLE: Total Organic Carbon by Ultra-Violet promoted persulfate oxidation by SM5310C

(Supersedes BL-WC-015R1)

PREPARED BY: _____ 11/22/14
Date

REVIEWED BY: _____ 12.22.14
Date

_____ 11/22/14
QA Manager Date

Brooke Chandler 12/23/14
Technical Director Date

Brooke Chandler 12/23/14
Laboratory Director Date

Control of Documents Statement

This document shall only be considered a controlled document if being viewed via the Element LIMS or the Belmont Labs Intranet. All other copies, digital or print shall be considered uncontrolled. It is the intention of QA that only controlled documents are referenced for the performance of Lab Procedures and Analyses. It is the responsibility of the analyst to verify the materials of any uncontrolled document with the controlled copy if an uncontrolled document is referenced.

1.0 SCOPE AND APPLICATION

1.1 This SOP is based on Standard Method 5310C and uses a ultra-violet promoted persulfate oxidation followed by infrared detection for determining the concentration of total organic carbon and dissolved organic carbon in water.

1.2 Implementation of this SOP is restricted to use by, or under the supervision of, analyst certified to perform this procedure, and skilled in the interpretation of the data generated.

2.0 METHOD SUMMARY

2.1 The process utilizes persulfate oxidation along with UV radiation. The sample is simultaneously exposed to persulfate ions and to UV radiation, producing highly reactive sulfate and hydroxyl-free radicals.

2.2 During an analysis, CO_2 levels are measured by a non-dispersive infrared (NDIR) detector. The detector is sensitive to the absorption frequency of carbon dioxide and provides a signal proportional to the instantaneous concentration of CO_2 in the carrier gas flowing through it. The detector output signal is linearized and as the carbon dioxide is transferred from UV reactor it is continuously monitored by the NDIR detector. This response is displayed on the screen as a real time strip chart recording of the output. The peak area is integrated and referred to stored calibration data and the carbon concentration in the sample is calculated to display carbon concentration in ppm.

3.0 DEFINITIONS

3.1 Definitions of general terms used in this method are listed in the Quality Assurance Manual.

3.2 NDIR- non-dispersive infrared detector detects carbon dioxide

3.3 UV Reactor- Nitrogen is swept through the UV reactor to carry CO_2 out of the UV reactor.

3.4 Gas-Liquid separator- Moisture removal system

3.5 Halogen Scrubber- Copper and Tin in a glass U shaped container.

3.6 Mist Trap- Moisture control.

4.0 INTERFERENCES

4.1 Insufficient acidification will result in incomplete release of CO_2.

4.2 The intensity of the ultraviolet light reaching the sample matrix may be reduced by highly turbid samples or with aging of the ultraviolet source, resulting in sluggish or incomplete oxidation.

4.3 Persulfate oxidation of organic molecules is slowed in samples containing significant concentrations of chloride, concentrations above 0.05%. To remove this interference add mercuric nitrate to the persulfate solution.

5.0 HEALTH AND SAFETY

5.1 Safety glasses shall be worn in the lab at all times.

5.2 Personnel shall have read relevant MSD sheets and be familiar with the Laboratory Chemical Hygiene Manual.

5.3 Disposable PVC gloves shall be worn while handling concentrated acids along with face shields and lab coats.

5.4 Concentrated Phosphoric Acid (H_3PO_4) can cause severe burns and react violently with water. Add cautiously and always work with phosphoric acid under a safety hood to avoid inhalation. If a spill does occur, neutralize the spill with the acid spill kit (located in a white box under the workbench with the balance on it.) Keep bottles of concentrated phosphoric acid in a tightly closed container. Store in a corrosion proof area (located on the left hand side of hood two in room 121.) When disposing of concentrated phosphoric acid, add the acid to a volume of water (minimum of one liter). Diluted solutions of phosphoric acid can be disposed into a sink and flushed with water for at least one minute.

5.5 Personnel shall be familiar with the nearest eyewash and safety shower before starting work. Eyewash and safety showers must be within 100 feet or 10 seconds of the stations.

5.6 All accidents must be promptly reported to a supervisor.

5.7 The Analyst shall utilize GOOD LAB PRACTICES at all times.

5.8 Good housekeeping shall be maintained to ensure safety.

5.9 Analysis shall be performed by competent personnel.

6.0 EQUIPMENT AND SUPPLIES

6.1 Tekmar-Dohrmann Phoenix 8000 Analyzer.

6.2 Autosampler for the Pheonix 8000 Analyzer

6.3 Microsyringes – certified volumes of 50 µl, 250 µl, and 1,000 µl.

6.4 40 ml Vials with PTFE-lined caps.

6.5 Volumetric Flasks-Class “A”, various sizes.

6.6 Volumetric pipettes-Class “A” various sizes

6.7 Various sizes of class “A” graduated cylinder.

6.8 Magnetic stirring device, stirring bars and retrievers

6.9 Pipette bulb

6.10 Automatic pipettor and appropriate sized tips

6.11 Water bottles

6.12 Dessicator and drying agent for dessicator

6.13 Drying oven which is able to maintain 100 degrees C for 4 hours.

6.14 Analytical balance- capable of accurately weighing to the nearest 0.0001 g.

6.15 Disposable plastic pipettes

6.16 Plastic weigh boats

6.17 Glass watch glass

6.18 TOC Talk software

6.19 Computer with a minimum of 266 Mhz Pentium II, 66 meg, 700mb

6.20 Hyrdrocarbon and CO_2 free nitrogen or air can be supplies from either a cylinder or gas generator.

6.21 Uncontaminated two stage regulator for above state gas. Second stage operation range should be 0-60 psi equipped with outlet for 1/8" Swagelock (brass) nut and ferrule.

6.22 DOC 0.45µm filter and syringe

7.0 REAGENTS AND STANDARDS

**Note: All reagents preparation must be documented in the Reagent preparation logbook, or the wet chem stock book. Please include Date of standardization performed, analyst initials, expiration and date of TOC standard. All reagents are stored at room temperature.*

7.1 Reagent water: Distilled water from the DI Tap.

7.2 Calibration Standards- A minimum of 5 standards encompassing the working range of the instrument shall be run every three months. The standards are prepared using the 1000 ppm KHP standard that was purchased from a vendor.

KHP Std Used	Vol. Used	Final Vol.	Final Conc.
1000 PPM	50 µl	100 ml	0.50 PPM
1000 PPM	100 µl	100 ml	1.0 PPM
1000 PPM	400 µl	100 ml	4.0 PPM
1000 PPM	1.0 ml	100 ml	10 PPM
1000 PPM	2.0 ml	100 ml	20 PPM

7.3 10% Sodium Persulfate Solution- to a liter volumetric flask add 500 ml of reagent water, add 100g of sodium persulfate, dilute to the mark. Invert to mix. Make fresh monthly. The solution is stored in a clean container next to the TOC analyzer.

7.4 20% Phosphoric Acid Solution- to a liter volumetric flask add 500 ml of reagent water, add 200 ml of phosphoric acid, dilute to the mark. Invert to mix. Make fresh monthly. The solution is stored in a clean container next to the TOC analyzer.

7.5 Potassium hydrogen phthalate (KHP)-ACS grade, Expires six years from the date opened.

7.6.1 To dry KHP place the 5-10grams of KHP on a watch-glass. Put in the oven @ 100°C for at least 4 hours. Remove from oven and store in a dessicator until cool. Once cool store in a 40 mL VOA vial. The dried KHP expires one year after drying.

7.6 Sodium Persulfate ACS grade- Expires six years from the date opened.

7.7 Phosphoric Acid ACS grade- Expires six years from the date opened.

7.8 KHP 1000ppmC stock standard- Weight 2.125 grams of KHP. Transfer the KHP to a 1.0 L volumetric flask which is half full of reagent water. Swirl the flask to dissolve the KHP. Add 1.0 ml of Phosphoric acid. Fill the flask to the 1.0 L mark with reagent water. Invert the flask five times to equilibrate the solution. Store the solution in an amber bottle. The stock solution expires six months from the date prepared.

7.9 Secondary TOC source purchased from Phenova, or equivalent. To prepare the standard follow directions provided with the standard

8.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

8.1 Samples are collected in three 40 mL VOA vials. If three vials are not received, note the deviation and proceed analysis with caution due to limited amount of sample.

8.2 Samples not analyzed immediately must be acidified to a pH<2 with either H_2SO_4 or H_3PO_4, and refrigerated at 4^oC with minimal exposure to light and atmosphere. If the sample has a pH of greater than 2 notify the PMs, the data has to be qualified with an P flag.

8.3 The sample has a holding time of 28 days. If the sample is received past the 28 day HT, notify the PM and H flag the data in LIMS.

8.4 Dissolved organic carbon samples are filtered in the field by the collector.

8.5 If the sample needs to be filtered in the lab, the following procedure should be followed.

8.5.1 Completely removed plunger from the syringe provided. Attach filter to end of syringe, writing on filter will be face up. Holding the syringe upright, fill with sample. Insert plunger into barrel. Push syringe down to approx. the 60 mL mark.

8.5.2 Open the 40mL VOA vial (containing sulfuric acid). Holding the vial upright, position filter over vial. Push syringe barrel down firmly, filling vial with filtered sample. Fill as near to the top as possible. Carefully complete filling the vial forming a meniscus at the top of the vial.

9.0 QUALITY CONTROL / QUALITY ASSURANCE

9.1 Start Up Procedure For TOC analyzer, the start-up procedure must performed before the instrument is used for analysis.

9.1.1 Cleaning Procedure rinses the UV reactor and IC sparger with DI water and 1 mL of persulfate. A cleaning procedure is set up on the autosampler set up screen. See section 11.0 for the procedure on how to access the autosampler set up screen. In autosampler set up worksheet enter the following information: **Pos** 1001, **Sample ID** Cleaning Procedure, **Sample Type** Sample, **Method ID** Cleaning Procedure, **Reps** 5, **Status** Ready.

9.1.2 Reagent water blanks, three must be analyzed after the cleaning procedure. See section 11.0 for the procedure on how to access the autosampler set up screen. In the auto sample set up worksheet enter the following information: **Pos** 1, **Sample ID** Blank, **Sample Type** Sample, **Method ID** Drinking H2O TOC 0.1-20 ppmC, **Reps** 4, **Status** Ready. Put a 40 mL VOA vial filled with reagent water in position1 of the autosampler. For the second blank fill in the following information: **Pos** 2, **Sample ID** Blank, **Sample Type** Sample, **Method ID** TOC Range 0.1-20 ppmC, **Reps** 4, **Status** Ready. Put a 40 mL VOA vial filled with reagent water in position 2 of the autosampler. For the third blank fill in the following information: **Pos** 3, **Sample ID** Blank, **Sample Type** Sample, **Method ID** Drinking H2O TOC 0.1-20 ppmC, **Reps** 4, **Status** Ready. Put a 40 mL VOA vial filled with reagent water in position 3 of the autosampler.

9.1.3 An Instrument Blank should be analyzed after the two reagent water blanks. See section 11.0 for the procedure on how to access the autosampler set up screen.

In autosampler set up worksheet enter the following information: **Pos** 1001, **Sample ID** Instrument Blank **Sample Type** Blank TC range 2, **Method ID** Drinking H2O TOC 0.1-20 ppmC, **Reps** 5, **Status** Ready.

9.2 Quality Control

9.2.1 A Method Blank is analyzed at the beginning of the batch and after every 10 samples. A method blank is analyzed using the following procedure. See section 11.0 for the procedure on how to access the autosampler set up screen. In autosampler set up worksheet enter the following information: **Pos** 3, **Sample ID** Method Blank, **Sample Type** Sample, **Method ID** Drinking H2O TOC 0.1-20 ppm C, **Reps** 4, **Status** Ready. Pour reagent water into a 40 mL VOA vial and place in position 6 in the auto sampler. The method blank must be below 0.5 ppm C, if the method blank is outside of this range refer to table 17-1.

9.2.2 An external standard (LCS) and LCSD (Duplicate) or Independent Calibration Verification (ICV) is analyzed with each batch and after every 10 samples. LCSD DUP must be within 10% of the LCS, if the LCSD is outside of these limits then refer to table 17-1. If the LCS is analyzed using. Recoveries must be within the limits 90 - 110%. If the LCS is outside of these limits then refer to table 17-1. A LCS/LCSD is analyzed using the following procedure. See section 11.0 for the procedure on how to access the autosampler set up screen. In autosampler set up worksheet enter the following information: **Pos** 7/8 **Sample ID** LCS/LCSD, **Sample Type** Sample, **Method ID** Drinking H2O TOC 0.1-20 ppmC, **Reps** 4, **Status** Ready. In a 100mL volumetric flask add approximately 50 mL of reagent water. Use the standard listed in section 7.9.

9.2.3 An Matrix Spike and Matrix Spike duplicate is analyzed periodically. Recoveries must be within the limits 90-110%. The MS duplicate must be within 10% of the MS. If the MSD is outside of these limits then refer to table 17-1. A MS/MSD is analyzed using the following procedure. See section 11.0 for the procedure on how to access the auto sampler set up screen. In auto sampler set up worksheet enter the following information: **Sample ID** MS/MSD, **Sample Type** Sample, **Method ID** Drinking H2O TOC 0.1-20 ppmC, **Reps** 4, **Status** Ready. Add 0.16ml of 1000ppmc KHP (7.9) to 40 ml of sample and spike dup. Invert several times and in designated position in the auto sampler. The true value of the MS/MSD is 4.0 ppm.

9.2.4 A CCV is analyzed at two different concentrations 1.0 ppmC and 4.0 ppmC at the beginning of each batch and CCV 4.0 at the end of each batch (a batch is up to 20 sample). CCV concentrations at 1.0 ppm are optional for waste water analysis. Recovery for the 1.0 ppmC standard is 70-130%, recoveries for the 4.0 ppm standard is 90-110%. If the CCVs are outside of these limits see section 17-1. See section 11.0 for the procedure on how to access the autosampler set up screen. In autosampler set up worksheet enter the following information: **Pos** 4 **Sample ID** CCV 1.0, **Sample Type** Sample, **Method ID** Drinking H2O TOC 0.1-20 ppmCC, **Reps** 4, **Status** Ready. To make the 1.0ppmC standard add approximately 50 mL of reagent water to a 100mL volumetric flask. To the volumetric flask add 0.1 mL of 7.9 1000 ppmC KHP stock standard standard, dilute with reagent water to the mark. Invert several times and then pour the CCV 1.0 into a 40 mL VOA vial and place in position 4 in the autosampler. For CCV 4.0 in autosampler set up worksheet enter the following information: **Pos** 5

Sample ID CCV 4.0, **Sample Type** Sample, **Method ID** Drinking H2O TOC 0.1-20 ppmC, **Reps** 4, **Status** Ready. To make the 4.0ppmC standard add approximately 50 mL of reagent water to a 100mL volumetric flask. To the volumetric flask add 0.4 mL of 7.9 1000 ppmC KHP stock standard standard, dilute with reagent water to the mark. Invert several times and then pour the CCV 4.0 into a 40 mL VOA vial and place in position 5 in the autosampler. At the end of the batch enter in another 4.0 ppmC standard, see the procedure above.

9.3 Manual Dilution Factor (MDF)

9.3.1 If sample concentrations are greater than 20 ppm, the sample must be diluted. Use a decreased volume of sample (exp. 5 or 10 mL) and add reagent water to the mark in a 50 mL volumetric flask. The ideal range of TOC/DOC dilution would be 4-6 ppm.

9.4 A duplicate sample is to be analyzed for each batch of 20 samples. The RPD of duplicate samples must be within ± 10%. If the RPD is outside of these limits, then refer to table 17-1

9.4.1 Each sample is analyzed at least 2 times, up to 4 reps. The RSD between each replicate must not be greater than 10%. If the RSD is outside of these limits refer refer to table 17-1

10.0 CALIBRATION AND STANDARDIZATION

10.1 Check to see that the analytical balance has been inspected within the last year and the daily check has been conducted. If either of these has not been completed, notify your supervisor before using.

10.2 Check to see that the automatic pipettor has been calibrated for the quarter and the daily verification has been performed. If either of these has not been completed, notify your supervisor before using.

10.3 The instrument must calibrated every 3 months.

11.0 PROCEDURE

11.1 Remove samples from refrigerator and let equilibrate to room temperature.

11.2 To initialize the instrument, double click the TOCTalk 3.0 icon.

11.3 Go to **Set-Up** click on **Instrument**. Click on **Ready**, to activate the UV lamp, the main gas inlet valve, the gas to UV chamber, and routes the carrier gas from the IC Sparger to vent, and from the UV Reactor to the NDIR.

11.4 Instrument Calibration.

11.4.1 In the main screen click on **setup** along the top menu bar on the screen. Under the **setup** tab click on **Calibration**, a window will pop up to the side of **Calibration** select **Standards** this will bring up the calibration set up page.

11.4.2 On the Calibration setup page select **File**, under the **File** tab select **New** from the menu bar. Enter the name you want to give your calibration curve and click **OK**. The calibration screen appears with the name you selected.

11.4.3 Click on the **#1** on the left of the screen to activate the **Standard ID** field. Type in **0.0 ppmC** into the **Standard field**.

11.4.4 Click in the field under **Concentration** and enter the **0.0** for the standard above.

11.4.5 Click on the arrow button under **Method ID**. Select a Drinking H2O TOC 0.1-20 ppmC.

11.4.6 The µC field fills in automatically.

11.4.7 Use the comment field if you wish to add additional information.

11.4.8 Press the down arrow key to create the next row to fill in. If you want to edit a field, click in the field and then type in the information.

11.4.9 Click on the **#2** on the left of the screen to activate the **Standard ID** field. Type in **0.5 ppmC** into the **Standard field**.

11.4.10 Click in the field under **Concentration** and enter the **0.5** for the standard above.

11.4.11 Click on the arrow button under **Method ID**. Select a Drinking H2O TOC 0.1-20 ppmCC.

11.4.12 Press the down arrow key to create the next row to fill in. If you want to edit a field, click in the field and then type in the information.

11.4.13 Click on the **#3** on the left of the screen to activate the **Standard ID** field. Type in **1.0 ppmC** into the **Standard field**.

11.4.14 Click in the field under **Concentration** and enter the **1.0** for the standard above.

11.4.15 Click on the arrow button under **Method ID**. Select a Drinking H2O TOC 0.1-20 ppmC.

11.4.16 Press the down arrow key to create the next row to fill in. If you want to edit a field, click in the field and then type in the information.

11.4.17 Click on the **#4** on the left of the screen to activate the **Standard ID** field. Type in **4.0 ppmC** into the **Standard field**.

11.4.18 Click in the field under **Concentration** and enter the **4.0** for the standard above.

11.4.19 Click on the arrow button under **Method ID**. Select a Drinking H2O TOC 0.1-20 ppmC.

11.4.20 Press the down arrow key to create the next row to fill in. If you want to edit a field, click in the field and then type in the information.

11.4.21 Click on the **#5** on the left of the screen to activate the **Standard ID** field. Type in **10 ppmC** into the **Standard field**.

11.4.22 Click in the field under **Concentration** and enter the **10** for the standard above.

11.4.23 Click on the arrow button under **Method ID**. Select a Drinking H2O TOC 0.1-20 ppmC.

11.4.24 Press the down arrow key to create the next row to fill in. If you want to edit a field, click in the field and then type in the information.

11.4.25 Click on the **#6** on the left of the screen to activate the **Standard ID** field. Type in **20 ppmC** into the **Standard field**.

11.4.26 Click in the field under **Concentration** and enter the **20** for the standard above.

11.4.27 Click on the arrow button under **Method ID**. Select a Drinking H2O TOC 0.1-20 ppmC.

11.4.28 Press the down arrow key to create the next row to fill in. If you want to edit a field, click in the field and then type in the information.

11.4.29 All of the standards have been entered, click **OK** on the calibration setup screen. Click **YES** to save changes.

11.4.30 The main screen will return. Click on **System** on the top menu bar. Click on **Calibration,** a side menu will appear click on **Set Active.** Another side menu will appear click on **TOC curve.**

11.4.31 A new screen will appear named **TOC MODE- Active Calibration Curves**. Make the new calibration curve active for all ranges available on the screen.

11.4.32 Return to main screen. Under the **sample analysis** screen click on the **Sample setup** button. The Auto sampler Analysis Setup screen will appear.

11.4.33 Select **File** and then select **New**. Name the rack as the month date and year the analysis is made for example 071409 for July 14th 2009.

11.4.34 This name will appear in the rack ID section in the AutoSampler Analysis Setup. The **Rack Style** must be 40 mL vial.

11.4.35 Setup up the auto sampler according to section 9.1. Once that is complete enter a DI water sample in **POS** #4, in **Sample ID** put DI water, **Sample Type** select Sample, **Method ID** select Drinking H2O TOC 0.1-20 ppmCC, **Reps** 4, **Status** Ready.

11.4.36 Enter the first standard in **POS**: #5, in **sample ID**: 0.0ppmC **Sample Type:** select TOC Standard (see section 11.4.36.1), **Method ID** select Drinking H2O TOC 0.1-20 ppmCC, **Reps** 4, **Status** Ready.

11.4.36.1 Once the TOC standard is selected the Select Calibrator screen will appear. Select the standard that is being entered by highlighting the row, then select **Exit**. To link the analysis to the calibration curve file, the TOC standard must be selected as the sample for each new row. Failure to do this will cause TOC Talk to misinterpret the calibration data.

11.4.37 Enter the next five standards in the following **POS #6-#10**. Use the same information from section 11.4.36 and 11.4.36.1

11.4.38 In **POS #**11 enter an ICV (9.2.1), in **Sample ID** ICV 4.0ppmC, **Sample Type** select sample, **Method ID** select Drinking H2O TOC 0.1-20 ppmCC, **Reps** 4, **Status** Ready.

11.4.38.1 The ICV must be 90-110%. If the ICV is outside of these limits the calibration curve must be repeat.

11.4.39 Once all standards and ICV's are entered into the autosampler screen save the screen, by clicking the **SAVE/Use** button. If the rack was not named at the start of entering sample names, it can be named now.

11.4.40 Load the autosampler with appropriate vials.

11.4.41 Click **Start** to begin the analysis.

11.4.42 When the calibration run is complete, the calibration curve screen automatically appears.

11.4.43 If the curve that was just analyzed is not displayed, select it from the pull down menu of the calibration curve ID field.

11.4.44 Select the "use" column for each of the calibration standards just analyzed. Deselect any of the old calibration standards that may appear on the screen.

11.4.45 Select the recalculation button to calculate the calibration factor, y-intercept, and the r^2 value, and plot the new calibration curve.

11.4.46 The r^2 must be 0.995 or better. If the r^2 is outside of that range the instrument must be recalibrated.

11.4.47 Each certified analyst must analyze a calibration curve at least once every 3 months.

11.5 Analysis of samples TOC /DOC

11.5.1 Remove samples from refrigerator and let equilibrate to room temperature.

11.5.2 Touch a strip of pH paper to the top of the cap and compare the pH strip to the pH chart on the front of the package. The pH must be less than 2. If the sample is not less than 2 that sample can't be analyzed. Notify the project manager and supervisor.

11.5.3 To initialize the instrument, double click the TOCTalk 3.0 icon.

11.5.4 Go to **Set-Up** click on **Instrument**. Click on **Ready**, to activate t the UV lamp, the main gas inlet valve, the gas to UV chamber, and routes the carrier gas from the IC Sparger to vent, and from the UV Reactor to the NDIR.

11.5.4.1 On the Main Screen under the **sample analysis** screen click on the **Sample setup** button. The Auto sampler Analysis Setup screen will appear.

11.5.5 Create a new Autosampler Analyzer Setup file by selecting **File** and then selecting **New** from the autosample analysis setup screen.

11.5.6 The Rack style should be 40 mL vials

11.5.7 Add startup procedure and quality control per section 9.0. Once that is complete enter samples. When entering samples include WO# and sample IDs, along with any dilution factors that may apply. Each sample must be analyzed as a sample, under the sample type menu. The method must be TOC Range 0.1-20 ppmC, the reps are 4. If the sample is a DOC marked it with a (D)

11.5.8 Click **Save/Use**. The system prompts you for an Auto sampler Setup Name. Name the file the date the file was created, for example 071409 for July 14th 2009.

11.5.9 Select the Start button to begin the analysis.

11.5.10 To view the results click on **Results** on the menu at the top of the screen.

11.5.11 Click on **Multiple Analysis**. To print click on **File** and select **Print Summary Report.**

11.5.12 If more detailed information in needed about the run follow 11.5.11 and select **Print Detailed Summary Report**.

11.5.13 The data that is reported is the under the **Mean** section in the reports. This is the average of the replicates, results are reported in ppm.

11.5.14 All DOC must have a blank that was collected in the field. If a blank was not received the DOC can't be analyzed.

11.6 If the instrument requires maintenance or troubleshooting seek the wet chemistry supervisor's attention.

11.7 When entering data into the LIMS, ensure that the reagents used are added into the reagent section of the Bench Sheet.

12.0 DATA ANALYSIS AND CALCULATIONS

12.1 $y = mx + b_{cal}$

$b_{cal} = b_{reagent} + b_{rinse\ water}$

12.2 Percent Recovery:

% Recovery = (calculated value / theoretical value) x 100%

12.3 Percent Relative Percent Difference (%RPD)

$$\% RPD = \frac{(V_1 - V_2)}{(V_1 + V_2)/2}$$

where:

RPD = Relative Percent Difference
V_1 = Observed Value of sample
V_2 = Observed Value of Duplicate Sample

12.4 DOC calculation

Final Result for the DOC sample- The final result of the Field Blank collected with the samples=Corrected DOC

13.0 METHOD PERFORMANCE

13.1 A method detection study is conducted annually to determine the Method Detection Limit (MDL). This study is based on a minimum of seven samples.

14.0 POLLUTION PREVENTION

14.1 Standards should be prepared in volumes consistent with laboratory use to minimize the volume of expired standards to be disposed.

14.2 Any acids used in this procedure need to be neutralized prior to be disposal.

15.0 WASTE MANAGEMENT

15.1 The Environmental Protection Agency (USEPA) requires that laboratory waste management practice be conducted consistent with all applicable rules and regulations. Excess reagents, samples and method process wastes should be characterized and disposed of in an acceptable manner. The agency urges laboratories to protect the air, water, and land by minimizing and controlling all releases from hoods, and bench operations, complying with the letter and spirit of any waste discharge permit and regulations, and by complying with all solid and hazardous waste regulations, particularly the hazardous waste identification rules and land disposal restrictions. For further

information on waste management consult the "Waste Management Manual for Laboratory Personnel", available from the American Chemical Society at the address listed in Section 16.3.

16.0 REFERENCES

16.1 Standard Methods for the Examination of Water and Wastewater, 22 nd., Method 5310C.

16.2 Tekmar-Dohrmann Phoenix 8000 User Manual, 2002.

16.3 American Chemical Society, Waste Management Manual for Laboratory Personnel, Subcommittee on Environmental Analytical Chemistry, 1155 16th Street NW, Washington DC 20036.

16.4 Belmont Labs, Quality Assurance Manual, Quality Assurance/Quality Control Program, most recent revision.

16.5 Belmont Labs, Pipettor Calibration Standard Operating Procedure, Quality Assurance/ Quality Control program, BPL01-Pipettor Rev. No.:2 Update 2, August 9, 2011

16.6 Belmont Labs, Glassware Cleaning Standard Operating Procedure, Quality Assurance/Quality Control program, BPL01-Glassware Rev. No.:3 Update 2, August 9, 2011

16.7 Belmont Labs, Sample Homogenization Standard Operating Procedure, Quality Assurance/Quality Control Program BPL01_Sample Homogenization Rev. No. 1 Update 1, August 9th 2011.

16.8 Belmont Labs, Procedure for Checking Balance Procedure, Quality Assurance/Quality Control program Rev. 1 September 22, 2011

16.9 Belmont Labs, Procedure for issuing Non Conformance/ Corrective Action, Quality Assurance/Quality Control program Rev. 2 September 22, 2011

17.0 DATA VALIDATION, TABLES, DIAGRAMS AND FLOW CHARTS

17.1 Bench review:

17.1.1 The preparer/analyst is responsible for completing the preparation, sequence logbooks and for maintaining all standards and analysis data in a retrievable, traceable fashion.

17.1.2 The analyst is responsible for verifying that all instrument and preparation checks are within acceptance parameters as detailed in Section 9.0. If checks are not within acceptance parameters, perform any necessary corrective actions as described in Section 9.0.

17.2 Secondary review:

17.2.1 The reviewer must verify that all of the quality control measures defined in Section 9.0 were within acceptance limits. This includes the preparation blank and the LCS (ICV).

17.2.2 If any data is out of control, review the related corrective actions to see that they adequately addressed the outlying event. If a corrective action has not been initiated, notify the QA Manager and/or Laboratory Manager for guidance. Corrective actions must be completed as detailed in Section 9.0.

17.2.3 Verify that the results units are in the format specified by the client.

Table 17-1 Summary of Internal Quality Control Procedures

QC Element	Frequency	Acceptance Criteria	Corrective Action
Method Blank	One of the beginning batch and one after every 10 samples.	Control Limits, refer to Section 9.2.1	1 Check for calculation errors 2 Reanalyze blank, if value is still above 0.5, use alternate source of blank 3 Reanalyze blank and samples 4 Assess impact on data
Laboratory Control Sample (LCS)/(LCSD)	One at beginning of batch and one after every 10 samples	Control Limits, refer to Section 9.2.2	1 Check for calculation errors 2 Reanalyze the sample 3 Re-prepare and reanalyze the sample if necessary 4 Assess impact on data
Continuing Calibration Standard (CCV)	One at beginning of batch, one at end of batch, one per batch of no more than 20 samples	Control Limits, refer to Section 9.2.4	1 Check for calculation errors 2 Reanalyze the sample 3 Recalibrate and reanalyze 4 Assess impact on data
Sample Duplicate	One per batch of no more than 20 samples	Control Limits, refer to Section 9.5	1 Check for calculation errors 2 Recalculate RPD 3 Reanalyze sample

			4 Assess impact on data
MS/MSD	Must be run periodically.	Control limits, refer to section 9.2.3	1 Check for calculation errors 2 Recalculate RPD 3 Reanalyze sample 4 Assess impact on data

SOP Revision Summary of Changes

Section of the SOP	Changes Made or Added	Reason for Change	REV NUM
7.1	Deleted Section, no longer applicable	2014 Internal Audit Finding	1
7.9, 9.2.2	Added section stating secondary source purchased from Phenova or equivalent; corrected associated section (9.2.2	2014 Internal Audit Finding	1
11.7	Added section stating that reagents must be added into the bench sheet	2014 Internal Audit Finding	1
7.2	Changed purged DI water to DI water	2014 Internal Audit Finding	1
11.5.2	Updated section to allow touching the pH paper to the top of the cap, instead of using a plastic pipette	2014 Internal Audit Finding	1

BELMONT LABS
STANDARD OPERATION PROCEDURE

TITLE: Glassware Cleaning

(supersedes BPL01-Glassware Revision 3 Update 002)

PREPARED BY: _____ 4/22/14

REVIEWED BY: _____ 4/22/14
Date

_____ 4/22/14
QA Manager Date

_____ 4/22/14
Technical Director Date

_____ 4/22/14
Laboratory Director Date

Control of Documents Statement

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1.0 SCOPE AND APPLICATION

1.1 In all analysis, the preparation of scrupulously clean glassware is mandatory. Failure to do so can lead to numerous problems resulting from contamination. Special care must be taken with glassware such as Kuderna-Danish evaporative concentrators, sampling-train components, or any other glassware that may come in contact with any samples or extracts.

2.0 METHOD SUMMARY

2.1 The glassware is washed with detergent (either Alconox, Neutrad or equivalent), rinsed with tap water, rinsed with DI water, heated in an oven (organic glassware only), and finally all organic glassware prior to the next use is rinsed with the extraction solvent called for in the sample preparation step.

3.0 DEFINITIONS

3.1 Definitions of general terms used in this method are listed in the Quality Assurance Manual.

4.0 INTERFERENCES

4.1 N/A

5.0 HEALTH AND SAFETY

5.1 Personnel must wear lab coat or chemical resistant apron.

5.2 Safety glasses or face shield must be worn.

5.3 Personnel shall be familiar with the nearest eyewash and safety shower before starting work. They must be within 100 feet or 15 seconds of the station(s).

5.4 All accidents must be promptly reported to a supervisor.

5.5 Analyst shall utilize GOOD LAB PRACTICES at all times.

5.6 Good housekeeping shall be maintained to ensure safety.

5.7 Disposable gloves or Playtex gloves must be worn while washing glassware.

6.0 EQUIPMENT AND SUPPLIES

6.1 Large plastic (HDPE) tub

6.2 General lab oven

6.3 Flask brushes

6.4 Cotton Swabs

6.5 Labconco Steam Washing Machine.

6.5.1 Dishwasher rollers. Part Number: 445400Z

7.0 REAGENTS AND STANDARDS

7.1 Alconox or equivalent - glassware detergent- Certified non-bactericidal

7.2 Neutrad or equivalent - glassware detergent-Certified non-bactericidal

7.3 Methylene chloride, ACS Grade. As Methylene Chloride is flammable it must be stored in a flammable cabinet. The Methylene Chloride expiration date is set 6 years from the received date, and 6 months after it is opened.

7.4 DI water

7.5 Isopropyl Alcohol, ACS Grade. As Isopropyl Alcohol is flammable it must be stored in a flammable cabinet. The Isopropyl Alcohol expiration date is set 6 years from the received date, and 6 months after it is opened.

7.6 1:1 Hydrochloric Acid (HCl) solution – this is made by adding equal parts of hydrochloric acid and DI water (measure out the water first and add acid to the water).

7.7 Sulfuric Acid

7.8 N-Hexane, ACS Grade. As n-hexane is flammable it must be stored in a flammable cabinet. The n-hexane expiration date is set 6 years from the received date, and 6 months after it is opened.

7.9 Ether, ACS Grade. As ether is flammable it must be stored in a flammable cabinet. The ether expiration date is set 6 years from the received date, and 6 months after it is opened.

7.10 LabSolutions Neutralizing Acid Rinse

7.11 LabSolutions Non-foaming Powder Detergent

7.12 Acetone, ACS Grade. As acetone is flammable it must be stored in a flammable cabinet. The acetone expiration date is set 6 years from the received date, and 6 months after it is opened.

8.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

8.1 N/A

9.0 QUALITY CONTROL/QUALITY ASSURANCE

9.1 If a glassware contamination problem is suspected or observed in method blanks it will be necessary to determine the source of contamination. In most cases the contaminated glassware can be contributed to carryover from a dirty or highly contaminated sample. When this is the case extra care must be taken in cleaning the glassware. Solvents listed

in section 7.0 can be used to rinse the glassware and/or longer heating time in the oven may be necessary.

10.0 CALIBRATION AND STANDARDIZATION

10.1 N/A

11.0 PROCEDURE

11.1 Procedure for washing semi-volatile organic glassware

11.1.1 As soon as possible after the glassware has been used, it is rinsed with methylene chloride by the extraction analyst. The glassware is then given to the dishwasher, if this person is different from the extraction analyst.

11.1.2 The glassware is then cleaned with soapy water (Neutrad only) using brushes. If needed, cotton swabs can be used to reach small areas missed by the brushes.

11.1.3 The glassware is then rinsed with tap water three times.

11.1.4 The glassware is then thoroughly rinsed with DI water three times.

11.1.5 Following the water rinses, the glassware is baked in an oven. The temperature programs used are as follows: Maytag Oven - 550°F, for 140 minutes. Accubake Oven – 500°F for 140 minutes.

11.1.6 The drying and storage of the cleaned glassware is of critical importance to prevent the beneficial effects of the scrupulous cleaning from being nullified. Pegboard drying is not allowed! Glassware will not be left in the open without protective covering. The dust cloud raised by the daily sweeping of the laboratory floor can easily re-contaminate the clean glassware. Keep all clean glassware in a drawer, covered with paper towels or upside down if possible.

11.1.7 Prior to the next use the glassware is rinsed with acetone and/or the extraction solvent called for in the sample preparation step. This is performed under a hood by the extraction analyst

11.1.8 Check all glassware for cracks, chips, and discoloration, and notify the supervisor if you find any.

11.2 Procedure for washing Wet Chem and Microbiology glassware

11.2.1 Wash by hand in hot soapy water using a brush to remove residues.

11.2.2 Rinse in hot tap water several times.

11.2.3 Rinse two to three times in DI water.

11.2.4 Air dry

11.2.5 Isopropyl alcohol can be used to remove stains instead of acid.

11.2.6 Glassware can be rinsed with 1:1 HCl to remove containments.

11.2.7 Every batch of micro glassware will have the pH tested while the glassware is still wet. The pH will be recorded in a logbook.

11.2.8 Check all glassware for cracks, chips, and discoloration, and notify the supervisor if you find any.

11.3 Procedure for washing TCLP glassware and plastics

11.3.1 Wash by hand in hot soapy water using a brush to remove residues.

11.3.2 Rinse in hot tap water several times.

11.3.3 Rinse two to three times in DI water.

11.3.4 Air dry

11.3.5 Acetone can be used only in the main wash room (115) to remove grease, paint or oil. Acetone cannot be used in the TCLP prep room.

11.3.6 Check all glassware for cracks, chips, and discoloration, and notify the supervisor if you find any.

11.4 Procedure for washing TCLP ZHE

11.4.1 Disassemble ZHE being careful to strain any solid content.

11.4.2 Wash by hand in hot soapy water using a scrub pad and brush to remove any residues.

11.4.3 Rinse in hot tap water several times.

11.4.4 Air dry

11.4.5 Isopropyl alcohol can be used to remove stains.

11. 4.6 Notify the supervisor if you notice any cracks or damaged parts.

11.5 Procedure for Dishwashers (Wet Chem and Micro Glassware only)

11.5.1 Load dishwasher with glassware.

11.5.2 Check acid reservoir in door of washer, add LabSolutions Neutralizing Acid Rince solution, to the right hand container, if running low. This needs to be checked every other day.

11.5.3 Add LabSolutions Non-foaming Powder Detergent to left hand container in the door. Half fill the left side compartment for regular washing or half fill the right side compartment for glassware that needs heavier cleaning.

11.5.4 Select user 2 program, press select program until User 2 program is displayed.

11.5.5 Push start on washer.

11.6 Procedure for washing volatile organic glassware

11.6.1 Rinse all glassware 3 times with tap water.

11.6.2 Rinse all glassware 3 times with DI water.

11.6.3 Bake in oven at 100°C for at least 4 hours. When possible glassware is baked in the oven overnight.

11.7 Quick drying procedure for NON-Semi volatile glassware is as follows:

11.7.1 After glassware is washed and rinsed glassware may be rinsed with acetone to eliminate residual water, then the glassware is to be rinsed with the extraction solvent. This is to be performed under the hood.

11.7.2 Analyst may also bake the glassware in the oven for 30-45 minutes at 500 degrees Fahrenheit or until all standing water is removed. Then rinse glassware with extraction solvent prior to use.

12.0 DATA ANALYSIS AND CALCULATIONS

12.1 N/A

13.0 METHOD PERFORMANCE

13.1 N/A

14.0 POLLUTION PREVENTION

14.1 N/A

15.0 WASTE MANAGEMENT

15.1 The Environmental Protection Agency (USEPA) requires that laboratory waste management practice be conducted consistent with all applicable rules and regulations. Excess reagents, samples and method process wastes will be characterized and disposed of in an acceptable manner. The agency urges laboratories to protect the air, water, and land by minimizing and controlling all releases from hoods, and bench operations, complying with the letter and spirit of any waste discharge permit and regulations, and by complying with all solid and hazardous waste regulations, particularly the hazardous waste identification rules and land disposal restrictions. For further information on waste management consult the “Waste Management Manual for Laboratory Personnel,” available from the American Chemical Society at the address listed in Section 16.4.

16.0 REFERENCES

16.1 "Test Methods for Evaluating Solid Waste Physical/Chemical Methods," SW-846, 3rd Edition, Revision 1, Chapter 4, December 1987

16.2 "Standard Methods for the Examination of Water and Wastewater", 17th Edition, Part 1000, 1989

16.3 "Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, OLM01.6, USEPA Contract Laboratory Program, June 1991

16.4 American Chemical Society, Waste Management Manual for Laboratory Personnel, Subcommittee on Environmental Analytical Chemistry, 1155 16th St. NW, Washington, DC 20036.

16.5 Belmont Labs, Quality Assurance Manual, Quality Assurance/Quality Control Program, Current Revision

1.6.6 Laboratory Manual for the Microbiological Analyses of Public Drinking Water, OEPA 2001.

17.0 DATA VALIDATION, TABLES, DIAGRAMS, & FLOW CHARTS

SOP Revision Summary of Changes

Section of the SOP	Changes Made or Added	Reason for Change	REV NUM
11.6	Added procedure for cleaning VOC glassware	Procedure Needed	0
11.2.5	Removed ability to use chromerge	Revision Update	0
11.1	Altered Section 11.1 to clarify which individuals perform which portions of the SOP	Procedural Update	0
11.1.5	Updated SOP to include new temperature programs for new equipment	Revision Update	0
6 and 7	Included new dishwasher and equipment	Additional Equipment	0
2 and 7	Removed references to Acetone (which is not used)	Revision Update	0
7	Removed Chromerge (no longer used)	Revision Update	0
11.7	Added Quick Drying Procedure for Non-SVOC Glassware	Additional Procedure	0

BELMONT LABS

STANDARD OPERATING PROCEDURE

TITLE: Nonconformances, Corrective Actions, and Client Complaints

(Supersedes BPL01-NCMR Revision 0)

PREPARED BY: _____ 5/23/14
Date

REVIEWED BY: Brooke Chandler 5-23-14
Date

_____ 5/23/14
QA Manager Date

Brooke Chandler 5-23-14
Technical Director Date

Brooke Chandler 5-23-14
Laboratory Director Date

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1.0 SCOPE AND APPLICATION

1.1 This SOP outlines the policies and procedures that have been established for dealing with work, or results of this work, that does not conform to Belmont Lab's written procedure or the agreed requirements of the client.

1.2 This SOP outlines the policies and procedures that have been established for dealing with chronic failure of the quality system or technical operations have been identified.

1.3 This SOP outline the policies and procedure that have been established for resolving complaints received from clients.

2.0 METHOD SUMMARY

2.1 The QCBD system has been put into place to organize and document deviations from written procedure, failures of the lab to meet client requirements, identified failures of the quality system or technical operation, and client complaints.

3.0 DEFINITIONS

3.1 Non-Conformance (NCMR): Deviations from accepted Belmont Labs written procedure or agreed requirements of the client.

3.2 Corrective Action (CA): Chronic failure of quality system or technical operation.

3.3 General deficiencies are issues that deviate from procedures established in SOPs or QAM that do not impact data, or client requirements.

3.4 Serious issues are deficiencies that have the potential to impact client data or impact client services. However these issues were caught and resolved before reporting to the client.

3.5 Critical issues are deficiencies that have the potential to result in revenue loss for the company.

4.0 INTERFERENCES

4.1 N/A

5.0 HEALTH AND SAFETY

5.1 N/A

6.0 EQUIPMENT AND SUPPLIES

6.1 Computer equipped with windows 2000 or new operating system, printer

6.2 QCBD- CAMA software

6.3 E-mail software

7.0 REAGENTS AND STANDARDS

7.1 N/A

8.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

8.1 N/A

9.0 QUALITY CONTROL / QUALITY ASSURANCE

9.1 N/A

10.0 CALIBRATION AND STANDARDIZATION

10.1 N/A

11.0 PROCEDURE

11.1 Non-Conformances

11.1.1 Once a deviation from written procedure or a deviation from client requirements have been identified, a NCMR must be started immediately. An NCMR is also started for all internal audit finding and any performance evaluation samples that have been missed.

11.1.2 Double Click on the QCBD software icon. A box will appear that will prompt the user for a user's name and password. Each employee has been given a unique username and password to enter the QCBD system. If there is the user name and password do not work, or you have not been issued a username and password please see the IT tech or Lab Manager.

11.1.3 Once an appropriate username and password have been entered into the appropriate field. Click the GO button.

11.1.4 A screen will appear, click on Non Conforming Material Control on the left side of the screen.

11.1.5 On the right side of the screen click enter a new non-conformance.

11.1.6 Info Tab:

11.1.6.1 The following fields are mandatory, and must be completed on all NCMRs.

11.1.6.2 <u>Nonconformance:</u> List in this field what occurred, i.e. the reason for the NCMR. This section should be kept brief, as the situation will be explained in more depth in the "Explanation of Nonconformance" Section.

11.1.6.3 <u>Requirements:</u> List in this field what was required, i.e. what should have happened.

11.1.6.4 Nonconformance Categories: Click on the "…" button, this will open a window of pre-set non-conformance categories. Select the one that best describes what occurred. If none are applicable, a manual entry may be used, however, this should only be done in rare circumstances.

11.1.6.5 Batch Number, WO Number, and Department: Complete these categories with the appropriate information.

11.1.6.6 The following fields are not mandatory, but should be completed if applicable: Instrument ID, Vendor Name, Vendor Lot Number.

11.1.7 Project Information Tab

11.1.7.1 The following fields are mandatory, and must be completed with every NCMR: Test Code, Clients Impacted and Analysis Date.

11.1.8 Explanation of Nonconformance Tab:

11.1.8.1 The following fields not are mandatory, but should be completed with if applicable:

11.1.8.2 Discrepancy Responsibility: Check either "Cause Customer" or "Cause in House", whichever is applicable.
Note: Both options may be selected if the cause was both the customer and in house.

11.1.8.3 Description of Nonconformance: In this field, list a detailed summary of the events that occurred to cause the Nonconformance to occur. This section should also include a root-cause analysis,

11.1.9 Corrective Action Tab

11.1.9.1 The following fields are mandatory, and must be completed with every NCMR:

11.1.9.2 Corrective Action Description: List the actions taken to correct the cause of the NCMR. This section should clearly indicate how the actions taken should prevent the given error moving forward.

11.1.9.3 Corrective Action Completed By: This field contains the initials of whoever completed the Corrective Action.

11.1.10 Follow up Tab

11.1.10.1 The following fields are mandatory, and must be completed with every NCMR:

11.1.10.2 Follow-Up Action: This field should be completed by QA; preferably at least a week after the corrective action has been put in place, to verify that the corrective action is still in place and working.

11.1.10.3 Follow-Up Verified By: This field contains the initials of whoever completed the follow up action.

11.1.11 File Attachments Tab

11.1.10.1 Attach any files that may be relevant to the Nonconformance. Some examples include: email correspondence, QC results, completed training documents, etc.

11.1.12 Approvals

11.1.10.1 Include any individuals that should be aware of the nonconformance and corrective action. Generally this should be anyone in the department who performs the analysis, the department supervisor, QA, and the Project Manager if the client was impacted.

11.2 Corrective Actions

11.2.1 Corrective Actions are a much more in-depth analysis of a process or policy. A CAR is started by QA or by the Laboratory Director, when any of the following criteria is met:

11.2.1.1 A trend is noted in NCMRs, necessitating a more thorough analysis of the issue.

11.2.1.2 The issue contains a large breadth or depth of impact to the lab; e.g. the issue affects multiple departments, or drastically affects one department.

11.2.1.3 **Internal Audits are documented via CARs.**

11.2.1.4 PT Performance is documented via CARs.

11.2.2 Double Click on the QCBD software icon. A box will appear that will prompt the user for a user's name and password. Each employee has been given a unique username and password to enter the QCBD system. If there is the user name and password do not work, or you have not been issued a username and password please see the IT tech or Lab Manager.

11.2.3 Once an appropriate username and password have been entered into the appropriate field. Click the GO button.

11.2.4 A screen will appear, click on Corrective Action on the left side of the screen.

11.1.5 On the right side of the screen click enter a new record.

11.2.6 Info Tab:

11.2.6.1 The following fields are mandatory, and must be completed on all NCMRs.

11.2.6.2 Reason for CAR: This should contain the reason(s) that the CAR was initiated

11.2.6.3 Nonconformance Categories: Click on the "…" button, this will open a window of pre-set non-conformance categories. Select the one that best describes what occurred. If none are applicable, a manual entry may be used, however, this should only be done in rare circumstances.

11.2.6.4 Assigned To: This field contains the name of the individual responsible for completing the investigation, containment, root cause, and corrective action tabs. While multiple individuals may be required to complete these tabs, it is the individual in the "Assigned To" field's responsibility to ensure that the listed tabs are completed.

11.2.7 Investigation Tab:

11.2.7.1 This tab contains an in-depth investigation of the issue. All relevant information surrounding the events is to be listed in this field in a coherent fashion.

11.2.8 Containment Tab:

11.2.8.1 This tab contains actions taken to prevent the problem from spreading to additional work orders.
Example: if a peak was mis-identified in a GC/MS calibration, a containment action would be to verify all current GC/MS calibrations for that analysis to ensure that problem is not impacting current data.

11.2.9 Root Cause:

11.2.7.1 This tab contains an in-depth Root Cause Analysis of the issue. This should address why the mistake occurred.
Note: Generally, analyst error should not be the final root cause, as the root cause should address why the analyst made the error, and attempt to ameliorate that situation.

11.2.10 Corrective Action Tab:

11.2.10.1 List the actions taken to correct the cause of the CAR. This section should clearly indicate how the actions taken should prevent the given error or situation moving forward.

11.2.11 Verification Tab:

11.1.10.2 This field should be completed by QA; preferably at least a week after the corrective action has been put in place, to verify that the corrective action is still in place and working.

11.2.12 Tasks Tab:

11.1.12.1 Tasks may be added to this tab after the CAR has been saved. This is not mandatory; however, it is recommended that tasks be assigned to individuals in order to clearly define jobs/roles in completing the CAR.

11.2.13 File Attachments Tab

11.1.13.1 Attach any files that may be relevant to the Nonconformance. Some examples include: email correspondence, QC results, completed training documents, etc.

11.2.14 Approvals

11.1.14.1 Include any individuals that should be aware of the nonconformance and corrective action. Generally this should be anyone in the department who performs the analysis, the department supervisor, QA, and the Project Manager if the client was impacted.

11.3 Client Complaints

11.3.1 In the event that a client of Belmont Labs whishes to register a complaint, this is documented via the Client Complaints Module. Any time a client expresses dissatisfaction with Belmont Lab's services, it should be documented via a Client Complaint.

11.3.2 Double Click on the QCBD software icon. A box will appear that will prompt the user for a user's name and password. Each employee has been given a unique username and password to enter the QCBD system. If there is the user name and password do not work, or you have not been issued a username and password please see the IT tech or Lab Manager.

11.3.3 Once an appropriate username and password have been entered into the appropriate field. Click the GO button.

11.3.4 A screen will appear, click on Customer Complaints on the left side of the screen.

11.3.5 On the right side of the screen click enter a Customer Complaint.

11.3.6 Info Tab:

11.3.6.1 All fields in the Info section should be completed including the Complaint Description Section. This should contain a general assessment of the complaint.

11.3.7 Details Tab:

11.3.7.1 The following fields are mandatory and must be completed with each customer complaint:

11.3.7.2 Company Name & Project Manager: Fill in the name of the company that the Customer Complaint pertains to, and the Belmont Lab's Project Manager responsible for that client.

11.3.7.3 Complaint Category: Click on the "…" button, this will open a window of pre-set non-conformance categories. Select the one that best describes what occurred. If none are applicable, a manual entry may be used, however, this should only be done in rare circumstances.

11.3.7.4 Check Boxes: Click all check boxes that apply

11.3.7.4.1 Customer Requests Response

11.3.7.4.2 Rechecks Requested

11.3.7.4.3 Report Reissued

11.3.8 Investigation Tab:

11.3.8.1 Fill in this tab with a thorough investigation as to the events that occurred that led to the client complaint. This should clearly detail the history of the event, as well as any corrective action taken to ameliorate the situation.

11.3.9 Follow Up Tab:

11.3.9.1 This field should be completed by either QA or the Laboratory Director; preferably at least a week after the corrective action has been put in place, to verify that the corrective action is still in place and working.

11.3.10 Approvals

11.3.10.1 Include any individuals that should be aware of the nonconformance and corrective action. Generally this should be anyone in the department who performs the analysis, the department supervisor, QA, and the Project Manager if the client was impacted.

11.4 QCBD Approval

Note: The NCMR, Corrective Action, or Customer Complaint needs to be complete before any approvals can be made.

11.2.1 Each approver is responsible for making sure that all of the information is completed in the QCBD Record. The QCBD Record report should be a complete description of the deviation and the action take to rectify the problem. The supervisor/manager that is reviewing each QCBD Record is ultimately responsible for ensuring that the QCBD Record is complete before it is finally closed.

11.2.2 Each approver should provide a detailed description in the follow-up section as to why they approved the QCBD Record. If no additional information is required, the approver should confirm that they approve the actions of the NCMR.

11.2.3 Review the QCBD Record, Click EDIT button to add an edit any or add a comment to any of the fields. Once this edit process is complete, click SAVE.

11.2.4 Click on the **Approval** tab, select your name, then click the approve button. A new screen will appear enter in your password. Then click OK.

11.2.5 E-mail all other parties involved with the QCBD Record to inform them that the QCBD Record has been approved.

12.0 DATA ANALYSIS & CALCULATION

12.1 N/A

13.0 METHOD PERFORMANCE

13.1 N/A

14.0 POLLUTION PREVENTION

14.1 N/A

15.0 WASTE MANAGEMENT

15.1 N/A

16.0 REFERENCES

16.1 U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised August 1993, Method 335.4.

16.2 Guideline and Format for EMSL-Cincinnati Methods. EPA-600/8-83-020, August 1983.

16.3 Standard Methods, For the Examination of Water and Waste Water, 21th ed. Revised 2005

16.4 American Chemical Society, Waste Management Manual for Laboratory Personnel, Subcommittee on Environmental Analytical Chemistry, 1155 16th St. NW, Washington, DC 20036.

16.5 Belmont Labs, Quality Assurance Manual, Quality Assurance/Quality Control Program, Twenty First Edition, May 6, 2011

16.6 Belmont Labs, Potable Quality Assurance Manual, Quality Assurance/Quality Control Program, Five Edition, July 7th , 2009.

16.7 DoD Quality System Manual for Environmental Laboratories
Version 4.2 10/25/2010

16.8 NELAC Quality system manual, Approved June 5, 2003.

17.0 TABLES, DIAGRAMS, FLOW CHARTS, & VALIDATION DATA

17.1 N/A

SOP Revision Summary of Changes

Section of the SOP	Changes Made or Added	Reason for Change	REV NUM
All	Extensive Changes to entire document, please review entire document.	Software Update	0

BELMONT LABS

STANDARD OPERATING PROCEDURE

TITLE: Digestion Procedures for Preparation of Surface and Ground Water for ICP and GFAA Based on Method 3005A.

(Supersedes BL-MT-009 Revision 1)

PREPARED BY: _____ 11/11/14
Date

REVIEWED BY: _____ 11/11/14
Date

_____ 11/11/14
QA Manager Date

Brooke Chandler 11/11/14
Technical Director Date

Brooke Chandler 11/11/14
Laboratory Director Date

Control of Documents Statement

This document shall only be considered a controlled document if being viewed via the Element LIMS or the Belmont Labs Intranet. All other copies, digital or print shall be considered uncontrolled. It is the intention of QA that only controlled documents are referenced for the performance of Lab Procedures and Analyses. It is the responsibility of the analyst to verify the materials of any uncontrolled document with the controlled copy if an uncontrolled document is referenced.

1.0 SCOPE AND APPLICATION

1.1 This digestion procedure is used for the preparation of surface water and ground water samples for analysis by inductively coupled argon plasma spectroscopy (ICP), or by graphite furnace atomic absorption spectroscopy (GFAA). Samples prepared by this method are for the following metals:

Aluminum	Magnesium
Antimony	Manganese
Arsenic	Molybdenum
Barium	Nickel
Beryllium	Potassium
Cadmium	Selenium
Calcium	Silver
Chromium	Sodium
Cobalt	Thallium
Copper	Vanadium
Iron	Zinc
Lead	

1.2 PQL for each element are listed in the analytical procedure.

2.0 METHOD SUMMARY

2.1 For the analysis of total dissolved metals, the sample is filtered at the time of collection, prior to acidification with nitric acid.

2.2 Total recoverable metals - The entire sample is acidified at the time of collection with nitric acid. At the time of analysis the sample is heated with acid and substantially reduced in volume. The digestate is filtered, if necessary, and diluted to volume, and is then ready for analysis.

2.3 Dissolved metals - The sample is filtered through a 0.45-µm filter at the time of collection and the liquid phase is then acidified at the time of collection with nitric acid. Samples for dissolved metals do not need to be digested as long as the acid concentrations have been adjusted to the same concentration as in the standards.

3.0 DEFINITIONS

3.1 Definitions of general terms used in this method are listed in the Quality Assurance Manual.

4.0 INTERFERENCES

4.1 Interferences are discussed in the referring analytical method. The analyst must be cautioned that this digestion procedure is not sufficiently vigorous to destroy some metal complexes.

5.0 HEALTH AND SAFETY

5.1 Safety glasses or face shield must be worn in the lab at all times.

5.2 Personnel must read relevant MSD sheets and be familiar with the Laboratory Chemical Hygiene Manual.

5.3 Disposable PVC gloves must be worn while handling acids.

5.4 Personnel must be familiar with the nearest eyewash and safety shower before starting work. They must be within 100 feet or 10 seconds of the station(s).

5.5 All accidents must be promptly reported to a supervisor.

5.6 Analyst must utilize GOOD LAB PRACTICES at all times.

5.7 Good housekeeping must be maintained to ensure safety.

5.8 Analysis must be performed by competent personnel.

6.0 EQUIPMENT AND SUPPLIES

6.1 Plastic watchglass cover.

6.2 Pipettes: Microliter with disposable tips. Sizes can range from 5 to 1,000 uL, as required.

6.3 55 ml screw top polypropylene sample containers, graduated.

6.4 Hot Block Digester.

6.5 Filtermates, plunger style filters. (Environmental Express)

6.6 Polycarbonate storage hot block racks.

6.7 Temperature probe.

6.8 Analytical balance – capable of accurate weightings to 4 significant figures.
6.9 Reagent dispensing bottles.

6.10 17x100 mm culture test tubes.

7.0 REAGENTS AND STANDARDS

7.1 Trace metal grade acids must be used in all tests requiring the use of acids. Reagent grade chemicals must be used in all tests. Unless otherwise indicated, it is intended that all reagents must conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades can be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its used without lessening the accuracy of the determination. If the purity of a

reagent is in question analyze for contamination. If the concentration is less than the MDL then the reagent is acceptable.

7.1.1 Concentrated hydrochloric acid (HCl).

7.1.2 Concentrated nitric acid (HNO_3).

7.2 Reagent Water. All references to water in the method refer to reagent water unless otherwise specified. Reagent water must be interference free. As defined in SW-846, chapter one, "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 can be used to generate organic-free deionized water."

7.3 Spiking solutions.

7.3.1 Laboratory control sample/laboratory control sample duplicate, matrix spike/matrix spike duplicate spiking solution – two purchased solutions, Quality Control Standard – 21 element (contains Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, Se, Tl, Ti, V, Zn, Li and Sr at a concentration of 100 ug/ml in 5% HNO_3) and Quality Control Standard – 7 element (contains Al, Ba, B, Ag and Na at 100 ug/ml, K at 100 ug/ml and Si at 50 ug/ml in 5% HNO_3). An equivalent vendor-certified solution can be used. The maximum shelf life for the solution is 1 year. Use the vendor-supplied expiration if it indicates less than a year shelf life. Store the solutions at room temperature sealed in their original plastic container.

8.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

8.1 Requirements for sample preservation, sample containers, and sample storage are detailed in Table 17-1.

8.2 Glassware can be prewashed. In the determination of trace metals, sample containers have the potential of introducing positive or negative errors in the measurement by (a) contributing contaminants through leaching or surface desorption, and (b) depleting analyte concentrations through adsorption. Consequently, the collection and treatment of the samples prior to analysis requires particular attention. The following cleaning treatment sequence has been determined to be adequate in minimizing contamination in sample bottles, whether borosilicate glass, linear polyethylene, polypropylene, or Teflon: detergent, tap water, 2% nitric acid, tap water, and Type II water.

Note: **Chromic acid must not be used to clean glassware**, especially if chromium is one of the analytes. Commercial, no-chromate products (e.g., Nochromix) can be used in place of chromic acid if a more rigorous cleaning procedure is required. (Chromic acid must also not be used with plastic bottles.)

8.3 Samples for analysis using this SOP must be stored tightly sealed in a 500 ml high density polyethylene bottle. All water samples must be made acidic with nitric acid to a pH of <2. Samples can be stored at room temperature.

9.0 QUALITY CONTROL/QUALITY ASSURANCE

9.1 All specific quality control samples described in the analytical procedure must be followed. Refer to the appropriate SOP for the analytical procedure for detailed instructions.

9.2 Process samples by analytical batch. A batch is a group of no more than twenty samples of a similar matrix (i.e. water) that are digested together.

9.3 Prepare the following quality control samples with each batch: a method blank, a laboratory control sample/laboratory control sample duplicate (LCS/LCSD) pair and a matrix spike/matrix spike duplicate (MS/MSD) pair. Groundwater samples and samples for dissolved metals also require a sample duplicate (DUP) and a Post Digestion Spike (PDS) per analytical batch.

9.3.1 Post Digestion Spike (PDS) – using the same sample that was used for the MS/MSD, digest the sample with no spiking solution added, sample only. After the digestion process, add 500 ul of each spiking solution to the sample and bring the volume back to 50 ml using reagent water. The PDS is used to confirm matrix interference and to determine that the digestion process did not cause the interference

10.0 CALIBRATION AND STANDARDIZATION

10.1 Check to see that the analytical balance has been inspected within the last year and the daily check has been conducted. If either of these has not been completed, notify your supervisor before using.

10.2 Each Lot of digestion tubes have their calibration verified at the 10, 20, 40 and 50 mL marks prior to use. This is performed by verifying the graduated mark against the weight of water. The value must be within the limits assigned in the logbook. The results recorded in the appropriate logbook.

11.0 PROCEDURE

11.1 Block Digestion Tube Verification

11.1.1 As the vendor provides a certificate of calibration with each lot, for 50mLs, this procedure need not be completed for that volume. This procedure must be completed for each lot number at 10, 20, 40 and 50 mL, and documented in the appropriate logbook

11.1.2 Place a sample container on an analytical balance and tare it.

11.1.3 Add the appropriate volume of water to the container for the volume being calibrated (10mL of water for the 10mL verification, etc.)

11.1.4 Re-weigh the container with the water added. The weight must be the volume (in mLs) of water added (in grams) ± 0.5g.

11.1.4 If the weight falls outside the acceptance range repeat the process with a different container to determine if the problem is with the lot or just the initial container. If the weight falls outside the acceptance range on the second container, the lot must be considered suspect and should be exchanged with the provider.

11.2 Checking the pH of the samples.

11.2.1 This can be done either one of two ways first take a plastic disposable pipette and remove an aliquot of sample from the bottle. Place the aliquot of sample on a pH strip. Compare the strip to the front/back of the pH strip container to determine pH range. Second pour the sample over the pH strip then compare the strip to the front/back of the pH strip container to determine pH range

11.2.2 The pH must be less than 2. If the pH is greater than 2, add 1:1 Nitric Acid to the sample, shake to mix and re-check the pH in 16 hours. Continue until the pH is less than 2.

11.2.3 If the sample pH had to be adjusted prior to analysis, the samples is flagged with a “P” flagging indicating the sample was not properly preserved.

11.3 Manual Procedure using a Hot Block

11.3.1 Add 50mL of sample, 1 ml of concentrated HNO_3 and 2.5mL of concentrated HCl to the digestion tube. Alternatively, 2mL of 50% v/v HNO3 and 2.5mL of concentrated HCl may be used. Less than 50 mL of sample may be used in the event that the sample is reactive, high in target analytes, and/or high in total solids. If less sample volume is used, the final sample volume is brought to 50mL using DI water, and the dilution factor is noted on the bench sheet.

11.3.2 The sample is covered with a ribbed watch glass, and heated for 3.5 hours using a block digester set at a temperature of 120-125°C (this results in a sample container temperature of 92-98°C). Heating of the samples for 3-5 hours will reduce the volume in the tube to approximately 7.5-10 ml. A tube filled to 50 ml with diH2O can used as a guide for digestion time.

11.3.3 Adjust to the final volume of 50 ml with reagent water in the graduated container labeled with that sample’s unique laboratory identification number or QC sample identification for that batch. The sample is now ready for analysis. Digestates must be analyzed within 6 months.

11.4 Prepare a Method Blank (MB), Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD), and Matrix Spike/Matrix Spike Duplicate (MS/MSD) pair with each batch of samples. All groundwater samples also require a Duplicate (DUP). A batch is a group of no more than twenty samples of a similar matrix prepared during one digestion.

11.4.1 Method blank – measure 50 ml of reagent water in to a graduated sample container. Proceed with the digestion starting in 11.3 or 11.4.

11.4.2 Laboratory control sample/laboratory control sample duplicate – Add 500 uL of each of the LCS spiking solutions to a graduated sample container and dilute to

the 50 ml mark using reagent water. Proceed with the digestion starting in 11.3 or 11.4.

11.4.3 Duplicate – Prepare a duplicate sample by performing the procedure listed in section 11.3 twice on the same sample,

11.4.3 Matrix spike/matrix spike duplicate – Add 500 uL of each of the LCS spiking solutions to a graduated sample container and dilute to the 50 ml mark with sample. Proceed with the digestion starting in 11.3 or 11.4.

11.5 When necessary, filter the digestate to remove silicates and other insoluble material that could clog the nebulizer. Filtration must be done only if there is concern that insoluble materials can clog the nebulizer. Use filter mates when possible. Whenever a sample requires filtration, the filtration method blank must also be included in the batch.

11.6 Make a record of the sample preparation in the preparation notebook. Include the date, work order and sample ID, preparation procedure, determinative procedure, quality control preparations, analyst's name, and the date of preparation. Any special circumstances or notations regarding the preparation or the samples must be included if the analyst deems them necessary for the analysis.

12.0 DATA ANALYSIS AND CALCULATIONS

12.1 Calculations are discussed in the referring analytical method.

13.0 METHOD PERFORMANCE

13.1 A method detection study is conducted annually to determine the Method Detection Limit (MDL). This study is based on a minimum of seven samples. The MDLs are listed in the analytical procedure.

13.2 Due to the change in technology, the Laboratory is using disposable plastic digestion containers instead of glass beakers. These containers are also graduated which eliminates the need to transfer the sample into volumetric flask after digestion. The manufacture provides a calibration certification which states that the calibration is 50 ml $\pm$ 0.2 ml. The tolerance for class "A" volumetric flask is 0.1% where the graduated plastic container Belmont Labs is using has a tolerance of 0.4%. There is a slight difference in the tolerance but not enough to make a difference in the analytical results.

13.3 The Laboratory is using a final volume of 50 mL instead of 100 mL. All reagents are reduced by half as well.

14.0 POLLUTION PREVENTION

14.1 Standards must be prepared in volumes consistent with laboratory use to minimize the volume of expired standards to be disposed.

14.2 Any acids used in this procedure need to be neutralized prior to being disposed.

15.0 WASTE MANAGEMENT

15.1 This procedure generates some inorganic acid wastes from unused standards and nonaqueous samples and solid waste from solid samples. All waste disposal procedures must comply with federal and local laws and regulations.

15.2 For sample management and disposal, see SOP BPL01-Archive&Disposal.

16.0 REFERENCES

16.1 "Test Methods for Evaluating Solid Waste Physical/Chemical Methods," SW-846, 3rd Edition, Revision 1, December 1987.

16.2 Belmont Labs, Quality Assurance Manual, Current Revision

16.3 "Acid Digestion of Waters for Total Recoverable or Dissolved Metals for Analysis by FLAA or ICP Spectroscopy," SW846 Method 3005A, Revision 1, July 1992

17.0 DATA VALIDATION, TABLES, DIAGRAMS & FLOW CHARTS

17.1 Data validation is discussed in the referring analytical method.

Table 17-1 Sample preservation, Containers, and Storage

Digestion

Measurement	Vol. Req. (ml)	Collection Volume (ml)	Preservative(1)	Holding Time(2)
Metals (except hexavalent chromium and mercury):				
Total Recoverable	50	500	HNO_3 to pH <2	6 months
Dissolved	50	500	Filter on site; HNO_3 to pH <2	6 months
Suspended	50	500	Filtered in-house	6 months
Total	50	500	HNO_3 to pH <2	6 months

either plastic or glass containers can be used.

*Note:

(1) – If the sample is not preserved at the time of collection, the sample is flagged according to section 11.

(2) - Holding time starts at the time the sample was collected and the samples must be digested within 6 months from this date.

SOP Revision Summary of Changes

Change BPL01-3005A Rev 6 to create BL-MT-009, Rev1)

Section of the SOP	Changes Made or Added	Reason for Change	Revision Number
11.3.1	Added sample volume used, and procedure for pre-prep dilution	2013 Internal Audit Finding #4	1
11.3.2	Changed temperature requirement from 95 Degrees to 92-98 Degrees	2013 Internal Audit Finding #5	1
1.0	Removed * from various analytes	Clarity, 2013 Internal Audit Finding #2	1
11.4	Modified to include a duplicate analysis for Groundwater Samples	2013 Internal Audit Finding #5	1

PACE ANALYTICAL

STANDARD OPERATING PROCEDRURE

TITLE: Determination of Trace Elements and Metals in Water, Waste Water, and Soil and Waste by Inductively Coupled Plasma-Atomic Emission Spectroscopy Based on Method 200.7

(Supersedes BPL01_200.7 Revision 2, Update 2)

PREPARED BY: _____ 11/11/14
Date

REVIEWED BY: _____ 11/11/14
Date

_____ 11/11/14
QA Manager Date

_____ 11/11/14
Technical Director Date

_____ 11/11/14
Laboratory Director Date

Control of Documents Statement

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1.0 SCOPE AND APPLICATION

1.1 Inductively coupled plasma-atomic emission spectroscopy (ICP) determines trace elements and total metals in solution. The method is based upon EPA Method 200.7 and is applicable to water, wastewater and soil analyses. Some samples may require digestion prior to analysis. Refer to Table 17-1 for the list of elements that are applicable to this procedure. The following metals are approved by the Ohio EPA : Ag, Al, Ba, Ca, Co, Cr, Fe, K, Mg, Mn, Na, Ni, Si, Sn, Sr, V, and Zn

1.2 Silver is only slightly soluble in the presence of chloride unless there is a sufficient chloride concentration to form the soluble chloride complex. Therefore, low recoveries of silver may occur in samples, fortified sample matrices and even fortified blanks if determined as a dissolved analyte (turbidity of <1 NTU). For the determination of silver in aqueous samples containing concentrations up to 2.0 mg/L.

1.3 Detection limits and linear ranges for the elements will vary with the wavelength selected, the spectrometer, and the matrices. Table 17-1 lists estimated instrument detection limits which met the OEPA's detection limit requirements. The actual method detection limits and linear working ranges can change dependent on the sample matrix, instrumentation, and selected operating conditions.

2.0 METHOD SUMMARY

2.1 An aliquot of a well mixed sample is accurately measured for preparation.

2.1.1 For total recoverable analysis of an aqueous or asolid sample containing undissolved metals, sample is digested by carefully refluxing with nitric and hydrochloric acids. After cooling, the sample is diluted to volume, mixed and centrifuged, filtered or allowed to settle overnight prior to analysis.

2.1.2 For the determination of dissolved metals in a filtered aqueous sample, measure the sample to the required volume, add appropriate nitric acid and hydrochloric acid, and then diluted to a predetermined volume and mixed well. Sample is now ready for analysis.

2.2 Method 200.7 describes the simultaneous, or sequential, multi-elemental determination of elements by ICP instrument. The instrument measures element-emitted light by optical spectrometry. Samples are nebulized and the resulting aerosol is transported to the plasma torch. Element-specific atomic-line emission spectra are produced by a radio-frequency inductively coupled plasma. The spectra are dispersed by a grating spectrometer, and the intensities of the lines are monitored by photomultiplier tubes. Background correction is required for trace element determination and is measured adjacent to analyte wavelength during analysis. The position used is free of spectral interference and reflect the same change in background intensity as occurs at the analyte wavelength measured.

3.0 DEFINITIONS

3.1 Definitions of general terms used in this method are listed in the Quality Assurance Manual.

4.0 INTERFERENCES

4.1 Spectral interferences are caused by: (1) overlap of a spectral line from another element at the analytical or background measurement wavelengths; (2) unresolved overlap of molecular band spectra; (3) background contribution from continuum or recombination phenomena; and (4) stray light from the line emission of high-concentration elements. Spectral overlap can be compensated for by computer-correcting the raw data after monitoring and measuring the interfering element. Unresolved overlap requires selection of an alternate wavelength. Background contribution and stray light can usually be compensated for by a background correction adjacent to the analyte line.

Users of all ICP instruments must verify the absence of spectral interference from an element in a sample for which there is no instrument detection channel. Recommended wavelengths are listed in Table 17-1 and potential spectral interferences for the recommended wavelengths are given in Table 17-2. The data in Table 17-2 are intended as rudimentary guides for indicating potential interferences; for this purpose, linear relations between concentration and intensity for the analytes and the interferences can be assumed.

4.1.1 Element-specific interference is expressed as analyte concentration equivalents (i.e. false analyte concentrations) arising from 100 mg/L of the interference element. For example, assume that As is to be determined (at 193.696 nominal) in a sample containing approximately 10 mg/L of Al. According to Table 17-2, 100 mg/L of Al would yield a false signal for As equivalent to approximately 1.3 mg/L. Therefore, the presence of 10 mg/L of Al would result in a false signal for As equivalent to approximately 0.13 mg/L. The user is cautioned that other instruments may exhibit somewhat different levels of interference than those shown in Table 17-2. The interference effects must be evaluated for each individual instrument since the intensities will vary with operating conditions, power, viewing height, argon flow rate, etc. The user must be aware of the possibility of interferences other than those specified in 17-2 and that analysts must be aware of these interferences when conducting analyses.

4.1.2 The dashes in Table 17-2 indicate that no measurable interferences were observed even at higher interference concentrations. Generally, interferences were discernible if they produced leaks, or background shifts, corresponding to 2 to 5% of the peaks generated by the analyte concentrations.

4.1.3 At present, information on the listed silver and potassium wavelengths is not available, but it has been reported that second-order energy from the magnesium 383.231-nm wavelength interferes with the listed potassium line (at 766.491 nominal).

4.2 Physical interferences are effects associated with the sample nebulization and transport processes. Changes in viscosity and surface tension can cause significant inaccuracies, especially in samples containing high dissolved solids or high acid concentrations. Differences in solution volatility can also cause inaccuracies when organic solvents are involved. If physical interferences are present, they must be reduced by diluting the sample or by using a peristaltic pump. Another problem that can occur with high dissolved solids is salt buildup at the tip of the nebulizer, which affects aerosol flow rate and causes instrumental drift. The problem can be controlled by wetting the argon prior to

nebulization, using a tip washer, or diluting the sample. Changing the nebulizer and removing salt buildup at the tip of the torch sample injector can be used as an additional measure to control salt buildup. Also, it has been reported that better control of the argon flow rate improves instrument performance; this is accomplished with the use of mass flow controllers.

4.3 Chemical interferences include molecular compound formation, ionization effects, and solute vaporization effects. Normally, these effects are not significant with the ICP technique. If observed, they can be minimized by careful selection of operating conditions (incident power, observation position, and so forth), by buffering of the sample, by matrix matching, and by standard addition procedures. Chemical interferences are highly dependent on matrix type and the specific analyte element.

5.0 HEALTH AND SAFETY

5.1 Safety glasses or face shield shall be worn in the lab at all times.

5.2 Personnel shall have lead relevant MSD sheets and be familiar with the Laboratory Chemical Hygiene Manual.

5.3 Disposable PVC gloves shall be worn while handling acids.

5.4 Personnel shall be familiar with the nearest eyewash and safety shower before starting work. They must be within 100 feet or 10 seconds of the station(s).

5.5 All accidents must be promptly reported to a supervisor.

5.6 Analyst shall utilize GOOD LAB PRACTICES at all times.

5.7 Good housekeeping shall be maintained to ensure safety.

5.8 Analysis shall be performed by competent personnel.

5.9 Make sure the vent fan for the instrument is turned ON before starting the plasma.

6.0 EQUIPMENT AND SUPPLIES

6.1 Class A volumetric flasks (100 µL, 1 L).

6.2 50ml polypropylene digestion tubes with screw cap lids from Environmental Express.

6.3 Autosampler racks.

6.4 Varian Atomic Emission Spectrophotometer, Model 720-ES and Model VISTA-MPX.

6.5 17x100 mm culture test tubes.

6.6 Hot Block digestors.

6.7 Pipettes: Microliter with disposable tips. Sizes can range from 5 to 1,000 uL, as required.

6.8 Reagent dispensing bottles.
6.9 Balance: one capable of reading 4 significant figures.

6.10 Filtermates, plunger style filters. (Environmental Express)

7.0 REAGENTS AND STANDARDS

7.1 Trace metal grade acids shall be used in all tests requiring the use of acids. Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its used without lessening the accuracy of the determination. If the purity of a reagent is in question analyze for contamination. If the concentration is less than the MDL then the reagent is acceptable.

7.1.1 Hydrochloric acid (concentrated), HCl.

7.1.2 Hydrochloric acid (1:1), HCl. Add 500 ml concentrated HCl to 400 ml water and dilute to 1 liter in an appropriate beaker.

7.1.3 Nitric acid (concentrated), HNO_3.

7.1.4 Nitric acid (1:1), HNO_3. Add 500 ml concentrated HNO_3 to 400 ml water and dilute to 1 liter in an appropriate beaker.

7.2 ASTM Type II water (ASTM D1193): Water must be monitored for impurities.

7.3 Stock standards used are:

7.3.1 Quality Control Standard – 7 element (QCS7) contains Al, Ba, B, Ag & Na at a concentration of 100 PPM, K at 1000 PPM & Si at 50 PPM

7.3.2 Quality Control Standard – 21 element (QCS21) contains Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, Se, Tl, Ti, V, Zn, Li, & Sr at a concentration of 100 PPM.

7.3.3 Single –element Sodium Standard (SENaS) at a concentration of 10,000 PPM.

7.3.4 Single –element Phosphorus Standard (SEPS) at a concentration of 10,000 PPM.

7.3.5 Single –element Bismuth Standard (SEBiS) at a concentration of 1000 PPM.

7.3.6 Single –element Tin Standard (SESnS) at a concentration of 1000 PPM.

7.3.7 Initial Check Verification Standard #3 (ICV-3) contains Au, Pd & Pt at a concentration of 50 PPM.

7.3.8 Initial Check Verification Standard #1 (ICV-1) contains Al, As, Ba, Be, Bi, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Mo, Ni, P, K, Se, Sr, Tl, V & Zn at a concentration of 100 PPM.

7.3.9 Initial Check Verification Standard #2 (ICV-2) contains Sb, Sn & Ti at a concentration of 100 PPM.

7.3.10 Single –element Silver Standard (SEAgS) at a concentration of 1000 PPM.

7.3.11 Single-element Sodium Standard (SENaS) at a concentration of 1000 PPM.

7.3.12 Single-element Gold Standard (SEAuS) at a concentration of 1000 PPM.

7.4 The following are added to a 1000 ml volumetric flask, diluted to volume with reagent water. Pour the standard into two 500 ml Plastic containers that are labeled “ICAL1 and ICAL2 or ICAL3 and ICAL4”.

Standard Used	Amount Added (ml)	Final Concentration (PPM)
QCS7	20	All at 2.0 except K @ 20 & Si @ 1.0
QCS21	20	All at 2.0
SENaS	20	100
SEPS	10	100
SEBiS	2.0	2
SESnS	2.0	2
IVC-3	40	2
Standard Used	Amount Added (ml)	Final Concentration (PPM)
SEAuS	2	2
Conc. HCL	50	
Conc. HNO3	20	

7.5 The instrument check standard (ICV) is prepared by the analyst by combining compatible elements at concentrations equivalent to the midpoint of their respective calibration curves. The instrument check standard are prepared from a source independent from that used in the calibration standards.

7.5.1 ICV Stock Standard - The following are added to a 500 ml volumetric flask, diluted to volume with reagent water. Pour the standard into a 500 ml plastic container that is labeled “ICV 1”.

Standard Used	Amount Added (ml)	Final Concentration (PPM)
ICV-1	5.0	All at 1.0 except Se, K & P @ 2.0 and Ba, Be, Cd, Cr, Co, Mn, V & Zn @ 0.5
ICV-2	5.0	1.0
SEAgS	0.25	0.5
SENaS	50	100
Conc. HCL	25	

Conc. HNO3	10	

7.5.2 ICV Working Standard (CRI) – The following are added to a 1000 ml volumetric flask diluted to volume with reagent water. Dilute 1 ml of the QC7+QC21 stock standard (Section 7.3.1 & 7.3.2), 0.1 ml SENaS (Section 7.3.3), 0.01 ml SEPS (Section 7.3.4) and 10 ml conc. hydrochloric acid then dilute to 1000 ml with reagent water. Pour the standard into a 1000 ml plastic container that is labeled "CRI".

The final concentrations are:

Na, K – 1 mg/L
All remaining elements – 100 ug/L

Note: The CRI standard also serves as the Reporting Limit Check for the Al, K, & Na elements. The CRI and RLC 100.0 ug/L standards are the same.

7.6 SIC (Spectral Interference Check)

The following are added to a 500 ml volumetric flask and diluted to volume with reagent water:

Standard Used	Amount Added (ml)	Final Concentration (PPM)
QCS7	5.0	All at 1.0 except K @ 10 & Si @ 0.5
QCS21	5.0	All at 1.0
SEBiS	0.5	1.0
SESnS	0.5	1.0
Standard Used	Amount Added (ml)	Final Concentration (PPM)
CLPIAS	20	All at 202 (see Fe Below)
SEFeS	5.0	182
Conc. HCL	25	
Conc. HNO3	10	

Pour standard into a 500ml plastic container labeled "SIC".

NOTE: All reagent suppliers and standard concentrations are subject to change.

7.7 RLC (Reporting Limit Check)

The following are added either to a 1000ml volumetric flask or a 50 ml graduated cylinder and diluted to volume with reagent water:

Standard Used	Amount Added (ml)	Final Concentration (PPM)
ICAL	25/1000ml	0.050 = RLC 50
RLC 50	10/50ml	0.010 = RLC 10
RLC 50	5.0/50ml	0.005 = RLC 5
RLC 50	2.0/50ml	0.002 = RLC 2
RLC 50	0.5/50ml	0.0005 = RLC 0.5

7.8 Two types of blanks are required for the analysis. The calibration blank is used in establishing the analytical curve, and the reagent blank is used to check for possible contamination resulting from varying amounts of the acids used in the sample processing.

7.8.1 The calibration blank is prepared by acidifying reagent water to the same concentrations of the acids found in the standards and samples. Prepare a sufficient quantity to flush the system between standards and samples. Run every 10 samples.

7.9 The instrument check standard (ICV) is prepared by the analyst by combining compatible elements at concentrations equivalent to the midpoint of their respective calibration curves. The instrument check standard is prepared from a source independent from that used in the calibration standards.

8.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

8.1 Glassware can be pre-washed with detergents and reagent water, then rinsed with de-ionized water.

8.2 Prior to the collection of an aqueous sample, consideration is given to the type of data required, (i.e., dissolved or total recoverable), so that appropriate preservation and pretreatment steps can be taken. The pH of all aqueous samples must be tested immediately prior to aliquoting for processing or "direct analysis" to ensure the sample has been properly preserved. If properly acid preserved, the sample can be held up to six months before analysis.

8.3 For the determination of the dissolved elements, the sample must be filtered through a 0.45 µm pore diameter membrane filter at the time of collection or as soon thereafter as practically possible. (Glass or plastic filtering apparatus are recommended to avoid possible contamination. Only plastic apparatus is used when the determinations of boron and silica are critical.) Use a portion of the filtered sample to rinse the filter flask, discard this portion and collect the required volume of filtrate. Acidify the filtrate with (1+1) nitric acid immediately following filtration to pH <2.

8.4 For the determination of total recoverable elements in aqueous samples, samples are not filtered, but acidified with (1+1) nitric acid to pH <2 (normally, 3 mL of (1+1) acid per liter of sample is sufficient for most ambient and drinking water samples). Preservation may be done at the time of collection, however, to avoid the hazards of strong acids in the field, transport restrictions, and possible contamination it is recommended that the samples be returned to the laboratory within two weeks of collection and acid preserved upon receipt in the laboratory. Following acidification, the sample is mixed, held for 24 hours, and then verified to be pH <2 just prior to withdrawing an aliquot for processing or "direct analysis". If for some reason such as high alkalinity the sample pH is verified to be >2, more acid must be added and the sample held for 24 hours until verified to be pH <2.

8.5 Water samples for analysis using this SOP must be stored tightly sealed in a 500 ml high density polyethylene bottle. Samples can be stored at room temperature.

8.6 Samples for metal analysis must be analyzed within 6 months of sample collection.

9.0 QUALITY CONTROL / QUALITY ASSURANCE

9.1 The initial calibration includes 1 multi-element standard and a blank. The verification for the ICV high is 95-105%. The ICV low or Reporting Detection Limit (RDL) check is 70-130%. IPC (1st CCV) is +/- 5%, ICV is +/-10%.

9.2 Calibration verification was performed with a mid range standard every 10 samples and at the end of the run, within a range of 90-110% recovery for drinking water samples and 85-115% for wastewater samples.

9.3 Linear Dynamic Range (LDR) standard is ran annually. This sample must have recovery within a range of 90-110%.

9.4 An interference check sample shall be analyzed at the beginning and the end of each run or every 8 hours within an 85-115% recovery range.

9.5 Assess the calibration/method blanks. The analyst shall confirm that this blank was analyzed every 10 samples and at the end of the run. The method blank must not exhibit any contamination of any analyte above the PQL for any of the method target analytes. Corrective action mustd be performed any time method target analytes are detected above the PQL to reduce and control contamination. The first step of corrective action is to assess the effect on the samples. Corrective action would include reanalysis of field and QC samples in the batch if some or all of the samples also contained levels of target analytes that exceeded the above criteria. If none of the field samples had values above the stated criteria. If one of the field samples had values above the stated criteria, then reanalysis may not be necessary. The source of contamination must still be investigated and reduced/eliminated. Whenever contamination is noted in the method blank, the situation and impact on the data discussed in the case narrative.

9.6 Preparation blanks must be prepared 1 per batch and analyzed with the batch that it was prepared with.

9.7 QC samples.

9.7.1 LCS/LCSD – prepare and analyze one LCS and LCSD per batch of samples (A batch is defined as up to twenty samples of a similar matrix that are prepared together). LCS/LCSD recovery must be within laboratory generated control limits listed in LIMS. Laboratory limits are not to exceed the method specified limits of ± 20%. If results are not within control limits, then proceed with the corrective actions described below.

9.7.1.1 Check for calculations errors and instrument performance.

9.7.1.2 If either the LCS or the LCSD fails and the other passes, evaluate for possible isolated occurrence (i.e all other spike recoveries in the batch are within limits)

9.7.1.3 Assess the impact on the data. Re-analyze the sample.

9.7.1.4 If both the LCS and LCSD fail, re-digest and re-analyze the entire sample batch.

9.7.2 MS/MSD - prepare and one matrix spike and one matrix spike duplicate sample per analytical batch. Matrix spike recoveries must be within laboratory generated control limits listed in LIMS. Laboratory limits must not exceed the method specified limits of ± 30%. If the MS is unacceptable, but the LCS is acceptable, then a potential matrix effect has been identified. If requested by the client, the sample must be digested and reanalyzed to verify matrix effect. Reported data must be flagged to indicate its non-homogeneous nature. Reasonable attempts must be made to address matrix interference. The relative percent difference (RPD) of the duplicate analysis, when both the sample and duplicate results are greater than or equal to 10 times the MDL, must be within laboratory generated control limits.

9.8 Ensure that duplicates were analyzed at required frequency. The acceptance criteria for all RPD is ± 20% (sample must be greater than 10x the MDL). If the acceptance criteria is not met, perform the following corrective actions as appropriate.

9.8.1 Re-analyze the sample to verify a matrix effect.

9.8.2 If the duplicate precision is still unacceptable, and LCS precision is acceptable, then a potential matrix effect has been identified. The project manager must be contacted to discuss further alternatives and the potential impact on the project.

9.9 RLC – These are QC checks at or below the laboratory reporting limits listed in the LIMS. RLC recovery must be within laboratory generated control limits listed in LIMS. Laboratory limits are not to exceed the method specified limits of ± 30%. If results are not within control limits, then proceed with the corrective actions described below.

9.9.1 Check for calculations errors and instrument performance.

9.9.2 If the RLC fails, evaluate for possible isolated occurrence.

9.9.3 Assess the impact on the data. Re-analyze the sample.

9.9.4 If the RLC fails again, recalibrate the run or remake the RLC standard.

Note: In both the ICP-720 and the VISTA-MPX the RLC will be listed as follows:

Sample 1: CRI/RLC 100 ug/L
Sample 2: RLC 50.0 ug/L
Sample 3: RLC 10.0 ug/L
Sample 4: RLC 5.0 ug/L
Sample 5: RLC 2.0 ug/L
Sample 6: RLC 0.5 ug/L

9.10 Verify the inter-element and background correction factors at the beginning of the analytical run, using the SIC standard. The results obtained for all analytes in SIC must agree to within ± 20 % of the true value. If not, terminate the analysis, correct the

problem, recalibrate the instrument, and reanalyze all samples since the last valid SIC analysis.

10.0 CALIBRATION AND STANDARDIZATION

10.1 Check to see that the analytical balance has been inspected within the last year and the daily check has been conducted. If either of these has not been completed, notify your supervisor before using.

10.2 The certificates provided by Environmental Express for the sample containers listed in 6.13 needs to be placed in a folder.

10.2.1 For each lot of 50 ml sample containers, the graduated calibration marks on the sample containers is certified for volume accuracy by the manufacturer, Environmental Express.

11.0 PROCEDURE

11.1 Aqueous Sample Preparation - Dissolved Analytes

11.1.1 For the determination of dissolved analytes in ground and surface waters, pipet an aliquot of 45 mL of the filtered, acid preserved sample into a 50 mL Environmental Express tube. Add 1 ml of concentrated HCL to the sample and 2 mL of 50% HNO_3. Cap the tube and mix. The sample is now ready for analysis. Allowance for sample dilution is made in the calculations.

Note: If a precipitate is formed during acidification, transport, or storage, the sample aliquot must be treated using the procedure described in Sections 11.2.2 through 11.2.7 prior to analysis.

Note: Hydrochloric acid is added in order to matrix match with calibration standards and to improve the recoveries of Ag, Ba and Fe.

11.2 Aqueous Sample Preparation - Total & Total Recoverable Analytes

11.2.1 For the "direct analysis" of total recoverable analytes in samples containing turbidity <1 NTU, treat an unfiltered acid preserved sample aliquot using the sample preparation procedure described in Section 11.1.1 while making allowance for sample dilution in the data calculation. For the determination of total recoverabl analytes in all other aqueous samples or for preconcentrating drinking water samples prior to analysis follow the procedure given in Sections 11.2.2 through 11.2.7.

11.2.1.1 Turbidity check: Using HACH 2100Q, an initial calibration standards of 0 and 20 NTU are analyzed every quarter or as needed, followed by an initial calibration verification of 1 NTU. The ICV must be +/- 30% of the true value.

11.2.1.2 For each day of use, a continuing calibration verification is performed by analyzing a 10 NTU. The CCV acceptance limits are +/- 30%.

11.2.2 For the determination of total recoverable analytes in aqueous samples transfer a 50 mL (±1 mL) aliquot from a well mixed, acid preserved sample to a 55 mL Environmental Express tube. (When necessary, smaller sample aliquot volumes may be used.)

11.2.3 Add 2 mL (1+1) nitric acid and 1.0 mL of concentrated hydrochloric acid to the tube containing the measured volume of sample. Place the tube in the hot block for solution evaporation. The hot block is located in a fume hood and previously adjusted to provide evaporation at a temperature of 95°C±3°C. (The tube is covered with an elevated watchglass or other necessary steps are taken to prevent sample contamination from the fume hood environment.

11.2.4 Reduce the volume of the sample aliquot to about 10 mL by gentle heating at 85°C. DO NOT BOIL. This step takes about three and a half hours for a 50 mL aliquot with the rate of evaporation rapidly increasing as the sample volume approaches 10 mL. (A spare tube containing 10 mL of water can be used as a gauge).

11.2.5 Cover the lip of the tube with a watch glass to reduce additional evaporation and gently reflux the sample for 30 minutes. (Slight boiling may occur, but vigorous boiling must be avoided to prevent loss of the HCl-H_2O mixture properties.

11.2.6 Allow the tube to cool, make to volume of 50 ml with reagent water, cap and mix.

11.2.7 Allow any undissolved material to settle overnight, or centrifuge a portion of the prepared sample until clear. (If after centrifuging or standing overnight the sample contains suspended solids that would clog the nebulizer, a portion of the sample may be filtered for their removal prior to analysis. However, care is exercised to avoid potential contamination from filtration. When samples are filtered the corresponding method blanks are filtered as a way to monitor for contamination by the filters.) The sample is now ready for analysis. Because the effects of various matrices on the stability of diluted samples cannot be characterized, all analyses is performed as soon as possible after the completed preparation.

11.3 Profile and calibrate the instrument according to the instrument manufacturers recommended procedures, using the calibration blank between each standard or as the manufacturer recommends. (Use the average intensity of multiple exposures for both standardization and sample analysis to reduce random error.) The calibration curve consist of a blank and one standard with various concentrations of QC samples along the curve to validate the calibration. The correlation coefficient must be ≥ 0.995 for each element.

11.4 Setting up analysis on the Varian VISTA-MPX

11.4.1 Turn on instrument, power supply, printer, cooling water and argon. Fill the rinse container with 10% HCl.

11.4.2 Load Software by double left clicking ICP icon.

11.4.3 Left click the control tab to get the ICP Operations menu and left click (cold or hot) auto Start plasma depending upon conditions. The plasma will usually light on the first try. Allow about 30 minutes for sufficient warm-up.

11.4.4 Select STD-S or STD-U or another well-defined protocol file for the desired protocol. Select Element selection and turn on the needed elements and any IEC {Fe, Mn} that are needed, usually Fe will always be on. When starting a new data set create a data folder filename that uses the format MMDDYY-? where MM is the month, DD is the day, YY is the last 2 digits of the year and ? is the last letter or number of the protocol.

Standard protocol setup is as follows:

Normal Protocol Setup

Cup Name	Standard Name	Active y/n?	Cup Name	Standard Name	Active y/n?
1	UI or S1	Y	8	Blank	Y
2	_ or S2	Y	9	ICV-L	Y
3	IEC or S3	Y	10	IPC	Y
4	_ or S4	Y	11	ICV-H	Y
5	_ or S5	Y	12	SIC	Y
6	US or S6	Y	13	CCV	Y
7	IEC or _	Y	14	_	N

_ denotes an empty cup.

Check Standard and Calibration Setup

Check Standard	Standard Name	Calibration Standard	Standard Value
C1	Blank	S1	Blank
C2	ICV-L	S2	0.001
C3	IPC	S3	0.005
C4	ICV-H	S4	0.02
C5	SIC	S5	0.5
C6	CCV	S6	4.0

11.4.5 Left click the scan tab and select position plasma, Peak Both. A 10 mg/L (approximately) Mn standard must be in cup #0,7 for this operation. Watch the graphs as they print onscreen. The ‘X’ graph is fairly smooth and symmetrical; the ‘Y’ normally looks like half of the ‘X’ chopped right past the maximum. If the ‘X’ graph is noisy replace the pump tubing first and / or nebulizer. Allow 5-10 min to clear the Mn before calibrating. Left click accept if OK.

11.4.6 Place standards, blank and samples in the auto-sampler. You must have a rinse sample at every position ending in ‘1’ to prevent carryover from updates. The protocol handles all needed standards except the ICV.

11.4.7 Left click the Main Rack editor. Select the desired rack and enter the sample ID's and their weight {starting}, volume {ending} factors. Identify the person who prepared any blanks run.

11.4.8 Select the following options in this order.

Update	:	Intercept
Update	:	Slope
Check std	:	1,3,4,5

11.4.9 If the check standard is OK proceed, otherwise fix the problem and repeat.

11.4.10 Before beginning the sample run, reanalyze the highest mixed calibration standards as if it were a sample. Concentration values obtained can not deviate from the actual values by more than 5% (or the established control limits, whichever is lower). If they do, follow the recommendations of the instrument manufacturer to correct for this condition.

11.4.11 Flush the system with the calibration blank solution for at least 1 minute before the analysis of each sample.

11.4.12 Analyze the initial calibration verification (ICV) followed by the initial calibration blank (ICB).

11.4.13 Analyze the continuing calibration verification (CCV) and continuing calibration blank (CCB) after every 10 samples and at the end of the run.

11.4.14 Analyze the spectral interference check (SIC) at the beginning and at the end of each run.

11.4.15 Press the SAMPLE key and enter the parameters for how many samples to analyze, the others do not change from what is in the protocol.

11.4.16 After the run turn off the plasma. The other items either turn themselves off or are OK to leave on.

11.5 Setting up an analysis on the Varian 720-ES

11.5.1 Load Software by double left clicking ICP Expert icon.

11.5.2 In the Analyze menu scroll down to Plasma ON and left-click to light plasma. The plasma usually lights on the first try, if not, check the argon level and try again. Allow about 30 minutes for warm-up. During warm-up place the culture tubes in the autosampler racks. Starting at 1 and continuing numerically label the tubes as they appear in the batch with "Rinse" tubes placed between batches to avoid carryover into the next method blank.

11.5.3 To create a new work sheet, click on file, new, open current database, select "Create Template",use "Tempalte" file and rename to current date. The way you

name the new file is by date, ex. 061209-1, for June 12, 2009. The -1 refers to the number of files generated that day.

11.5.4 Click on the "Sequence" tab then click on the "Sequence Editor" button. Under the "Sample and Calibrations" tab adjust the following parameters. In the "How many samples" area, enter the number of samples (samples only) in the "Sample Count" box. In the "How to insert calibrations in the solutions list" area, make sure the following boxes are checked: Begin with calibration, Recalibrate every 20 samples and include a blank in calibration. Hit enter and then when asked "Update changes to the sequence?" hit Yes. Scroll to the top of the data worksheet and begin entering sample ID's starting with cell 1:1. Sample ID's must be entered as full sample ID's such as 0703559-001A is entered exactly as 0703559-001A.

11.5.5 Place standards, blank and samples in the autosampler. Sample racks are placed in position 1, 2, & 3 and standards are in racks 0 & 4. An example of where standards are placed in their rack as follows:

Rack #	Tube Position	Standard Label
0	1	Blank
	2	Standard
	3	CCV
	4	ICV
	5	ICV2
	6	SIC
Rack #	Tube Position	Standard Label
4	1	ICB
	2	CCB

11.5.6 Left-click on the Analysis tab and make sure all samples are highlighted in yellow, if not click on the sample ID to highlight the sample. It is important to highlight the samples because they are not analyzed if not highlighted, also once the run is started you cannot go back and highlight the sample unless you stop the run. To start the run left-click the single green arrow icon. The run is automated from this point on and needs to be monitored by the analyst to ensure the calibration, QC and blank are all within method specifications.

11.5.7 A Rack Loading Guide is saved on the network and can be printed if required. Press CTRL-R and the Report Settings dialog box appears. Choose Rack Loading Guide under the "Style" box then click the "Print…" button and the Print dialog box appears. Click the "OK" button and the Rack Loading Guide prints.

11.5.8 Most worksheets run overnight and the plasma turns off automatically. The analyst needs to inspect the worksheet the next morning to ensure all samples; QC, blanks and calibrations were within method specifications.

12.0 DATA ANALYSIS AND CALCULATIONS

12.1 Percent Relative Standard Deviation (%RSD)

% RSD = (SD / RF) x 100

where:

RSD = Relative standard deviation.
RF(m) = Mean of initial RFs for a compound
SD = Standard deviation of average RFs for a compound.

SQR (Square root function)
SUM(n) (Summation where I= 1 to n)

$SD = SQR(SUM(n)(RF-RF(m))^2) / (n-1)$

12.2 Percent Difference

$\% \text{ Difference} = ABS(RF(m) - RF_c) / RF \times 100$

where:

ABS (Absolute value function)
RF(m) = Average response factor from initial calibration
RF_c = Response factor from current verification check standard.

12.3 Hardness Calculation

Hardness = 2.497(Ca)+4.118(Mg)

12.4 Calcium Carbonate Calculation

CaCO3 = 2.497(Ca)

12.5 Calcium Oxide Calculation

CaO = 1.4(Ca)

12.6 Phosphate Calculation

PO4 = 3.065(P)

13.0 METHOD PERFORMANCE

13.1 A method detection study is conducted annually to determine the Method Detection Limit (MDL). This study is based on a minimum of seven samples of near zero concentrations. The current MDLs are listed in Table 17-1.

13.2 The Laboratory uses a digestion temperature of 95°C±3°C. This temperature assures the sample is never brought to a boil per the method.

14.0 POLLUTION PREVENTION

14.1 Standards must be prepared in volumes consistent with laboratory use to minimize the volume of expired standards to be disposed.

14.2 Any acids used in this procedure need to be neutralized prior to being disposed.

15.0 WASTE MANAGEMENT

15.1 The Environmental Protection Agency (USEPA) requires that laboratory waste management practice be conducted consistent with all applicable rules and regulations. Excess reagents, samples and method process wastes are characterized and disposed of in an acceptable manner. The agency urges laboratories to protect the air, water, and land by minimizing and controlling all releases from hoods, and bench operations, complying with the letter and spirit of any waste discharge permit and regulations, and by complying with all solid and hazardous waste regulations, particularly the hazardous waste identification rules and land disposal restrictions.

16.0 REFERENCES

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16.3 Sampling and Analysis Methods for Hazardous Waste Combustion; U.S. Environmental Protection Agency; Air and Energy Engineering Research Laboratory, Office of Research and Development: Research Triangle Park, NC, 1986; Prepared by Arthur D. Little, Inc.

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16.7 American Chemical Society, Waste Management Manual for Laboratory Personnel, Subcommittee on Environmental Analytical Chemistry, 1155 16th St. NW, Washington, DC 20036.

16.8 Belmont Labs, Quality Assurance Manual, Quality Assurance/Quality Control Program, Current Revision.

17.0 DATA VALIDATION, TABLES, DIAGRAMS & FLOW CHARTS

17.1 Bench review:

17.1.1 The preparer/analyst is responsible for completing the preparation and run logbooks and for maintaining all standards and analysis data in a retrievable, traceable fashion.

17.1.2 The analyst is responsible for verifying that all instrument and preparation checks are within acceptance parameters as detailed in section 9.0. If checks are not within acceptance parameters, perform any necessary corrective actions as described in section 9.0.

17.2 Secondary review:

17.2.1 The reviewer must verify that all of the quality control measures defined in section 9.0 were within acceptance limits. This includes the preparation blank, the LCS (ICV), and MS/MSD.

17.2.2 If any data is out of control, review the related corrective actions to see that they adequately addressed the outlying event. If a corrective action has not been initiated, notify the QA Manager and/or Laboratory Manager for guidance. Corrective actions must be completed as detailed in section 9.0.

17.2.3 Verify that the results units are in the format specified by the client.

SOP Revision Summary of Changes

Section of the SOP	Changes Made or Added	Reason for Change	REV NUM
All	Minor Grammatical corrections and format change	Revision Update/Clarity	0
9.5	Changed SIC requirement to once per analytical run per the method	2014 Internal Audit Finding	0
11.2.3	Changed from 85 Degrees C to 95 Degrees C, removed note for clarity purposes	Clarity	0
13.2	Added section describing the digestion temperature	2014 Internal Audit Finding	0
12.3	Inserted Hardness equation	2014 Internal Audit Finding	0
12	Added equations for CaCO3, CaO and PO4	Revision Update	0

Table 17-1 Recommended Wavelengths, Current MDLs and PQLs

Element	Wavelength[a] (nm)	MDL (ug/L)	PQL (ug/L)
Aluminum	308.215	5.7367	100
Antimony	206.833	1.8361	5
Arsenic	193.696	2.1225	5
Barium	455.403	2.4429	5
Beryllium	313.042	0.0679	0.5
Boron	249.773	3.0285	100
Cadmium	214.438	0.1745	2.0
Calcium	393.366, 317.933	7.9081	100
Chromium	267.716	0.3911	5
Cobalt	228.616	0.9853	5
Copper	324.754	1.6276	5
Iron	259.940	3.3156	50
Lead	220.353	1.9201	5
Lithium	670.784	0.0806	5
Magnesium	279.553, 279.079	2.8798	100
Manganese	257.610	0.6600	5
Molybdenum	202.030	0.9173	10
Nickel	231.604	1.5873	5
Phosphorus	213.618	6.4812	100
Potassium	766.491	10.4831	1000
Selenium	196.026	4.1079	10
Silica	251.610	6.3717	107
Silver	328.068	0.7009	2.0
Sodium	588.995	137.3585	1000
Strontium	407.771	0.6191	5
Thallium	190.801	3.4242	50
Tin	189.926	2.4895	5
Titanium	334.941	0.2153	5
Vanadium	292.402	0.7190	5
Zinc	213.856	2.9217	10

[a] The wavelengths listed are recommended because of their sensitivity and overall acceptance. Other wavelengths may be substituted if they can provide the needed sensitivity and are treated with the same corrective techniques for spectral interference. In time, other elements may be added as more information becomes available and as required.

[b] The estimated instrumental detection limits shown are taken from Reagent blanks. They are given as a guide for an instrumental limit. The actual method detection limits are sample dependent and may vary as the sample matrix varies.

[c] Highly dependent on operating conditions and plasma position.

Table 17-2 Analyte Concentration Equivalents Arising From Interference at the 100 mg/L Level

		Interference[a,b,c]									
	Wavelength----------										
Analyte	(nm)	Al	Ca	Cr	Cu	Fe	Mg	Mn	Ni	Tl	V
Aluminum	308.215	--	--	--	--	--	--	0.21	--	--	1.4
Antimony	206.833	0.47	--	--	--	0.08	--	--	--	0.25	0.45
Arsenic	193.696	1.3	--	0.166	--	--	--	--	--	--	1.1
Barium	455.403	--	--	--	--	--	--	--	--	--	--
Beryllium	313.042	--	--	--	--	--	--	--	--	0.04	0.05
Cadmium	226.502	--	--	-0.024	--	0.002	--	--	0.02	--	--
Calcium	317.933	--	--	0.08	--	--	0.01	0.04	--	0.03	0.03
Chromium	267.716	--	--	--	--	0.004	--	0.035	--	--	0.04
Cobalt	228.616	--	--	-0.001	--	--	--	--	0.03	0.15	--
Copper	324.754	--	--	--	--	0.003	--	--	--	0.05	0.02
Iron	259.940	--	--	--	--	--	--	-0.11	--	--	--
Lead	220.353	0.17	--	--	--	--	--	0.014	--	--	--
Magnesium	279.079	--	0.02	0.11	--	0.13	--	0.25	--	0.07	0.12
Manganese	257.610	0.005	--	0.01	--	0.004	0.002	--	--	--	--
Molybdenum	202.030	0.05	--	0.005	--	0.03	--	--	--	--	--
Nickel	231.604	--	--	--	--	0.003	--	--	--	--	--
Selenium	196.026	0.23	--	--	--	-0.001	--	0.056	--	--	--
Sodium	588.995	--	--	--	--	--	--	--	--	0.08	--
Thallium	190.864	0.30	--	--	--	--	--	--	--	--	--
Vanadium	292.402	--	--	0.05	--	0.005	--	--	--	0.02	--
Zinc	213.856	--	--	--	0.14	0.009	--	0.005	0.29	--	--

[a] Dashes indicate that no interference was observed even when interferences were introduced at the following levels:

Al -	1000	mg/L	Mg -	1000	mg/L
Ca -	1000	mg/L	Mn -	200	mg/L
Cr -	200	mg/L	T1 -	200	mg/L
Cu -	200	mg/L	V	200	mg/L
Fe -	1000	mg/L			

[b] The figures recorded as analyte concentrations are not the actual observed concentrations; to obtain those figures, add the listed concentration to the interference figure.

[c] The only interference correction factors used are those listed for Fe, Mn and Cr. Background correction works for the other interference analytes. Operator must take notice when high concentrations of other interference are found.

Table 17-3

Summary of Internal Quality Control Procedures for Method 200.7

QC Element	Frequency	Acceptance Criteria	Corrective Action
Method Blank	One per batch	< RDL	1. Rerun 2. Re-calibrate as necessary 3. Reanalyze 4. Re-digest samples if reanalysis fails 5. Reanalyze affected samples
Matrix Spike	One per batch	Refer to Table 17-4	1. Check calculations 2. Analyze Laboratory Control Sample
Duplicate	One per batch	Refer to Table 17-4	1. Check calculations 2. Reanalyze 3. Assess impact on data 4. Re-digest samples as necessary 5. Reanalyze affected samples
Laboratory Control Sample	One per batch	Refer to Table 17-4	1. Check calculations 2. Reanalyze 3. Assess impact on data 4. Re-digest samples as necessary 5. Reanalyze affected samples
Laboratory Control Sample Duplicate typical per analytical batch	One per batch	Refer to Table 17-4	1. Check calculations 2. Reanalyze 3. Assess impact on data 4. Re-digest samples as necessary 5. Reanalyze affected samples

Table 17-4

Quality Control Acceptance Criteria for Method 200.7

Analyte	Precision Objectives		Accuracy Objectives		
	Field Dup RPD	Lab Dup RPD	Method (% Recovery)	MS/MSD[1] (% Recovery)	LCS/LCSD[1] (% Recovery)
Aluminum	80	10	90-110	85-115	90-110
Barium	80	10	90-110	85-115	90-110
Beryllium	80	10	90-110	85-115	90-110
Calcium	80	10	90-110	85-115	90-110
Chromium	80	10	90-110	85-115	90-110
Cobalt	80	10	90-110	85-115	90-110
Copper	80	10	90-110	85-115	90-110
Iron	80	10	90-110	85-115	90-110
Magnesium	80	10	90-110	85-115	90-110
Manganese	80	10	90-110	85-115	90-110
Molybdenum	80	10	90-110	85-115	90-110
Nickel	80	10	90-110	85-115	90-110
Potassium	80	10	90-110	85-115	90-110
Sodium	80	10	90-110	85-115	90-110
Vanadium	80	10	90-110	85-115	90-110
Zinc	80	10	90-110	85-115	90-110