QUALITY ASSURANCE PROJECT PLAN

for

INDIANA SURFACE WATER PROGRAMS

WATERSHED ASSESSMENT AND PLANNING BRANCH
Indiana Department of Environmental Management (IDEM)
Office of Water Quality
100 North Senate Avenue
MC 65-40-2 (Shadeland)
Indianapolis, Indiana 46204-2251

PREPARED FOR

IDEM's Quality Management System

BY

Timothy Bowren
Technical & Logistical Services Section

Revision 4 Effective Date March 2017
B-001-OWQ-WAP-XX-17-Q-R4

SECTION A1

SIGNATURE PAGE
QUALITY ASSURANCE PROJECT PLAN
Indiana Surface Water Program

Revision 4
March 2017

Indiana Department of Environmental Management
OWQ
WAPB
Indianapolis, Indiana

	Signature	Date
Cyndi Wagner, Chief, Targeted Monitoring Section	Cyndi Wagner	3/30/17
Stacey Sobat, Chief Probabilistic Monitoring Section	Stacy L. Sobat	3/29/17
Mike Sutton, Chief Technical and Logistical Services Quality Assurance Manager (QAM):		3/29/17
Timothy Bowren, Environmental Chemist Technical and Logistical Services Quality Assurance Officer (QAO):	Timothy Bowren	3/29/17
Marylou Renshaw, Branch Chief WAPB/OWQ		3/29/17
Approved by: **IDEM/OWQ:** Assistant Commissioner: Martha Clark Mettler	Martha Clark Mettler	3/30/17
IDEM, Office of Program Support Quality Assurance Staff: David Parry	Dav Parry	3/30/17

ACKNOWLEDGEMENTS

This Quality Assurance Project Plan (QAPP) was revised from the previous revision prepared by Dr. Syed GhiasUddin and Timothy Bowren. Special thanks to Mike Sutton for his guidance and review in preparing this revision of the document. Thanks also to the branch chief, section chiefs, project managers, and technical staff in the Watershed Assessment and Planning Branch for their contributions to the project sections of this QAPP.

FOREWORD
Revision 4

The *Quality Assurance Project Plan (QAPP) for Indiana Surface Waters* has been prepared for environmental data collection for a wide variety of Watershed Assessment and Planning Branch (WAPB)/Office of Water Quality (OWQ), and other non-point source Indiana Department of Environmental Management (IDEM) water quality monitoring Programs. The structure and organization of the QAPP complies with the most recent 2002 "EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5" (EPA/240/R-02/009); and provides a comprehensive description of several elements specified by the United States Environmental Protection Agency (U.S. EPA). The Title/Signature Page and Table of Contents of this QAPP constitute the first two elements. The remaining elements provide the body of the QAPP.

It is envisioned that WAPB staff involved in water quality evaluation programs will use this QAPP to provide a format for environmental data collection targeted to achieve specific project data quality objectives (DQOs) and data usability by assigning one of four data quality assessment levels (DQAs) for regulatory decisions. This QAPP describes procedures that will be implemented to obtain environmental data of known quality that is adequate for the decisions to be made.

This QAPP is expected to serve as a guide to WAPB project officers, field personnel, and quality assurance staff charged with the collection and review of physical, chemical, biological, and microbiological water quality data. It is intended to provide guidance to both contract and state analytical laboratory staff charged with the analysis of OWQ environmental samples (water, sediments, and biological) in order to provide results that will meet the data quality objectives (DQOs) for the individual project. The QAPP is expected to satisfy U.S. EPA requirements for environmental data collection projects funded in whole or in part by U.S. EPA grants. Successful collection of precise, accurate, and complete data will provide IDEM and U.S. EPA with decisiveness that can be used to implement programs to improve and maintain water quality in the State of Indiana.

This revised QAPP represents additions and changes to the previous QAPP (Revision 3) approved internally by IDEM management in October 2004. The QAPP is expected to be updated or revised when significant changes to the programs described within the document occur or at a minimum of every five years. This QAPP will remain in effect until a new QAPP is updated and approved. You may send comments or suggestions regarding this document to:

Indiana Department of Environmental Management
100 North Senate Avenue
MC 65-40-2 (Shadeland)
Indianapolis, IN 46204-2251
Attention: Marylou Renshaw, Branch Chief
Watershed Assessment and Planning Branch
Phone: (317) 308-3235; (800) 451-6027

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

List of Tables

TABLE OF CONTENTS

List of Figures

TABLE OF CONTENTS

List of Appendices

Definitions

Definitions of terms used by IDEM/OWQ in this QAPP and in Sampling and Analysis Workplans are contained in Appendix A.

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

%R	Percent Recovery
%Recov	Percent Recovery
µg/Kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
µS/cm	MicroSiemen per centimeter (equivalent to µMho/cm)
AA	Atomic Absorption
AB	Office of Water Quality Assessment Branch (now WAPB)
AEPT	Aqueous Ethylation, Purge and Trap
AFDM	Ash Free Dry Mass
AIMS	Assessment Information Management System
AOAC	Association of Official Agricultural Chemists
ASTM	American Society for Testing and Materials
AVS	Acid Volatile Sulfide
BAA	State of Indiana Broad Agency Announcement (Superseded by Request for Proposals)
BHC	Benzene hexachloride
BIC	Balanced, Indigenous Community
BNA	Base Neutral Aromatics
BSS	Probabilistic Monitoring Section (formerly Biological Studies Section)
CAS	Chemical Abstract Service
CASRN	Chemical Abstract Service Registry Number
$CBOD_5$	Five Day Carbonaceous Biochemical Oxygen Demand
CCC	Continuing Calibration Check
CCV	Continuing Calibration Verification
CEES	IUPUI Center for Earth and Environmental Science.
CEI	Compliance Evaluations Inspection
CFU/100mL	Colony Forming Units per 100 Milliliters
CI	Compliance Inspection
CLP	Clean Lakes Program
CLP	U.S. EPA Contract Laboratory Program
COD	Chemical Oxygen Demand
CRQL	Contract Required Quantification Limit
CTAS	Cobalt Thiocyante Active Substances
CVAFS	Cold-Vapor Atomic Fluorescence Spectrometry
CWA	Clean Water Act
DDD	Dichlorodiphenyl-dichloroethane
DDE	Dichlorodiphenyl-dichloroethylene
DDT	Dichlorodiphenyl-trichloroethane
DO	Dissolved Oxygen

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

DOA	Department of Administration
DQA	Data Quality Assessment
DQO	Data Quality Objectives
DW	Dry Weight
EC	Positive Culture control for bacteriological media tests
EDI	Electronic Data Import
EEA	Eurofins Eaton Analytical Inc.
ELISA	Enzyme-Linked Immunosorbent Assay
EMAP	Environmental Monitoring and Assessment Program (see http://www.epa.gov/emap/)
ESG	Electrical Generating Station
FR	Federal Register
GC/ECD	Gas Chromatography with Electron Capture Detector
GC/MS	Gas Chromatography / Mass Spectrometry
GFAAS	Graphite Furnace Atomic Absorption Spectrometer
GLP	Good Laboratory Practices
HCR	Hydrograph Controlled Release
HPC	Hetotrophic Plate Count
HPLC	High Performance Liquid Chromatography
HPLC/PCD	High Performance Liquid Chromatography / Post Column Derivatization
IBI	Index of Biotic Integrity
IC	Initial Calibration
IC	Ion Chromatography
ICP	Inductively Coupled Plasma
ICP/AES	Inductively Coupled Plasma-Atomic Emission Spectrometer
ICP/MS	Inductively Coupled Plasma / Mass Spectrometry
IDEM	Indiana Department of Environmental Management
ISDH	Indiana State Department of Health
IDNR	Indiana Department of Natural Resources
IDOA	Indiana Department of Administration
IS	Internal Standard
ISE	Ion-selective electrode
IUPAC	International Union of Pure and Applied Chemistry
IUPUI	Indiana University – Purdue University, Indianapolis Campus
Kg	Kilograms
KP	*Klebsiella* Positive Culture for bacteriological media tests
LA	Load Allocation
LC	Liquid chromatography
LCS	Laboratory Control Standard
LCSD	Laboratory Control Standard Duplicate

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

LC/PDA	Liquid chromatography / Photodiode Array
LFB	Laboratory Fortified Blank
LFM	Laboratory Fortified Sample Matrix (See MS/MSD)
LRB	Laboratory Reagent Blank
MBAS	Methylene Blue Active Substances
MDL	Method Detection Limit
Mg	Milligrams
MGK 264	N-Octyl Bicycloheptene Dicarboximide
MGK 326	Dipropyl Isocinchomeronate
Mg/Kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MGD	Million Gallons per Day
MIBK	Methyl Isobutyl Ketone
mL	Milliliter
ML	Minimum Level
mMho/cm	Reciprocal MilliOhm-Centimeters (1/ Ω)
MPN	Most Probable Number
MRL	Method Reporting Limit
mS/cm	MilliSiemen per centimeter (equivalent to mMho/cm)
MS/MSD	Matrix Spike / Matrix Spike Duplicate
NPDES	National Pollutants Discharge Elimination System
NTU	Nephelometric Turbidity Unit(s)
O & M	Operation and Maintenance
OLQ	Office of Land Quality
OPA	Office of Planning and Assessment
OPT	Oxidation, Purge and Trap
OWQ	Office of Water Quality
PA	Negative *Pseudomonas* control culture for bacteriological media tests
PAB	Planning and Restoration Branch
PAH	Polycyclic Aromatic Hydrocarbons
PB	Permits Branch
PBDEs	Polybrominated Biphenyl Ethers
PPA	Performance Partnership Agreement
PPG	Performance Partnership Grant
pC/L	Picocuries per Liter
PCBs	Polychlorinated Biphenyl Compounds
PDA	Photo Diode Array
PDQO	Project Data Quality Objectives
PIC	Particulate Inorganic Carbon
PMP	Preventative Maintenance Program

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

PMS	Probabilistic Monitoring Section (formerly Biological Studies Section)
PNA	Polynuclear Aromatics
PPA	Performance Partnership Agreement
PQL	Practical Quantitation Limit
QA	Quality Assurance
QAC	Quality Assurance Coordinator
QAO	Quality Assurance Officer
QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RF3	Reach File 3
RFP	State of Indiana Request for Proposals
RFQ	State of Indiana Request for Quotations
RL	Reporting Limit
RPD	Relative Percent Difference
SEM	Simultaneously Extracted Metals
SOD	Sediment Oxygen Demand
SOP	Standard Operating Procedure
SPEA	School of Public and Environmental Affairs at Indiana University
SS	Surrogate Standard
SU	Standard Units
SVOC	Semivolatile Organic Compounds
$TBOD_5$	Five Day Total Biochemical Oxygen Demand
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TLA	Total Load Allocation
TMDL	Total Maximum Daily Load
TNTC	Too Numerous to Count
TOC	Total Organic Carbon
TOX	Total Organic Halogen
TPC	Total Particulate Carbon
TPCN	Total Particulate Carbon & Nitrogen
TPH	Total Petroleum Hydrocarbons
TPN	Total Particulate Nitrogen
TS	Total Solids
TSOP	Technical Standard Operating Procedure
TSS	Total Suspended Solids
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

UWA	Unified Watershed Assessment
VFC	Virtual File Cabinet
VOC	Volatile Organic Compounds
WAPB	Watershed Assessment and Planning Branch
WLA	Waste Load Allocation
WMS	Watershed Management Section
WPB	Watershed Planning Branch
WQ	Water Quality
WQC	Water Quality Criteria
WQS	Water Quality Standards
WQSSB	Water Quality Surveillance and Standards Branch (now the WAPB).
WW	Wet Weight
WWTP	Waste Water Treatment Plant
YSI	Yellow Springs Instruments®

A3. DISTRIBUTION LIST

The following individuals will be notified via email of any changes to this document. Electronic copies of this QAPP will be made available upon request to the WAPB.

Copy Number	Name	Organization
1	Willie H. Harris	U.S. EPA Region 5
2	Linda Holst	U.S. EPA Region 5/ Water Division
3	David Parry	IDEM OPS/QA/
4	Martha Clark Mettler	IDEM OWQ
5	Marylou Renshaw	IDEM OWQ/WAPB
6	Jody Arthur	IDEM OWQ/WAPB
7	Jim Stahl	IDEM OWQ/WAPB
8	Cyndi Wagner	IDEM OWQ/WAPB/Targeted Monitoring Section
9	Stacey Sobat	IDEM OWQ/WAPB/Probabilistic Monitoring Section
10	Mike Sutton	IDEM OWQ/WAPB/Technical & Logistical Services Section
11	Timothy Bowren	IDEM OWQ/WAPB/Technical & Logistical Services Section
12	Cindy Jewell	IDEM OWQ/WAPB/Technical & Logistical Services Section
13	David Jordan	IDEM OWQ/WAPB/Technical & Logistical Services Section
14	Carol Newhouse	IDEM OWQ/WAPB/Technical & Logistical Services Section
15	Betty Ratcliff	IDEM OWQ/WAPB/Technical & Logistical Services Section
16	Todd Davis	IDEM OWQ/WAPB/Probabilistic Monitoring Section
17	Joe Schmees	IDEM OWQ/WAPB/Watershed Planning and Restoration Section
18	Cory Fischer	IDEM OWQ/WAPB/Watershed Planning and Restoration Section
19	Dave Harrison	IDEM OLQ/Science Service
20	Bharat Patel	ISDH Chemistry Lab Manager
21	David Parry	IDEM OPS/QA

A4 PROJECT/TASK ORGANIZATION

A4.1 Background

The Office of Water Quality (OWQ) is responsible for reviewing and proposing revisions to Indiana's statewide water quality standards (WQS) as required by the 1977 Clean Water Act (CWA), as amended.

Environmental sample collection from waters, sediments, and fish tissues and their analyses for various pollutants to support water quality monitoring activities is an ongoing effort in the Watershed Assessment and Planning Branch (WAPB) and OWQ. The following water quality monitoring programs are currently active in the WAPB:

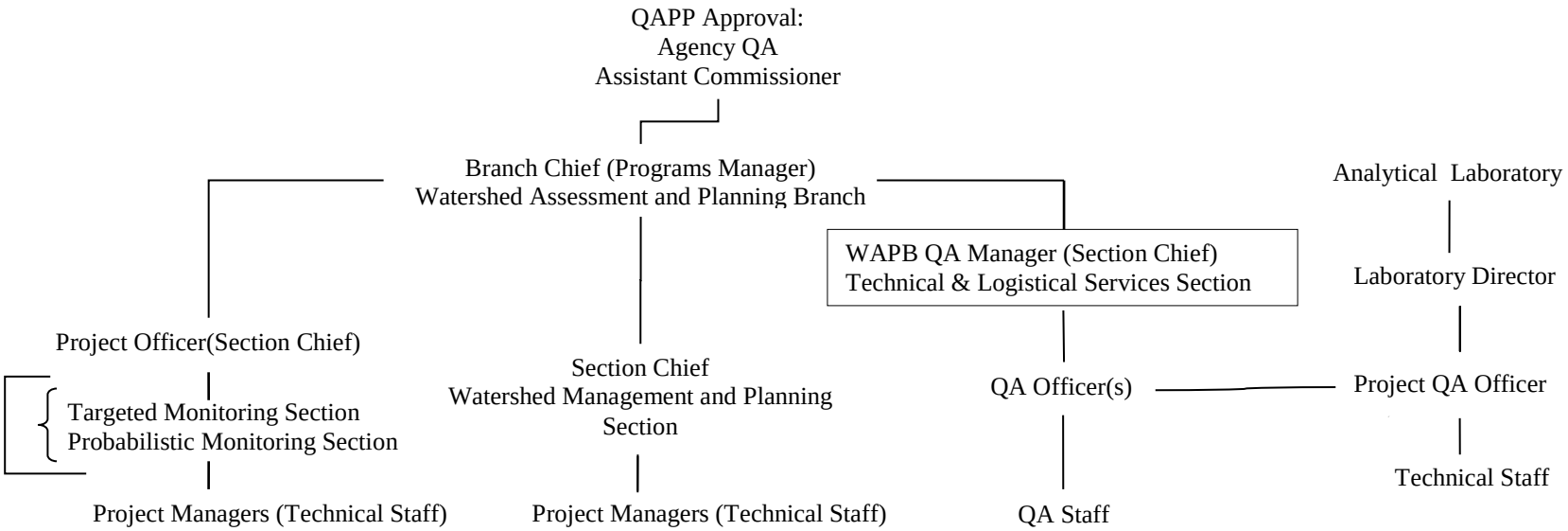
- Fixed Station Monitoring Program
- Probabilistic Monitoring Program
- Watershed Characterization Program for Total Maximum Daily Load development and for Watershed Management Planning
- Fish Tissues and Sediment Contaminants Monitoring Program
- Performance Measures Monitoring to Identify Improvements In Water Quality
- Cyanobacteria and Cyanotoxin Monitoring Program
- Hydrograph Controlled Release (HCR) Facility Evaluations Program
- Reference Site Monitoring Program
- Thermal Verification monitoring Program
- Special Projects Program

The most recent information on surface water quality, National Pollutant Discharge Elimination System (NPDES) point source monitoring, the nonpoint source water pollution control program, and various other environmental data collection activities may be found in the biennial "*Indiana Integrated Water Monitoring and Assessment Report: 2016*" (IR).

A4.2 ROLES AND RESPONSIBILITIES

Figure A4.1 shows the Indiana surface water monitoring programs and projects organization and responsibilities. All personnel involved in the project are shown with lines of authority and communication.

Figure A4.1
Water Quality Monitoring Program and Projects Organization



SECTION A4

A4.2.1 Management Responsibility

The OWQ WAPB chief, as programs manager, has final authority and responsibility for managing all WAPB surface water quality monitoring programs and projects. Environmental data collection projects are planned under the guidance of and supervised by each section chief, who, as the project officer, is responsible for quality control procedure implementation and project data collection activities. The IDEM OWQ assistant commissioner is responsible for approving the QAPP.

A4.2.2 Quality Assurance Responsibilities

The WAPB quality assurance manager (QAM), is responsible for coordinating all quality assurance and laboratory activities. The quality assurance officers (QAOs), assigned to projects by the QAM, coordinate and audit quality assurance (QA) and quality control (QC) activities, prepare and review program quality assurance project plans (QAPPs), act as liaison to external laboratories, and report to management on the quality assurance aspects of a project. QA staff perform data validation review, data assessment, data qualification, and internal performance and system audits for their assigned projects under the direction of the QAM. Assigned QA personnel review all work plans and SOPs for compliance with this QAPP and to verify that data quality objectives have been addressed by the respective work plan.

Each laboratory performing data analysis for the IDEM OWQ) is responsible for data validation of results before reporting to IDEM/OWQ/WAPB. IDEM Requests for Quotation (RFQs), and Requests for Proposal (RFPs) require that each contract analytical laboratory have a QAO and a written quality assurance plan (QAP). See Section A4.2.4 for more details.

The U.S. EPA Region 5 Water Division Project Officer is responsible for providing guidance regarding specific U.S. EPA and Region 5 requirements.

A4.2.3 Field (or Operating Section) Responsibilities

The section chief/project officer is responsible for sampling and data collection efforts, and assigns section staff to data collection duties. He/she is responsible for section staff following the QAPP in the course of sampling and data collection activities. Any nonconformities are reported to the appropriate section chief who, as a project officer, is responsible for documenting and addressing the nonconformity through the corrective action process. He or she is also responsible for notifying the QAO of the nonconformity and status of corrective action. The section chief typically assigns a technical staff member to document the nonconformity and institute required corrective actions..

SECTION A4

A4.2.4 Laboratory Responsibilities and Analytical Labs

IDEM RFQs, and RFPs set forth requirements and technical specifications for contract laboratory analysis of water, sediment, and fish tissues samples for various contaminants or pollutants.

In short, labs must have and maintain a documented quality assurance/quality control (QA/QC) program, capable of demonstrating that data have a specified degree of precision and reliability. An acceptable QA/QC program would be one patterned after a publication such as the *Handbook for Analytical Quality Control in Water and Wastewater Laboratories*, U.S. EPA 600/4-79/019. Labs must be able to validate each method used and each analysis performed by that method using the QA/QC Program.

QA/QC measures must be documented. All documentation must be maintained and made available for the use of IDEM/OWQ for five years after the expiration date of the contract. QA/QC documentation must be submitted as required.

Labs must maintain and document continual evaluation of the accuracy and precision of an analytical procedure and the ability of individual analysts to meet laboratory performance for a procedure.

The following analytical laboratories have been accepted by IDEM to analyze water and/or sediment samples using acceptable U.S. EPA test methods designated in 40 CFR Part 136, SW-846 or U.S. EPA 500 Methods for the Determination of Organic Compounds in Drinking Water (U.S. EPA 1998) (see RFP 16-74, **Appendix B**). The contracts and RFP for these labs is shared with the drinking water branch.

	Laboratory	Sample Media
1.	Pace Analytical Services, Inc. Indianapolis, IN	Water and Sediment
2.	Eurofins Eaton Analytical Inc (EEA) South Bend, IN.	Water
3	TestAmerica University Park, IL	Water and Sediment

Samples analyzed at any of the above three laboratories are analyzed for numerous analytes (metals, inorganic chemicals, physical properties, organic compounds, and bacteria) listed in Sections **B2.1.1.2, B2.1.1.4, B2.1.1.5, B2.1.1.6,** and **B2.1.1.7**. Each analytical laboratory is responsible for maintaining its own Quality Assurance Plan (QAP) in compliance and response to the IDEM RFP 16-74 which provides

SECTION A4

specifications for contract laboratories (See **Appendix B**). The choice of a laboratory to be used for an individual project is determined by factors such as location, prior performance and ability to meet data quality objectives, funding, and expertise with selected test methods and media. The project sampling and analysis workplan details the laboratory selected for that project.

Surface water and sediment samples are analyzed for numerous analytes (metals, inorganic chemicals, physical properties, organic compounds, and *E. coli* bacteria) listed in **Section B2.1, Table B2.1.1 and Table B2.1.1.8-1**, at the Indiana State Department of Health (ISDH), Environmental Laboratory. The ISDH laboratory maintains its own quality assurance and Clean Water Act regulatory compliance program. The ISDH laboratory is also responsible for complying with the IDEM RFP 16-74. Samples collected by the Fixed Station Monitoring Program are analyzed by the ISDH Laboratory. The ISDH Lab is also used by the Cyanobacteria and Microcystin Monitoring Program and the other projects as needed.

4. Indiana State Department of Health (ISDH) Environmental Laboratory
   Indianapolis, IN

Fish Tissues and Sediments Samples are analyzed at:

5. Pace Analytical Services, Inc.
   Madison, WI

The numerous analytes (metals, inorganic chemicals, physical parameters, and organic compounds) that are analyzed for the Fish Tissues and Sediment Contaminants Monitoring Programs are listed in Section B2.1, **Tables B2.1.3-1 through B2.1.3-18.** The laboratory is responsible for maintaining its own QAP in compliance and response to the IDEM RFP 16-88, which provides specifications including test methods for biological and sediment samples analyzed at contract laboratories. (See IDEM RFP 16-88, **Appendix C**).

6. The IDEM OWQ/WAPB maintains a laboratory at the Shadeland office location to perform analyses of cyanotoxins, *E. coli*, and *Total coliforms*. In addition the WAPB has two *E. coli* monitoring program mobile laboratories capable of collecting and analyzing samples in the field.

E. coli samples collected by the various monitoring programs use these labs.

The *E. coli* Mobile Laboratories analyze surface water samples for total coliforms and *E.*

SECTION A4

coli bacteria. The Cyanotoxins Lab performs analyses of Cyanotoxins (Microcystin-LR, Anatoxin (A), and Cylindrospermopsin using equipment and methology from Abraxis. These IDEM laboratories are responsible for maintaining their own QAP in compliance and response to the IDEM RFP 16-74.

Samples collected for trace metals (total recoverable and dissolved) using clean sampling techniques (EPA method 1669) have been analyzed by:

	Laboratory	Parameter Type
7.	Wisconsin State Laboratory of Hygiene Madison, WI	Metals
8.	Pace Analytical Services, Inc. Indianapolis, IN	General Chemistries and Nutrients

Water samples are analyzed for numerous analytes (metals, inorganic chemicals, physical properties) listed in Section B2.1, **Table B2.1.1.8-1**. The laboratories are responsible for maintaining their own Quality Assurance Plans (QAPs) in compliance and response to the IDEM RFP 5-60 and IDEM RFP 16-74 which provide specifications for contract laboratories. (See **Appendix B** and **Appendix D**).

A4.2.5 Laboratory and Field Audit Responsibilities

Laboratory and field performance audits are the responsibility of the IDEM QAO and QA staff. Audits are performed as assigned by the QAM, but are typically performed at the beginning of a laboratory contract and at least once a year during the contract term. The system audit includes any or all of the operational quality control elements of the laboratory's quality assurance system, including:

- Sample handling and analysis
- Record keeping
- Preventive maintenance
- Proficiency testing
- Personnel requirements
- Staff training and expertise
- Staff workload and holding times
- Other procedures influencing results, reporting, or documentation.

See Section C for more details on laboratory audits and corrective actions.

SECTION A5

A5. PROJECT DESCRIPTION

A5.1 Purpose/Background

The WAPB is responsible for assessing the surface waters of the State of Indiana. These waters include approximately:

- 63,000 rivers and stream miles.
- 575 publicly-owned inland lakes and reservoirs, with an aggregate surface area of 106,200 acres
- 154,000 acres (43 shoreline miles) of Lake Michigan.
- 813,000 acres of wetlands, mostly in the northern part of the state.

The Indiana Water Quality Monitoring Strategy (WQMS) 2011-2019 (Appendix E) outlines the monitoring programs employed to collect the water quality data needed to meet IDEM's water management needs.[1] It includes the ten elements recommended by U.S. EPA in order to meet the prerequisites of Section 106 of the federal Clean Water Act (CWA). The OWQ collects surface water quality data for the following purposes:

- To fulfill requirements of the CWA §305(b), §303(d), and §314 to assess all waters of the state to determine if they are meeting their designated uses and to identify those waters that are not.
- To support OWQ programs including water quality standards (WQS) development, National Pollutant Discharge Elimination System (NPDES) permitting, and compliance.
- To support public health advisories and address emerging water quality issues.
- To support watershed planning and restoration activities.
- To determine water quality trends and to evaluate the performance of programs.
- To engage and support a volunteer monitoring network across the state.

The following monitoring programs are employed to achieve the above objectives:

- Probabilistic monitoring in one basin/year on a 9-year rotating basin cycle.
- Fixed Station monitoring at 165 sites across the state (2 added in 2014 for Natural Resource Conservation Service (NRCS) National Water Quality Initiative (NWQI).
- Fish tissue and sediment contaminants monitoring on a 5-year rotating basin cycle.

[1] The revised document, *Water Quality Monitory Strategy 2017-2021,* is under review at U.S. EPA as of March 29, 2017.

SECTION A5

- Targeted (watershed characterization) monitoring for Total Maximum Daily Load (TMDL) reassessments and development, watershed baseline planning, and performance measures determinations.
- Cyanobacteria monitoring of 10-12 lakes.
- Special studies such as hydrograph controlled release facilities (HCR) and remediation follow-up sampling.
- Thermal verification studies.
- Hoosier Riverwatch (HRW) program citizen volunteer monitoring.

The state is divided geographically into nine major river basins for the purpose of probabilistic sampling, analysis, and assessment of surface water quality. Each of the major river basins and the associated watersheds are shown in **Figure A5.1.** Water quality assessment of the entire state is expected to be completed by 2019.A complete listing of each major river basin and the targeted year for assessment of water quality scheduled in each river basin is as follows:

Major River Basin	Assessment Year
Upper Illinois River (Kankakee) Basin	2017
Great Lakes Basin	2018
Ohio River Tributaries	2019
White River Basin, West Fork	2020
Patoka River Basin	2021
White River Basin, East Fork	2022
Whitewater River Basin	2023
Upper Wabash River Basin	2024
Lower Wabash River Basin	2025

Thereafter, per the design strategy, sampling, analyses, and water quality assessment of each major river basin is to be conducted once every nine years as shown above.

Watershed characterization studies conducted by the WAPB for nonpoint source watershed planning projects are funded with CWA § 319 grant funds. All laboratory analyses for NPDES permit support are state funded. All other WAPB programs are funded by a federal Performance Partnership Grant (PPG) with state matching funds.

A majority of chemical and microbiological analyses for surface water quality monitoring programs are performed either by state-accepted contract laboratories, the Indiana State Department of Health (ISDH) Laboratory, or IDEM's *E. coli* mobile laboratories.

SECTION A5

Parameters measured and data quality objectives and assessments for these programs and projects are covered by this QAPP to document data quality objectives and assessments for the programs. Likewise, special projects in the WAPB are included in this QAPP to produce data of known quality for regulatory decisions.

SECTION A6

A6 INDIVIDUAL PROGRAM DESCRIPTIONS AND INTENDED DATA USES

A brief description of the individual water quality monitoring programs and intended data uses is presented below:

A6.1.1 Fixed Station Monitoring Program

Purpose

The primary objective of this program is to gather ambient physical, chemical, and biological water quality data at fixed sites that are of sufficient quality to be used to determine long-term water quality trends.

Secondary objectives include providing data to:

- calibrate and verify waste load allocations for NPDES permits;
- make water quality assessements;
- help develop TMDL documents;
- help with watershed planning documents; and
- to collect data at drinking water intakes from a subset of sites on Lake Michigan.

Data Collected

Under this program, 165 locations statewide (see details in Section B1.5.1 (MEASUREMENT / DATA ACQUISITION)) are sampled monthly for up to 85 parameters (see Table B2.1.1.1), including numerous metals, organics, nutrients, and *E. coli* bacteria enumeration. The selection of parameters to be tested at each sampling location is based on consideration of potential sources of pollution, matrix, and intended data use. Nearby United States Geological Survey (USGS) gauging stations are used for flow data where possible in order to provide the necessary data for loading calculations.

A6.1.2 Probabilistic Monitoring Program

The objective of this program is to provide a statistically valid assessment of overall water quality of rivers and streams within each major river basin in Indiana using a nine-year rotating basin approach (Figure A6.2). This approach divides Indiana into nine river basins, with one basin sampled per field season. The probabilistic design involves sample site selection using a stratified random distribution weighted by Strahler stream order. Sites are selected by U.S. EPA National Health and Environmental Effects Research Laboratory in Corvallis, Oregon. This statistical method requires sampling 38-50 locations within a given basin. The results are extrapolated to characterize water quality conditions for the entire basin. Over time, the data may be used to identify emerging trends in basin-wide water quality conditions.

SECTION A6

The probabilistic monitoring design gathers a variety of biotic and abiotic parameters including the following:

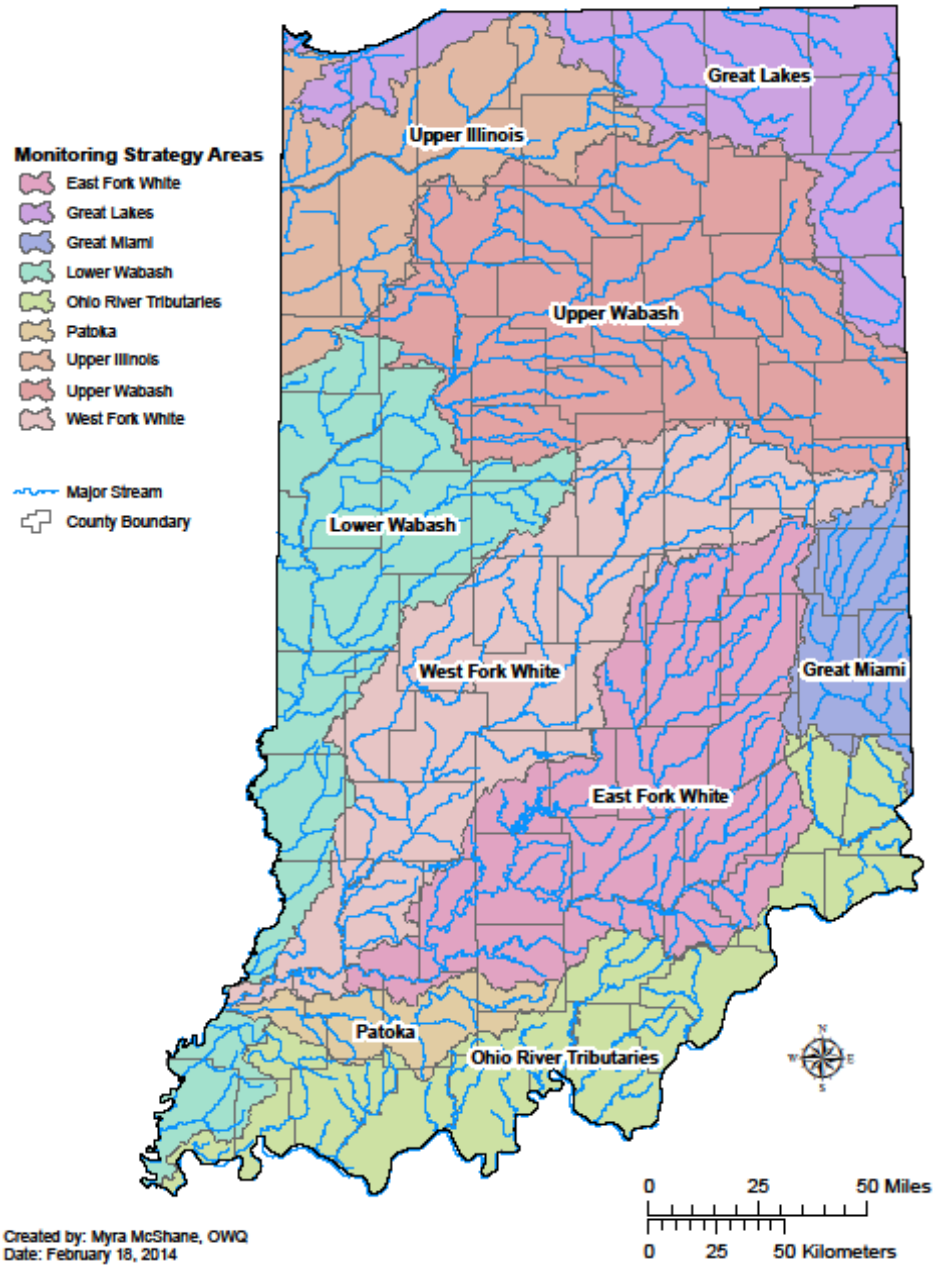
- General water chemistry, dissolved metals, and nutrients collected three times (over three sampling events) from May through October.
- Algal samples including phytoplankton (seston) and periphyton, Chlorophyll a and pheophytin a collected during one sampling event from September through October
- Ambient *E. coli* concentrations with field chemistry collected once each week for five consecutive weeks April through October.
- Macroinvertebrate community including insects, crayfish, and mollusks collected once mid-July through October.
- Fish community collected once mid-July through October.
- Habitat evaluations completed after fish and macro-invertebrate sampling.

Each major river basin and the targeted year for assessment of water quality scheduled in each river basin is as follows:

Major River Basin	Assessment Year
Upper Illinois River (Kankakee) Basin	2017
Great Lakes Basin	2018
Ohio River Tributaries	2019
White River Basin, West Fork	2020
Patoka River Basin	2021
White River Basin, East Fork	2022
Whitewater River Basin	2023
Upper Wabash River Basin	2024
Lower Wabash River Basin	2025

SECTION A6

Figure A6.2
Indiana's Major River Basins and Watersheds of the Monitoring Strategy



SECTION A6

Intended Data Use

The probabilistic monitoring design provides the information needed to assess the extent to which Indiana's rivers and streams support their designated aquatic life and full body contact recreational uses. More specifically, the results of this type of sampling provide information for the IDEM OWQ's *Integrated Water Monitoring and Assessment Report* (IR), total maximum daily load (TMDL) development, development of nonpoint source watershed management plans, and some types of trend analyses. Data collected using a probabilistic design may also be used to identify potential compliance issues which may need further sampling. Probabilistic nutrient sampling provides data to help implement OWQ's Nutrient Criteria Development Plan. Various outside organizations, contractors, and government agencies also use these data.

Using data collected from the various monitoring programs, IDEM assigns each AU of a waterbody to a category, according to the Consolidated Listing Methodology (CALM), for listing in the biennial IR. The categories are as follows:

Category 1. The available data, or information, or both, indicate that all designated uses are supported and no use is threatened.

Category 2. The available data or information, or both, indicate the individual designated use is supported.

Category 3. Insufficient information is available to determine whether the individual designated use is supported. Waters are listed in this category if there are no data or other information to determine whether the individual designated use is supported, or if the available data or information are not consistent with the requirements of Indiana's CALM.

Category 4. The available data or information, or both, indicate that the individual designated use is impaired or threatened, but a TMDL is not required because:

A. A TMDL for one or more pollutants has been completed and approved by U.S. EPA and is expected to result in attainment of all WQS applicable to the designated use.

B. Other pollution control requirements are reasonably expected to result in the attainment of all WQS applicable to the designated use in a reasonable period of time. Consistent with the regulation under 40 CFR Part 130.7(b)(i),(ii), and (iii), waters are listed in this subcategory where other pollution control

SECTION A6

requirements required by local, state, or federal authority are stringent enough to achieve any WQS applicable to the designated use.

C. Impairment is not caused by a pollutant. Waters are listed in this subcategory if the designated use impairment is not caused by a pollutant but is instead attributed to other types of pollution for which a TMDL cannot be calculated.

Category 5. The available data or information, or both, indicate the individual designated use is impaired or threatened, and a TMDL is required.

A. This subcategory constitutes the Section 303(d) list of waters impaired or threatened by one or more pollutants for which a TMDL is required. Waters are listed in this category if it is determined that a pollutant has caused, is suspected of causing, or is projected to cause, impairment of a designated use. Where more than one pollutant is associated with the impairment of a single AU, the AU will remain in Category 5 for each pollutant until the TMDL for that pollutant has been completed and approved by the U.S. EPA.

B. This subcategory constitutes the Section 303(d) list of waters that are impaired due to the presence of mercury or PCBs, or both, in the edible tissue of fish collected from the AUs at levels exceeding Indiana's human health criteria for these contaminants.

A6.1.3 Watershed Characterization Program

Watershed characterization monitoring provides valuable data for the purposes of TMDL development and CWA § 319 watershed management planning. This intensive monitoring design allows for future comparisons to evaluate changes in the water quality within the watershed(s) studied. Selecting a spatial monitoring design with sufficient sampling density to accurately characterize water quality conditions is a critical step in the process of developing an adequate local scale watershed study.

For its watershed characterization studies, OWQ uses a modified geometric site selection process in order to get the necessary spatial representation of the entire study area. Sites within a watershed are selected based on a geometric progression of drainage areas starting with the area at the mouth of the mainstem stream and working upstream through the tributaries to the headwaters (sites $\geq$ 5 square miles). Monitoring sites are then "snapped" to the nearest bridge with additional sites located at pour points and, to the extent possible, sites of concern to the stakeholders.

Study areas are selected based upon TMDL development needs and where there is a successful CWA § 319 planning grant application. Due to staffing and laboratory

SECTION A6

constraints, no more than two watershed characterization studies are ongoing within a calendar year with one commencing in the spring (usually April) and the other in the fall (usually November). The watershed characterization monitoring project provides physical, chemical, and bacteriological data collected monthly for twelve months at the pour points and for the rest of the sites, April through October, which constitutes the recreational season. Biological data are collected once per year at each of the sites.

Intended Data Use

The water quality data collected through the watershed characterization monitoring provides the data needed to identify the sources and extent of impairment for TMDL development and for local watershed groups to designate critical areas and make management decisions for their watershed management plans. The rigor of this monitoring design supports future performance measures monitoring to determine if improvements in water quality have occurred due to management and best management plan (BMP) implementation. For more detailed information, please refer to the most recent work plan.

A6.1.4 Fish Tissues and Sediments Contaminants Monitoring Program

Samples of fish and occasionally sediments are collected from Indiana streams and lakes each year from each major river basin for analysis of bioaccumulating pollutants. Data from the fish tissues and sediments samplings are used to locate and identify contaminants whose concentrations in the water column are too low to be easily found with routine water sampling and analyses. A survey of streams, lakes and rivers for contaminants in fish tissues and sediments within the state has been on-going for more than 25 years. Fish tissues and sediment sampling locations that are likely to be sampled each year are shown in **Figure B1.5-4.**

Intended Data Use

Data from the Fish Tissue Contaminants Monitoring program helps support the efforts of a variety of water management decisions throughout IDEM and among other agencies. These include the following:

- Aquatic Life Use Support (ALUS) status for fish consumption in the 303(d) List of Impaired Waters.
- The Indiana Fish Consumption Advisory.
- The Great Lakes Fish Contaminants Monitoring Program.

SECTION A6

- The U.S. EPA National Fish Contaminants Program.
- The Office of Land Quality- Site Investigations, Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Resource Conservation Recovery Act (RCRA) clean-up efforts.
- The Natural Resources Damage Assessment (NRDA) Program.
- Understanding impacts to aquatic communities from the toxic effects of bio-accumulating compounds of concern.
- Understanding the health risks to humans and wildlife of eating fish.
- Understanding long term trends of contaminants in fish.

A6.1.5 Performance Monitoring

Performance measures monitoring to identify changes in water quality is conducted in areas where there is reason to believe improvements may have occurred due to activities such as the implementation of point source and nonpoint BMPs, hydrological restoration, riparian restoration and/or wetland mitigation and restoration.

Generally, study areas are selected based on where watershed management plans (WMPs) have been implemented and where BMPs have had sufficient time to provide a measurable effect on water quality. In addition to the practices installed through CWA § 319 or via implementation of a TMDL, IDEM consults with the Indiana Conservation Partnership (ICP) to identify watersheds where various Farm Bill, Clean Water Indiana, and Lake and River Enhancement cost-share funds have been used. These are mapped at the 12-digit scale and the IDEM § 319 Watershed Specialist provides further insight on activities, including social indicators, within the watershed. Analyses of AIMSII data are also completed for indications that an improvement has occurred. Performance measures monitoring is conducted at the 12-digit HUC scale, which is consistent with the implementation scale of many OWQ-funded WMPs. The specific parameters to be monitored and the number of sampling sites vary depending on the type and spatial extent of the original impairment. Each 12-digit HUC watershed may include up to 20 sampling sites, which may be sampled for general chemistry and nutrients, bacteria, and/or fish and macro-invertebrate communities depending on the type of impairment(s) identified.

The number of samples collected at each site and the sample frequency is consistent with the minimum data requirements described in IDEM's CALM for the listing and delisting of impairments on the 303(d) list. For more detailed information, please refer to the most recent work plan.

SECTION A6

Intended Data Usage

OWQ uses these data to evaluate the performance of programs and to determine if water quality is improving. OWQ is required to submit five performance measure reports over a 5-year period in order to demonstrate satisfactory progress in its CWA § 319 program. Performance measures reports are posted on the website and may be found at: http://www.in.gov/idem/nps/3360.htm

A6.1.6 Cyanobacteria and Cyanotoxin Monitoring

Cyanobacteria are common constituents of algal communities in lakes and many are known to produce potent toxins, which are now recognized as a potentially serious threat to human health. IDEM's cyanobacteria surveillance program is conducted statewide at fourteen sites on twelve IDNR public access beaches and analyzes those samples for the type and quantity of cyanobacteria present and for the following toxins which may be produced by certain types of cyanobacteria: microcystin, cylindrospermopsin (only done if species that produce it are present) and anatoxin-a (Table B2.1.1.5).

For protection of human health from exposure to the cyanobacteria and any of the toxins, Indiana uses the World Health Organization (WHO) guideline level of 100,000 cells/ml or a microcystin toxin level of 6 parts per billion (ppb) for a recreation advisory. Beaches are closed if microcystin toxin reaches 20 ppb. The WHO has not set guideline values for cylindrospermopsin or anatoxin-a. Indiana uses 5 ppb of cylindrospermopsin and 80 ppb of anatoxin-a for a recreation advisory, consistent with the state of Ohio recommendations. Toxin results are posted if they meet those threshold numbers. Exact cell counts and toxin levels can be found in the "Test Results" section of the web site http://www.in.gov/idem/algae/. Swimming areas stay on the high cell count alert until the cell counts fall below 100,000. Sampling is conducted monthly from June through September with the frequency increased to biweekly for lakes where cyanobacteria densities are found to be greater than 100,000 cells/ml.

Intended Data Use

This program provides data for public health advisories through the ISDH, beach warnings and closings through the IDNR, and alerts for pet and livestock through the Board of Animal Health (BOAH).

SECTION A6

A6.1.7 Hydrograph Controlled Release Evaluations

The objective of this project is to evaluate the accuracy of the flow measuring equipment and the effect of the effluent on the receiving stream of HCR lagoons.

Intended Data Usage
This information will be used by the WAPB for water quality assessments and any NPDES or WQS violations will be brought to the attention of the OWQ Compliance Section.

A6.1.8 Reference Site Monitoring Program

The Reference Site Monitoring Program provides physical, chemical, and biological data from reference sites that will be used to develop or refine the Index of Biotic Integrity (IBI) for aquatic assemblages as well as biological criteria for aquatic life use assessments. Reference sites are located in areas with the least amount of anthropogenic disturbance and are considered the most natural remaining areas within a specified geographic boundary. Ideally, reference sites should be sampled at least once every 10 years to monitor for changes in the biological expectations for "least disturbed condition" and possible revisions to biological criteria; therefore, IDEM will sample at least 20 reference sites (with a goal of 25) each year over a 10-year period to refine biological indices, water quality criteria, and possibly develop other assessment indicators and thresholds.

Intended Data Use
Sampling at reference sites includes a minimum of two biological communities (fish, macroinvertebrates, and/or diatoms), habitat evaluations, and at least in-situ water chemistry (ideally laboratory water chemistry parameters, algal biomass, and flow will also be sampled as resources allow). After 10 years of reference site monitoring, water chemistry and habitat data will be used as a filter to validate reference site selection. Afterwards, biological expectations for "least disturbed condition" (best available condition given widespread disturbance) can be developed for the biological communities.

A6.1.9 Thermal Verification Monitoring

In accordance with 327 IAC 5-7 and CWA § 316(a), NPDES dischargers may request alternative thermal effluent limitations (ATEL) for a discharge based on a demonstration that the proposed effluent limitations for temperature are more stringent than necessary for the protection and propagation of the receiving waterbody's balanced, indigenous

SECTION A6

community (BIC) or balanced indigenous population (BIP) of shellfish, fish, and wildlife in and on the body of water. This means that a new or existing discharger may request an ATEL to the thermal effluent limitations otherwise imposed by IDEM based on the water quality criteria for the receiving waterbody or the technology standards, using the results from a demonstration study they implement.

The objective of monitoring point source discharge thermal plumes is to independently determine if impairments are occurring to the biological communities downstream of the thermal discharge outfalls on rivers and lakes. This monitoring effort documents the current downstream discharge conditions, determines zones of recovery of biological communities, and establishes the instantaneous pattern of the outfall thermal discharge plume by gathering biological (fish and macroinvertebrate), chemical, and habitat quality data. For determination of "no harm" to BIC, sampling is conducted on up to three (3) sites per year for fish community and one site for macroinvertebrate community (weather, environmental, and health and safety conditions permitting) during the period of the discharger's NPDES permit.

Intended Data Use

The information gathered from these studies support NPDES industrial permit decision making processes for the issuance of ATELs for permitted thermal discharges. For more detailed information, please see the most recent work plan.

A6.1.10 Special Projects

Special projects are limited in scope and designed to provide specific data for IDEM decision makers. The descriptions for individual special projects are described in individual sampling and analysis workplans.

Intended Data Use

Data use varies based on the data quality objectives of the special project and is described in the individual sampling and analysis project workplan.

SECTION A6

A6.2 Project Schedules

Plans for sample and data collection for the individual surface water quality monitoring projects are revised annually based on results from the previous field season. A comprehensive project schedule for all water quality monitoring programs is illustrated in **Table A6.2-1.**

Table A6.2-1
Annual Project Schedule

	Activity Started (Time to complete in months)									
PROGRAMS	Historical data collection and review prior workplans	Write sampling workplan	Prepare equipment and personnel for field sampling	Field data collection	Receive results-assess and determine usability	Evaluate data and write reports	Use results for assessment decisions	Provide data to users	Plan for next round of data and sample collection	Total Time from Start to Completion
Fixed Station Monitoring	November (1)	April (1)	April-May (2)	Monthly (12)	June (12)	November-March (6)	November-March (6)	November-March (6)	November-March (6)	April-June (14)
Watershed Characterization	March-May (3)	June-September (4)	September-October (2)	November-October (12)	December-November (12)	December-March (4)	April-May (2)	April-May (2)	May-September (4)	March-May (15)
Fish Tissues and Sediments Contaminants Monitoring	May (1)	May (1)	May-June (2)	July-October (4)	September (12)	November (12)	December (1)	December (1)	December (1)	May-December (20)
Probabilistic Monitoring	November-December (2)	January - March (3)	November-March (5)	April-November (8)	April-March (12)	June-March (10)	April-May (2)	April-May (2)	November-March (6)	November-March (19)
TMDL	March-May (3)	June-September (4)	September-October (2)	November-October (12)	December-November (12)	December-March (4)	April-May (2)	April-May (2)	May-September (4)	March-May (15)
Performance Monitoring	August-December (5)	January-March (3)	November-March (5)	April-November (8)	April-March (12)	June-March (10)	April-May (2)	April-May (2)	August-December (5)	August-December (17)
Cyanobacteria and Microcystin Monitoring	March (1)	April (1)	April-May (2)	May-August (4)	May-September (5)	May-September (5)	May-September (5)	May-September (5)	September-October (2)	March-October (8)
Reference Site Monitoring	November-December (2)	January - March (3)	November-March (5)	April-November (8)	April-March (12)	June-March (10)	April-May (2)	April-May (2)	November-March (6)	November-March (19)
Special Projects	March (1)	April (1)	April-May (2)	May-October (6)	June-November (6)	November-March (6)	November-March (6)	November-March (6)	November-March (6)	March (12)

SECTION A7

A7 DATA QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT/ACQUISITION OF DATA

A7.1.1 Data Quality Objectives

The data quality objective (DQO) process is a planning tool for data collection activities. The DQO is a seven step systematic process. It provides a basis for data collection activities that support decision making. The seven steps or elements of DQO as defined by U.S. EPA ("Guidance on Systematic Planning Using the Data Quality Objectives Process – EPA QA/G-4", Section 0.7, U.S. EPA, EPA/240/B-06/001, 2006) are:

1. Description of the Problem
2. Decision for the Data Collection
3. Identify Input to the Decision
4. Define Boundaries for the Study
5. Develop a Decision Rule
6. Specify Performance or Acceptance Criteria
7. Develop the Plan for Obtaining Data

Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify study objectives and acceptable criteria for the collection, evaluation, or use of environmental data. As such, each water quality monitoring program with its various data uses may require different levels of data quality. Moreover, each water quality monitoring program has separate goals addressed through specific tasks and projects. This QAPP is intended for all the surface water quality monitoring programs. Therefore a comprehensive description of DQOs for all the water quality monitoring programs is beyond the scope of this QAPP. Instead, specific details related to the seven steps of DQOs will be listed in the respective sampling and analysis workplan for each water quality monitoring program and project. The program and project goals as representative of DQOs common to each of the eleven Indiana surface water quality monitoring programs are listed below.

SECTION A7

Program and Project Goals

Fixed Stations Monitoring Program:	**Representative DQOs**
• The objective of this program is to gather water quality data that can be used for Clean Water Act assessments, permitting and compliance programs, determining long-term water quality trends, watershed characterization, and in limited cases to determine source water quality.	• Determine ambient concentrations of physical, chemical, and *E. coli* parameters for trend analysis over time for overall assessment of water quality. • Monthly collect and analyze water samples from fixed station locations statewide. Specific parameters are selected after consideration of potential sources of pollution, matrix, and intended data use. • Each year, 165 sampling locations statewide are sampled monthly. Nearby USGS gaging stations are used for flow measurements for pollutant load calculations. • The information is used in determining background data for pollutants and future pollution abatement activities. Information gathered from this program is published in the state biennial IR. • These data are used in wasteload allocation models for NPDES permits. • The optimum design is monthly sampling from 165 fixed station locations statewide.

SECTION A7

Program and Project Goals

Probabilistic Monitoring Program:	**Representative DQOs**
• This program provides an evaluation of stream water quality and biological integrity by sampling water chemistry, bacteria, algae, macroinvertebrate and fish communities as well as habitat.	• Determine if designated uses and/or WQS are being met in each major river basin using a 9-year rotating basin approach. Impaired waterbodies are placed on the 303(d) List of Impaired Waters. • Sites are selected using a stratified random distribution weighted by Strahler stream order. This statistical method requires sampling 38-50 locations within a given basin. The results are extrapolated to characterize water quality conditions for the entire basin. • Over time, the data may be used to identify emerging trends in basin-wide water quality conditions..

SECTION A7

Program and Project Goals

Watershed Characterization Program:	Representative DQOs
• Watershed characterization monitoring provides valuable data for the purposes of TMDL development (required by CWA § 303(d) for impaired waters) and CWA § 319 watershed management planning.	• The water quality data collected through the watershed characterization monitoring provides the data needed to identify the sources and extent of impairment for TMDL development and for local watershed groups to designate critical areas and management decisions for their watershed management plans. The watershed characterization monitoring project provides physical, chemical, and bacteriological data collected monthly for twelve months at the pour points and for the rest of the sites, April through October, which constitutes the recreational season. Biological data are collected once per year at each of the sites. • Site selection employs a modified geometric design in order to get the necessary spatial representation of the entire study area. Sites within a watershed are selected based on a geometric progression of drainage areas starting with the area at the mouth of the mainstem stream and working upstream through the tributaries to the headwaters (sites ≥ 5 square miles). Monitoring sites are then "snapped" to the nearest bridge with additional sites located at pour points and, to the extent possible, sites of concern to the stakeholders.

SECTION A7

Program and Project Goals

Fish Tissues and Sediment Contaminants Monitoring Program:	**Representative DQOs**
• Monitor bioaccumulation of toxic pollutants in whole fish (skin on) and in edible portions (skin off) of fish tissues.	• Provide scientific basis for developing the Fish Consumption Advisories (FCAs) for protection of human health. • Assess the concentration of contaminants in fish tissue. • Collect fish tissue data statewide from 23 national U.S. EPA CORE network stations in Indiana. • Violations of Water Quality Standards (WQS) for mercury and PCBs in fish tissues will be used as action levels for decision making to develop the FCAs. • Levels of contaminants and their exceedances from WQS in fish tissue constitute the basis for tolerable limits for "Unlimited Fish Consumption" in Group-1 to "Do Not Eat Any Fish" in Group-5. • The optimum design collects contaminants data in fish tissue statewide from 23 U.S. EPA CORE network stations, statewide on a 5-year rotating basin schedule, as well as sites not previously sampled. ,

SECTION A7

Program and Project Goals

Performance Measures Monitoring:	**Representative DQOs**
• The objective of this program is to gather water quality and biological data to determine if water quality has improved in order to report improvements to U.S. EPA Region 5's Nonpoint Source Program.	• This monitoring activity requires that OWQ show improvements in water quality conditions in impaired watersheds that have resulted from watershed planning and restoration activities. • It is anticipated that the water quality data collected will highlight improvements in watersheds where waterbodies previously identified as impaired are now meeting water quality standards. • The study areas are Indiana 12-digit watersheds that were both 1) cited on the 303(d) list as impaired and 2) underwent restoration using the watershed approach. • Data is assessed as support/non-support for designated uses. If the watershed fully or partially supports designated uses, or can be statistically shown to be making improvements, or a weight of evidence indicates impending water quality improvement, the watershed is reportable under U.S. EPA's success measures. • All assessments can be planned and executed to minimize data deficiencies and optimize conditions to gather data of known quality through implementation of proper QA/QC procedures.

SECTION A7

Program and Project Goals

Cyanobacteria and Microcystin Monitoring:	**Representative DQOs**
• The objective of this surveillance program for public lakes with recreational areas/beaches is to warn the public when cyanobacteria and cyanotoxins are present in large enough quantities to render recreation unsafe.	• Composite water samples will be collected at each swimming beach water sampling location for cyanobacteria identification and enumeration, and cyanotoxin levels. Field parameters (pH, Dissolved Oxygen (DO), DO saturation, temperature, turbidity, and specific conductance) will be measured at each site during each sampling event. Water samples will be collected for ammonia nitrogen, nitrate/nitrite, total Kjeldahl nitrogen and total phosphorus. Visual field observations will include weather conditions and lake/beach conditions. All samples collected will be identified and enumerated. Samples will be analyzed for the cyanotoxins microcystin and cylindrospermopsin using the Abraxis™ ADDA ELISA Immunoassay Test Kit. • The study areas are chosen primarily from lakes with swimming beaches managed by the DNR. • Cyanobacteria and microcystin data are compared to the WHO guidelines. WHO guidelines recommend using an action level of 100,000 cells/ml of cyanobacteria to post recreational advisory signs. While WHO guidelines for microcystin recommend posting recreational advisories at 10µg/l to 20µg/l, IDEM will recommend a warning level of 4 µg/l, which is consistent with Ohio and other states that have similar programs. IDEM will use a cylindrospermopsin level of 8 µg/l and an Anatoxin-a level of 80 µg/l as warning levels. • Program-specific controls will be used to minimize the introduction of errors. Controls for field sampling include the collection of field duplicates and blanks. Laboratory controls include thorough verification of species identifications and

SECTION A7

	cyanotoxin analyses. Photographs of cyanobacterial identification slides will be taken and stored on file. Each beach swimming area will have composite samples using the integrated water column sampler in order to better represent the cyanobacteria populations in the swimming area. Samples will be collected in the morning and early afternoon when the cyanobacteria are believed to be the most prevalent.

SECTION A7

Program and Project Goals

HCR Evaluations:	Representative DQOs
• The objective of this Program is to evaluate the accuracy of the flow measuring equipment and the effect of the effluent on the receiving stream of HCR Facilities that are due for NPDES renewal.	• This program identifies if problems exist with the HCR Facility discharge that may be causing WQS violations. This information will be used by the WAPB in 305(b) reporting process and in the development of watershed restoration plans. Any NPDES or WQS violations will be brought to the attention of OWQ Compliance Branch.. • This program evaluates facility discharge and stream flow measurement equipment at HCR facilities to assess if the equipment is located properly for the application. When the flow measuring equipment is accurately measuring the flow and if the facility is adequately treating sewage in accordance with their NPDES permits, the receiving streams should meet the water quality standards. • Chemical and physical measurements, visual observations, and historical records collected by this study will be used in the decision making process. Chemical parameters selected from the facility NPDES permits, stream flow, land use observations, general stream conditions, riparian zone conditions, facility NPDES permits, Monthly Report of Operation (MRO), Discharge Monitoring Reports (DMRs), and weather records will all be considered in regards to the water quality status of the receiving streams. • There are more than 75 NPDES permitted controlled discharge lagoons with HCR operations. Each HCR Facility has a five-year NPDES permit to which the facility must comply to meet both the federal permit and Indiana water quality standards. The NPDES permit limits are determined with a wasteload allocation,

SECTION A7

Program and Project Goals

	which specifies the level of treatment required to meet Indiana Water Quality Standards. • Water chemistry data and physical stream information gathered for this study will be subjected to numerical and narrative limitations as set forth in the Indiana Administrative Code, Title 327 IAC 2-1-6 (IAC, 2011), IAC 2-1.5-8 (IAC, 2011b) and the facility NPDES permit criteria as applicable. The numeric and narrative standards will be considered action levels for this study and exceedances will show evidence for 303(d) listing, possible NPDES non-compliance proceedings, and/or TMDL development. Further, nutrient data and stream observations will be evaluated according to nutrient benchmarks for determining nutrient impairments as cited in the Indiana Integrated Water Quality Monitoring and Assessment Report (IDEM, 2006). Generally, samples will be analyzed for parameters that have criteria either in the NPDES permit or WQS. All analytical results will be subjected to rigorous quality assurance protocols as set forth in the QAPP. • The Field Procedure Manual dictates consistent and proven techniques for sample collection to assure representative samples and minimize sample contamination. The QA/QC process detects deficiencies in the data collection as set forth in the QAPP. The QAPP also requires that all laboratories use and adhere to rigorous standards during sample analyses in order to assure good quality, usable data. The WAPB Technical and Logistical Services Section, reviews the laboratory analytical results for quality assurance. Any data that is "Rejected" due to analytical problems or

SECTION A7

Program and Project Goals

	errors will not be used for water quality assessment decisions. Any data flagged as "Estimated" may be used on a case by case basis. • Sampling design error is minimized by utilizing a comprehensive checklist of informational sources, evaluation of historical information, and a thorough HCR/watershed pre-survey. By exhausting all current and historical information sources, this sampling design has been formulated to address data deficiencies and render the optimum amount of data needed to fill gaps in the decision process.

SECTION A7

Program and Project Goals

Reference Site Monitoring Program:	Representative DQOs
• This program provides physical, chemical, and biological data from reference sites that will be used to develop/refine the IBI for aquatic assemblages (including diatoms, macroinvertebrates, and fish) as well as biological criteria for aquatic life use assessments. • The objectives of this program are to: 1) Refine biological indices (e.g., the IBI) and water quality criteria using physical, chemical, and biological data collected from approximately 250 "least anthropogenically disturbed" reference sites (as determined by evaluating land use, water chemistry, and habitat quality) over a 10-year period. 2) Refine the list of reference sites every 10 years by using using collected physical, chemical, and biological data.	• Chemical and physical sampling data will be used to validate the absence of anthropogenic disturbance or a minimal level of allowed disturbance at reference sites; thus, each site will be evaluated as "supporting" or "non-supporting" when compared with water quality criteria. • Conduct the water quality, biological community, and habitat assessments of selected references sites in two separate areas of the state to allow for sampling at least one region, regardless of weather or streamflow conditions. • Watershed areas of the state are divided geographically into major River Basins. Water quality assessment of each major river basin is conducted once every nine years. • Assess compliance or non-compliance to Water Quality Standards (WQS) in the watershed. Assess biological communities and habitats for intended waterbody uses. Waterbodies that are determined to be impaired for WQS are to be put on the 303(d) list of impaired waterbodies for TMDLs development. All assessments are included in the state biennial 305(b) report to the U.S. EPA. • The optimum design for this project is sampling at least 20 sites 3 times, and biological community and habitat assessment once during the summer sampling season.

SECTION A7

Program and Project Goals

Thermo Verification Monitoring:	**Representative DQOs**
• The objective of monitoring point source discharge thermal plumes is to independently determine if impairments are occurring to the biological communities downstream of the thermal discharge outfalls on rivers and lakes.	• The main objectives of this program are to assess the recommended fish community assessment method listed in the "Guidance for Conducting a Demonstration as a Requirement of a 316(a) Alternative Thermal Effluent Limitation Request" (IDEM 2014c), make recommendations for modification (if necessary), gain understanding of biological community response to thermal inputs and their longitudinal recovery, and to obtain supporting information on BIC. • Biological community sampling (fish community), instantaneous field parameters (DO, % DO Saturation, Water Temperature, pH, Specific Conductance, and Turbidity) data collection, and QHEI scoring will occur as one-time sampling events at the potential locations. • Any permitted electrical generating station (ESG) within the political boundary of the state of Indiana that discharges into state waters is subject to thermal and biological sampling. • For water quality, field measurements along tri-section transects (right descending bank (RDB), middle of river (MOR), left descending bank (LDB)) will be collected at 100 meter intervals downstream (or proportion of 1/10th the average wetted width of the stream reach) of the discharge point out to 1000 meters (or out to 2 times 15 times the average wetted width of the stream reach). For assessment purposes, this information will be used to create two dimensional maps to characterize the thermal plume as it moves downstream and distributes. Fish community census will occur in discrete 100 meter segments up to 1000 meters (or

SECTION A7

Program and Project Goals

	discrete segments of 1/10th the distance of 2 times 15 times the average wetted width of the stream reach) downstream from the point of thermal discharge for the LDB, MOR, and RDB of the river. For assessment purposes, the fish assemblage will be evaluated at each site using the appropriate IBI. IBI scoring for fish communities will be determined by separating the left and right 1000 meter bankside sampling reaches (or reaches of 2 times 15 times the average wetted width of the stream reach) into two consecutive 500 meter reaches (or consecutive reaches of 15 times the average wetted width of the stream reach), for a total of two IBI scores. Specifically, a 500 meter reach site (or reach of 15 times the average wetted width of the stream reach) will be considered non-supporting for aquatic life use when IBI scores are less than 36 for fish community. • Site specific aquatic life use assessments include program specific controls to minimize the introduction of errors. These controls include data sonde calibrations, field equipment checks, biological site revisits or duplicates, and laboratory controls through verification of species identifications as described in Field Procedure Manuals (IDEM 2002; IDEM 2016a) and Standard Operating Procedures (SOPs, IDEM 1992a, 1992b, 1992c, 1992d, 1992e). • The QA/QC process detects deficiencies in the data collection as set forth in the IDEM QAPP for the Indiana Surface Water Quality Monitoring Program (IDEM 2004). Precision and accuracy goals with acceptance limits for applicable field measurements are provided in the QAPP, Table B2-2: Field Parameters. Criteria for acceptance or rejection of results as well as application

SECTION A7

Program and Project Goals

	of data quality flags is presented in the Watershed Assessment and Planning Branch (WAPB) QAPP. Field techniques used during sample collection, along with laboratory procedures will be subject to periodic evaluation by both WAPB QA and field staff. • Sampling locations in this project have been selected based on the locations of the permitted Electrical Generating Stations. As these plants are continually upgrading their technology or being shut down, our sampling location priority could change within a few weeks of actual sampling events. It is pertinent for IDEM-OWQ staff to have the flexibility to adjust our sampling locations based on information gained from the EGSs.

Program and Project Goals

Special Projects:	**Representative DQOs**
• Objectives for each special project are detailed in the Sampling and Analysis Workplan for the project.	• DQOs are detailed in each project Sampling and Analysis Workplan.

SECTION A7

A7.2 SPECIFYING MEASUREMENT PERFORMANCE CRITERIA

The overall quality assurance (QA) objective for this QAPP is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results which are not only suitable for assessing the surface water quality of the waterbodies and streams in the State of Indiana but could be used for supporting regulatory decisions made by the IDEM/OWQ. The true quality of the data is assessed from the precision and accuracy of the analytical methods used to detect an analyte in the matrix or the environmental medium (water, sediments, or fish tissues). Certain criteria for measuring accuracy, representativeness, and comparability of data for the various water quality monitoring projects would be as follows:

A7.2.1 Precision

Precision is a measure of the degree to which two or more measurements are in agreement. Relative percent difference (RPD) is calculated for each pair of duplicates as indicated below:

$$RPD = \frac{|(S - D)| \times 100}{(S + D) / 2}$$

where: S = First sample value (original or matrix spike value)
D = Second sample value (duplicate or matrix spike duplicate value)

Precision goals with acceptance limits for applicable analytical methods are provided in **Table A7-1**. Table A7-1 is a high level view of the control ranges, which have been extracted from the EPA, ASTM, and Standard Methods. Control ranges for similar or equivalent test methods are the same. What makes a difference is the type of test method, not if it is EPA or Standard Methods test which often references each other. Hence, reference to method types is appropriate for this list. A more complete list is included in the RFPs (RFP 16-74 Attachment D9).

A7.2.1.1 Assessment of Precision for Field Samples

Field precision is assessed through the collection and measurement of field duplicates or co-located samples. Field precision for samples analyzed in the laboratory is assessed at the minimum rate of one duplicate sample collected for each sample set, for each field day, or for each twenty sample locations if twenty or more samples are taken in one day.

SECTION A7

A7.2.1.2 Assessment of Precision for Laboratory QC Samples

Laboratory precision is assessed by comparing the analytical results between matrix spike (MS) samples and matrix spike duplicates (MSDs) for organic analysis. Precision of inorganic parameters is assessed by comparing analytical results between fortified laboratory control standards (LCS) and their duplicates (LCSD). Laboratory duplicates rate is determined for each analytical parameter by the acceptable U.S. EPA analytical test method used for the analysis.

A7.2.2 Accuracy

Accuracy is the degree to which an observed value and an accepted reference value agree. Percent recovery (%R) of reference standards is calculated as indicated below:

$$\%R = \frac{(A - B) \times 100}{C}$$

where:

- A = Analyte concentration determined experimentally with known quantity of reference material added.
- B = Background determined by separate (unspiked) analysis of sample, or in the field, a blank.
- C = True value of reference standard added.

Accuracy goals with acceptance limits for applicable analytical methods may be found in **Table A7-1.**

A7.2.2.1 Field Accuracy Objectives

Accuracy of field measurements is assessed with reference standards measured periodically throughout field activities or by using measurement equipment calibrated at a frequency interval set to maintain field accuracy goals. The reference measurement rate is specified for each parameter in the field method procedure. Accuracy of sample collection activities is assessed with field, equipment, and trip blanks (VOCs only), and by adherence to all sample handling, preservation, and holding time requirements as specified elsewhere in WAPB SOPs. See the *Surveys Section Field Procedure Manual* **(Appendix F)** and the Probabilistic Monitoring Section SOP Manual **(Appendix G)**. An index of the two sets of SOPs is provided with this QAPP (See **Appendix H**).

SECTION A7

A7.2.2.2 Laboratory Accuracy Objectives

Laboratory accuracy is assessed by comparison of %R (Percent Recovery) with the quality control acceptance criteria listed in **Table A7-1**, Precision and Accuracy Goals. The experimental results of method blanks, reagent/ preparation blanks, matrix spike/ matrix spike duplicates (MS/MSDs), field blanks, and bottle blanks are compared with established quality control criteria specified in the test method.

A7.2.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained for that measurement. The percent completeness for the project is stated for both field and laboratory analyses as follows:

$$\% \text{ Completeness} = \frac{(\text{number of valid measurements}) \times 100}{(\text{number of measurements planned})}$$

where: "valid measurements" refers to numbers of investigational samples obtained or to be obtained for a specific purpose, or in order to satisfy a particular project objective.

The overall completeness goal of these projects including field data collection, sample collection, and analysis is 70%. The laboratory completeness goal is 95%.

A7.2.4 Representativeness

Representativeness expresses the degree to which data accurately and precisely typify a characteristic of a population, parameter uniformity at a sampling point, a process condition, or an environmental condition.

SECTION A7

A7.2.4.1 Representativeness of Field Data

Representativeness of field data is dependent upon the proper design of the sampling program. The field sampling program is designed to collect samples which present an overall indication of the increase or decrease in a parameter in one location from one sampling event to the next. See the Surveys Section Field Procedure Manual **(Appendix F)** and the Probabilistic Monitoring Section SOP Manual **(Appendix G)** for WAPB (WAPB)/SOPs for field data acquisition and sampling.

A7.2.4.2 Representativeness of Laboratory Results

Representativeness in the laboratory is ensured by using proper analytical procedures, following good laboratory practices (GLPs), meeting sample holding times, and analyzing and assessing field duplicate samples. Laboratories performing analytical tests for OWQ are required to have a Quality Assurance Plan and written SOPs which comply with the two IDEM RFPs (IDEM RFP 16-74, **Appendix B,** IDEM RFP 16-88, **Appendix C,** and IDEM RFP 5-60, **Appendix D**). Contractors, their employees and subcontractors are required to comply with all applicable licensing standards, certification standards, accrediting standards and any other laws, rules, or regulations governing services provided by the contractor pursuant to the laboratory contract.

A7.2.5 Comparability

Comparability is an expression of the confidence with which one data set can be compared with another data set. Field and laboratory procedures are documented and followed to ensure comparability of results. Proposed changes in field data acquisition, sample acquisition, or laboratory sample analysis procedures are reviewed and verified for comparable results before being implemented.

Contract Requirements For Method/Parameter Updates
Analysis will be performed for the parameters listed in **Table B4-1**, using the analytical method(s) and minimum reporting level(s) given. Contract laboratories are permitted to make modifications to methods listed as described in "Analytical Procedure Modifications", below.

As methods are updated (either by the Federal Register, supplemental updates, technical notes, or memo from the U.S. EPA), the laboratory must update their methodology, SOPs, and/or analyte list. The updates must be completed within the time specified in the update or 60 days, whichever is greater.

SECTION A7

All instrumental, sample preparatory, and QA/QC procedures must be met in accordance with the method and technical specifications. Any alterations of an analytical method, parameter list, or QA/QC item must be approved by the WAPB.

Analytical Procedure Modifications
Many analytical methods allow changes in separatory methods, columns, extraction techniques, and preconcentration procedures. The modification must provide analyte selectivity and detector response greater than or equal to the unmodified procedure.

Modifications outside of those specified in the method must be approved by WAPB prior to utilization on samples. Such modifications may be approved on a conditional basis until sufficient sample analyses are conducted (at least 30 actual samples) under production conditions.

To receive conditional approval for a procedure modification the lab must provide the following:

1) Sample and QA/QC numbers, prep dates and times, analytical sequence, and names analyst(s) and/or technician(s).
2) MDL determination.
3) Initial Precision and Recovery (IPR) determination or (study)
4) Side by side comparison runs without modifications.
5) All sample preparation data.
6) Initial, intermediate, and final volumes for each step.
7) Instrumental conditions, column types, detectors, flow rates, or other operational parameters.
8) Raw data.
9) QA/QC showing accuracy and precision.

Permanent approval may be granted by WAPB after reviewing results of production analytical runs with the modification(s).

SECTION A7

Table A7-1
Precision and Accuracy Goals
for Data Acceptability
by Matrix

Test Method	Water		Sediment		Fish Tissues	
	Precision	Accuracy	Precision	Accuracy	Precision	Accuracy
	RPD	%R	RPD	%R	RPD	%R
Metals						
ICP, ICP/MS or AA	± 20	80-120	± 20	80-120	± 20	75-125
Mercury (cold vapor)	± 20	75-125	± 20	75-125	± 20	75-125
Organotin (GC/FPD)			± 20	75-125	± 20	75-125
Inorganic Chemicals, Nutrients, and Physical Properties						
Cyanide and Sulfide	± 20	75-125	± 20	75-125		
Other inorganic, nutrient and physical properties	± 20	80-120	± 50	80-120		
Volatile Organic Compounds by GC/MS						
1,1-Dichloroethene	± 20	61-145	± 22	59-172	± 22	59-172
Trichloroethene	± 20	71-120	± 24	62-137	± 24	62-137
Benzene	± 20	76-125	± 21	66-142	± 21	66-142
Toluene	± 20	76-125	± 21	59-139	± 21	59-139
Chlorobenzene	± 20	76-130	± 21	60-133	± 21	60-133
Semi- Volatile Organic Compounds by GC/MS						
Phenol	± 42	12-100	± 35	26-100		
2-Chlorophenol	± 40	27-123	± 50	25-102		
1,4-Dichlorobenzene	± 28	36-100	± 27	28-104		
N-Nitroso-di-n-propylamine	± 38	41-120	± 38	41-126		
1,2,4-Trichlorobenzene	± 28	39-100	± 23	38-107		
4-Chloro-3-methylphenol	± 42	23-100	± 35	26-103		
Acenaphthene	± 31	46-120	± 20	31-137		
4-Nitrophenol	± 50	10-100	± 50	11-114		
2,4-Dinitrotoluene	± 38	24-100	± 47	28-100		
Pentachlorophenol	± 50	9-103	± 47	17-109		
Pyrene	± 31	26-127	± 35	35-142		
Polynuclear Aromatics (PNAs) by HPLC/ UV Fluorescence						
Naphthalene			11.8	31-102	19.1	31-146
Acenaphthylene			9.8	38-97	21.4	18-146
Acenaphthene			11.6	35-105	16.1	32-129
Fluorene			13.5	29-110	12.3	32-106
Phenanthrene			16.2	27-125	10.2	49-111
Anthracene			11.7	36-106	16.3	16-113
Chrysene			14.3	31-116	16.6	24-123
Fluoranthene			10.7	38-103	16.5	27-126
Pyrene			12.6	34-110	14.9	33-123
Benzo (a) anthracene			11.7	35-105	14.8	23-112
Benzo (b) anthracene			12.3	36-110	14.3	30-116

SECTION A7

Table A7-1
Precision and Accuracy Goals
for Data Acceptability
by Matrix

Test Method	Water		Sediment		Fish Tissues	
	Precision	Accuracy	Precision	Accuracy	Precision	Accuracy
	RPD	%R	RPD	%R	RPD	%R
Polynuclear Aromatics (PNAs) by HPLC/ UV Fluorescence						
Benzo (k) anthracene			13.8	30-113	13.4	32-112
Benzo (a) pyrene			18.1	21-129	12.7	34-110
Dibenzo (a,h) anthracene			13.5	28-1098	15.0	24-114
Benzo (g,h,i) perylene			14.7	29-117	13.7	27-109
Indeno (1,2,3-c,d) pyrene			12.3	34-108	13.4	33-113
1-Methyl naphthalene			9.0	37-92	24.4	16-162
2-Methyl naphthalene			10.2	33-94	12.0	43-116
Pesticides and PCBs by GC/ECD						
Lindane	± 20	56-123	± 36	19-140	± 50	46-127
Heptachlor	± 20	40-131	± 20	34-111	± 31	35-130
Aldrin	± 22	40-120	± 21	42-122	± 43	34-132
Dieldrin	± 20	52-126	± 38	36-146	± 38	31-134
Endrin	± 21	56-121	± 37	30-147	± 45	42-139
4,4'-DDT	± 27	38-127	± 36	25-160	± 50	23-134
Aroclor 1260	± 20	56-123	± 21	8-127		
Decachlorobiphenyl					± 50	44-130
Pesticides by HPLC/PDA (EHL Method EHL-L131)						
Herbicides/ Pesticides SAS1 (EHL-L131)	± 30	70-130				
Semivolatile Organic Compounds by GC/MS (EHL Method EHL-S125)	**Std. Dev**					
Semivolatile Organic Compounds SAS5 (EHL-S125)	± 30	70-130				
Semivolatile Organic Compounds by HPLC (EPA Method 547)						
AminoMethylPhosphoric Acid (AMPA)	± 30	70-130				
Glyphosate	± 30	70-130				

SECTION A7

Table A7-1
Precision and Accuracy Goals
for Data Acceptability
by Matrix

Test Method	Water		Sediment		Fish Tissues	
	Precision	Accuracy	Precision	Accuracy	Precision	Accuracy
	RPD	%R	RPD	%R	RPD	%R
Bacteriology						
E. coli Positive Control	30[2]	Yes				
Bacteriology – (SM9223)						
E. coli & Total Coliforms – Colilert Method	127.9	N/A				
Media Lot Tests for Colilert Method:		**Target Result**				
E. coli – Sterility Control	N/A	< 1				
Total Coliforms – Sterility Control	N/A	< 1				
E. coli – PA	N/A	< 1				
Total Coliforms – PA	N/A	< 1				
E. coli – KP	N/A	< 1				
Total Coliforms – KP	N/A	TNTC > 2400				
E. coli – EC	N/A	TNTC > 2400				
Total Coliforms – EC	N/A	TNTC > 2400				

Precision is evaluated from the RPD of laboratory duplicate samples. Accuracy is evaluated from Laboratory Fortified Blanks, surrogate spikes, or equivalent QC sample. Individual test methods may permit optional control limits developed from the mean percent recovery (x) and the standard deviation (S) of the mean percent recovery. These data can be used to establish the upper and lower control limits as follows:

UPPER CONTROL LIMIT = x + 3S
LOWER CONTROL LIMIT = x - 3S

The optional control limits must be equal to or better than the required control limits detailed in the test method or applicable quality control standard.

[2] Based on limited number of samples.

SECTION A9
A9 DOCUMENTATION AND RECORDS

A9.1 Field Activities

Field measurements are made according to the Surveys Section Field Procedure Manual, (**Appendix F**) and Probabilistic Monitoring Section SOP Manual, (**Appendix G)**, instrumentation or equipment manuals, and SOPs and TSOPs written for field activities. All instrument readings and observations which do not require data reduction are recorded on field sheets, such as those shown in **Figure A9-1** and **Figure A9-3.** Field observations requiring calculations are reduced in the field and validated after return by the field crew. Results are documented and reported after quality control verification procedures in OWQ/WAPB/SOP 2003 (See **Appendix H**) are performed. QA staff audit field data reduction, validation, and reporting procedures as a component of performance audits described in **Section C1.1**, Field Performance and System Audits.

A9.2 Laboratory Activities

Data reduction, validation, and reporting procedures found in applicable Acceptable U.S. EPA test methods are required by each IDEM RFQ, or RFP for all analytical laboratory tests performed for the IDEM/OWQ. Data reduction is expected to be completed at the time of analysis, with the calculations included with the report to OWQ WAPB. Each analytical laboratory is required to maintain a quality assurance system capable of providing the OWQ with data for use in enforcement actions. A contract laboratory is expected to validate results and provide QAO approval of validated results. Reports submitted to the WAPB satisfying DQA Levels 2 through 4 (see **Section D3**) are required to satisfy the reporting requirements detailed in the Technical Specifications for each IDEM RFQ, and RFP (See IDEM RFP 16-74 **(Appendix B)**, RFP 16-88 **(Appendix C)**, and IDEM RFP 5-60 (**Appendix D**)). **Table A9-1** in this section provides an overview of laboratory report documentation for DQA Level 2 through 4. In addition laboratory reports for DQA Level 4 are required to comply with Contract Laboratory Program (CLP) data reporting requirements. The forms may be computer generated, but in a format similar to CLP forms.

SECTION A9

Table A9-1
Laboratory Reporting Requirements

- Report Date (date report is completed).
- Documentation of IDEM/OWQ sample set number including: OWQ Analysis Set Number, IDEM/OWQ sampling date, receipt date
- Documentation of sample holding time summary, IDEM/OWQ sample identification number, Lab sample identification number.
- IDEM/OWQ sample number cross reference with Laboratory internal identification number(s) and laboratory QA/QC results.
- Sample analytical results, parameter name, CAS Number (Use the CAS Number assigned by IDEM if a unique CAS Number does not exist for the parameter), sample preparation dates, sample analysis dates & time, analytical and sample preparation methods, analytical and preparation batch numbers, dilution multipliers, method reporting limit (MRL) for the parameter. Adjust MRL for any individual sample dilutions.
- Sample analytical result and MRL units. Results must be in the same units.
- Method Reporting Limit (MRL) or Practical Quantification Limit (PQL) for each IDEM sample result and each QC sample result in the analytical run. If the MRL is different than the IDEM/OWQ required CRQL, then report the actual MRL (3.18 * Method Detection Limit).
- Calculations and raw data including chromatograms, recorder charts, and spectrograms. (Maintained by contract laboratory for easy retrieval and review. Inclusion in reports is required only for DQA Level 4).
- Results of QC check samples including blanks, duplicates, matrix spikes, matrix spike duplicates, QC standards, surrogates, internal standards, external standards, calibration standards, interference check samples.
- Calibration and tuning documentation.
- Case narrative indicating any deviations from the test method or SOP, unexpected or unusual results, out-of-limits QC check sample results.
- Explanations of any laboratory flags included in the report
- ORIGINAL copy of IDEM/OWQ chain-of-custody forms and copy of IDEM/OWQ sample and test request form.
- Lab Identification and Contact Information.

Figure A9-1

IDEM Stream Sampling Field Data Sheet

Analysis Set #	Rank

Sample #	Site #	Sample Medium	Sample Type	Duplicate Sample #

Stream Name:		River Mile:		County:	
Site Description:					

Survey Crew Chief	Sample Collectors 1	2	3	4	Date Sampled	HydroLab #	Water Depth/ Gage Ht (ft)	Water Flow (cf/sec)	Flow Estimated?	Algae?	Aquatic Life?
									☐	☐	☐

Sample Taken?		Aliquots				Water Flow Type			Water Appearance			Canopy Closed %	
☐ Yes	☐ No; Frozen	☐ 1	☐ 2	3	☐ 4	☐ Riffle	☐ Dry	☐ Stagnant	☐ Clear	☐ Green	☐ Sheen	☐ 0-20%	☐ 60-80%
☐ No; Stream Dry	☐ No; Other	☐ 6	☐ 8	12	☐ 24	☐ Pool	☐ Run	☐ Flood	☐ Murky	☐ Black	☐ Other	☐ 20-40%	☐ 80-100%
☐ No; Owner Refused Access		☐ 48	☐ 72	☐ AS-Flow		☐ Glide	☐ Eddy	☐ Other	☐ Brown	☐ Gray (Septic/Sewage)		☐ 40-60%	

Special Notes:	

Field Data:

Date (m/d/yy)	24-hr Time (hh:mm)	D. O. (mg/l)	pH	Water Temp (°C)	Spec Cond (µS/cm)	Turbidity (NTU)	% Sat.	Chlorine (mg/l)	Chloride (mg/l)	Chlorophyll (µg/l)	Weather Codes SC	WD	WS	AT
Comments:														
Comments:														
Comments:														
Comments:														
Comments:														
Comments:														
Comments:														

Measurement Flags

<	< Min. Meter Measurement
>	> Max Meter Measurement
E	Estimated (See Comments)
R	Rejected (See Comments)

Field Calibrations:

Date (m/d/yy)	Time (hh:mm)	Calibrator Initials	Calibration Type	Meter #	Value	Units

Calibration Type	pH DO Turbidity

Preservatives/Bottle Lots:

Group: Preservative	Preservative Lot #	Bottle Type	Bottle Lot #

Weather Code Definitions

SC Sky Conditions				WD Wind Direction		SW Wind Strength		AT Air Temp	
1	Clear	8	Rain	0	North (0 degrees)	0	Calm	1	< 32
2	Scattered	9	Snow	9	East (90 degrees)	1	Light	2	33-45
3	Partly	10	Sleet	18	South (180 degrees)	2	Mod./Light	3	46-60
4	Cloudy			27	West (270 degrees)	3	Moderate	4	61-75
5	Mist					4	Mod./Strong	5	76-85
6	Fog					5	Strong	6	> 86

Groups: Preservatives		Bottle Types	
GC	General Chemistry: Ice	2000P	2000mL Plastic, Narrow Mouth
Nx	Nutrients: H2SO4	1000P	1000mL Plastic, Narrow Mouth
Metals	Metals: HNO3	500P	500mL Plastic, Narrow Mouth
Cn	Cyanide: NaOH	250P	250mL Plastic, Narrow Mouth
O&G	Oil & Grease: H2SO4	1000G	1000mL Glass, Narrow Mouth
Toxics	Toxics: Ice	500G	500mL Glass, Wide Mouth
Ecoli	Bacteriology: Ice	250G	250mL Glass, Wide Mouth
VOA	Volatile Organics: HCl & Thiosulfate	125G	125mL Glass, Wide Mouth
Pest	Pesticides: Ice	40GV	40mL Glass Vial
Phen	Phenols:H2SO4	120PB	120ml Plastic (Bacteria Only)
Sed	Sediment: Ice	1000PF	1000mL Plastic, Corning Filter
Gly	Glyphosate: Thiosulfate	500PF	500mL Plastic, Corning Filter
Hg	Mercury(1631): HCl	60P	60mL Plastic
Cr6	ChromiumVI(1636) : NaOH	250T	250mL Teflon

Figure A9-2

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Project: _____

[X] OWQ [ ] OSHWM [ ] OER [ ] OAM

Analysis Set # _____

CHAIN OF CUSTODY

I Certify that the sample(s) listed below was/were collected by me or in my presence. Date:____/____/____ P.O. #: _____

Signature:_____ Section:_____

LAB NUMBER ASSIGNED	IDEM CONTROL NUMBER	CONSISTING OF THE INDICATED NUMBER OF BOTTLES											DATE AND TIME COLLECTED
		200ml P,N.M.	1000ml P,N.M.	1000ml G,N.M.	500ml G,W.M.	250ml G,W.M.	125ml G,W.M.	40 ml VIAL	120ml P,(B.O.)	500ml P,N.M.	250ml P,N.M.	250ml T,N.M.	/ / : AM/PM
													/ / : AM/PM
													/ / : AM/PM
													/ / : AM/PM
													/ / : AM/PM
													/ / : AM/PM
													/ / : AM/PM
													/ / : AM/PM
													/ / : AM/PM
													/ / : AM/PM
													/ / : AM/PM

T-Teflon **P-Plastic** **G-Glass** **N.M.-Narrow Mouth** **W.M.-Wide Mouth** **B. O.- Bacti. Only**

I certify that I received the above sample(s)

CARRIERS

Should samples be iced? **Y** **N**

SIGNATURE	DATE AND TIME	SEALS INTACT		COMMENTS
RELINQUISHED BY:	/ /			
RECEIVED BY:	: AM/PM	Y	N	
RELINQUISHED BY:	/ /			
RECEIVED BY:	: AM/PM	Y	N	
RELINQUISHED BY:	/ /			
RECEIVED BY:	: AM/PM	Y	N	
RELINQUISHED BY:	/ /			
RECEIVED BY:	: AM/PM	Y	N	

Lab Custodian

I certify that I received the above sample(s) and is/are recorded in the official record book. The same samples will be in custody of competent laboratory personnel at all times or locked in a secure area.

Signature: Date: / / Time: : AM/PM

Lab:_____ Address:_____

Figure A9-3

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

FACILITY FIELD SHEET

Date: _____ Surveyors: _____

Facility: _____ NPDES #: _____ Operator: _____

Location: _____ Facility Phone #: ( ) _____

Receiving Stream: _____

Sampler # & Location(s): _____

Time	Location	Flow	Aliquot	D.O.*	Temp.	pH	Other

Lab #	Location

Facility Totalizer

Final _____ Time _____

Initial _____ Time _____

Total _____

IDEM Total _____

% Difference _____ %

IDEM Flow Meter # _____

Flow Device: _____ Location: _____

Calibrated: _____

Staff Gage Readings

Time	Gage Ht.	Gage MGD	Facility Meter	Facility MGD	% Diff.

Parameters		Pres.	Lot #
G.C.	_____	ICE	
Nx	_____	2 ml H_2S0_4/l	_____
Metals	_____	10 ml $HN0_3$/2l	_____
Cn	_____	1 ml Nao H/l	_____
O & G	_____	2 ml H_2S0_4/500ml	_____
Toxics	_____	ICE	
E. coli	_____	ICE	
VOA	_____	B_____	C_____

*D.O. Method _____

Calibration Checks

pH Meter # _____ buffer 7

Time _____

Reading _____

Hydrolab # _____

Time _____

Hydrolab _____

Winkler _____

Comments: _____

SECTION B1

B MEASUREMENT/DATA ACQUISITION

B1 Sampling Network and Rationale

The sample network design and rationale for sampling locations is described in the 2011 "Surface Water Quality Monitoring Strategy 2011-2019" (**Appendix E**). For the probabilistic monitoring program, the state is divided into nine major river basins (**Figure A5.1**) for environmental sampling, analysis, and assessment, with the goal of completing a water quality survey of the state during a nine-year period.

Site reconnaissance activities are conducted in-house and through physical site visits. In-house activities include preparation and review of site maps and aerial photographs. Physical site visits include verification of accessibility, safety considerations, equipment needed to properly sample the site, and property owner consultations, if required. Final coordinates for each site are determined during the physical site visits or at the beginning of the sampling phase of a project using a Trimble Juno ™ Global Positioning System (GPS) with an accuracy of one to three meters. Sampling is according to IDEM Spacial Data Standards (http://www.in.gov/idem/files/spatial_data_collection_standards.pdf).

B1.5.1 Fixed Station Monitoring Locations

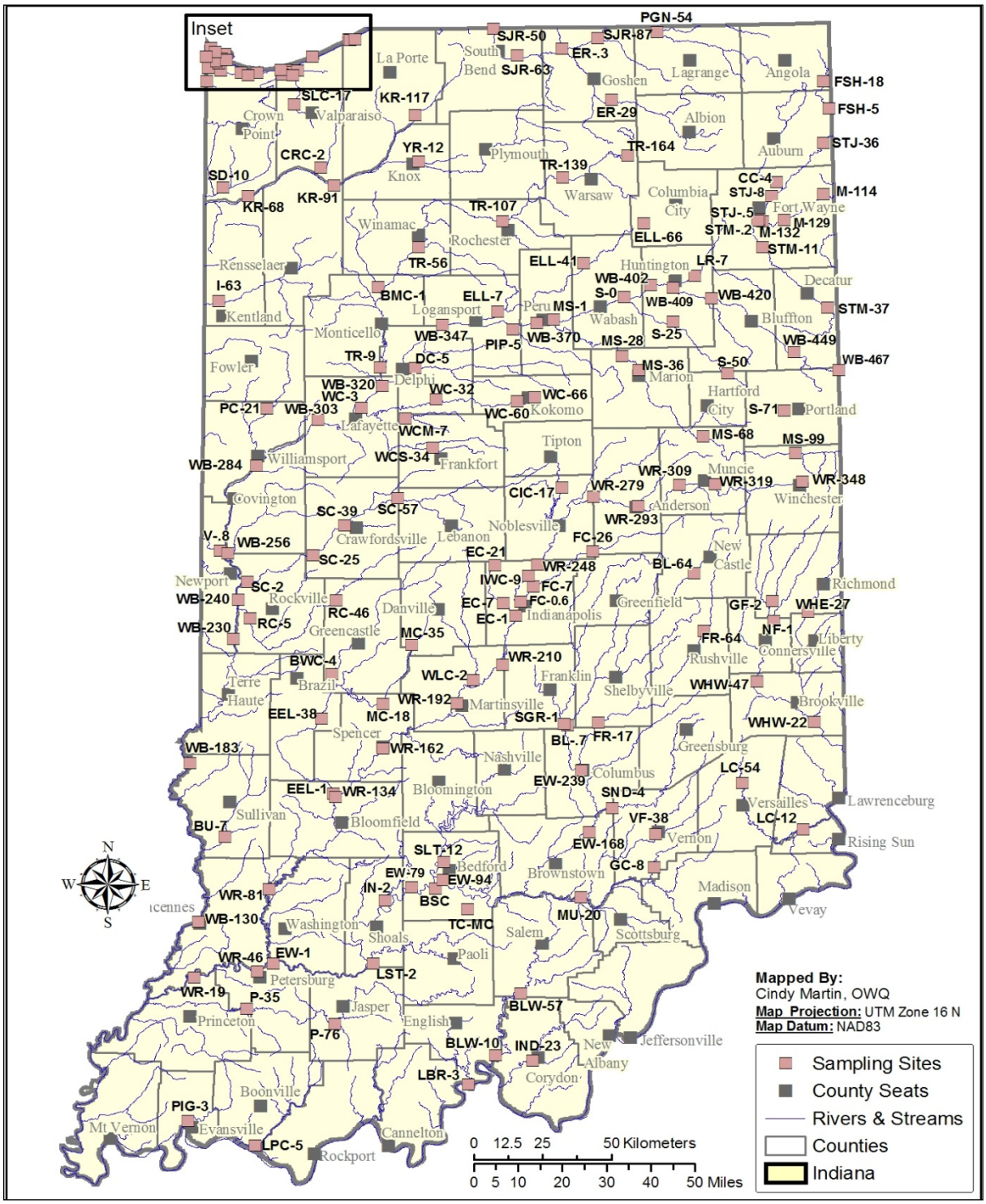
Fixed station monitoring locations have been chosen in general using the following criteria:

- Waters used for public water supply, industrial, agricultural, and recreational purposes and capable of supporting well-balanced warm/cold water aquatic/fish community, as well as supporting put-and-take trout fishing.
- Near known or suspected sources of pollution.
- Near state boundaries to determine the quality of water entering or leaving the state.

More detail and rational of the current list of 165 sampling sites for fixed station monitoring are listed in **Table 2** and **Table 3** of the Fixed Station Sampling and Analysis Workplan**.** Sampling locations for fixed station monitoring are also identified in **Figure B1.5-1** and **Figure B1.5-2.**

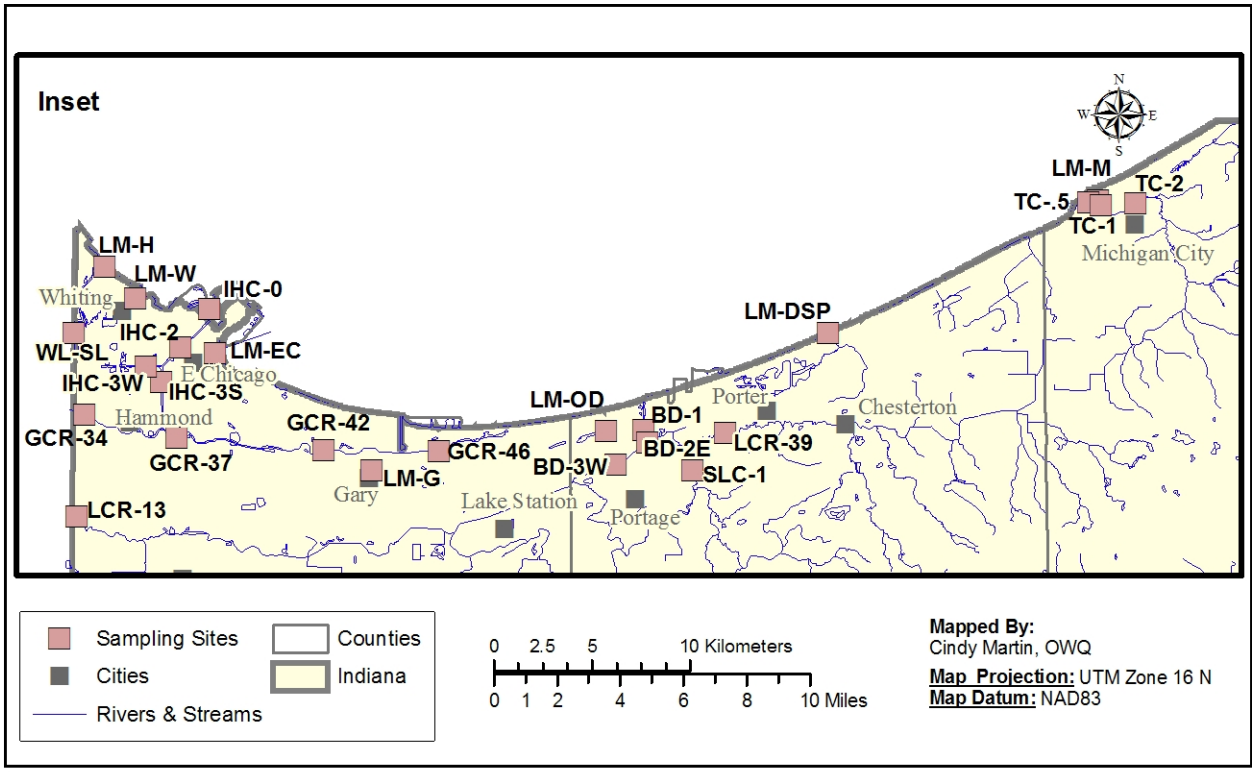
SECTION B1

Figure B1.5-1
Map of Indiana Water Quality Fixed Station Monitoring Sites – State-wide



SECTION B1

Figure B1.5-2
Map of Indiana Water Quality Fixed Station Monitoring Sites – Northwest Indiana



B1.5.2 Probabilistic Monitoring Program

A list of 100 sampling sites in the basin of study are generated using Environmental Monitoring Assessment Program (EMAP) selection methods from U.S. EPA's National Health Environmental Effects Research Laboratory, Western Ecology Division, in Corvallis, Oregon. (Diaz-Ramos, et.al. 1996, Stevens, D.L., Jr. 1997, Stevens, D. L., Jr., and A. R. Olsen. 2004) The site selection process incorporates a stratified random probability design in order to select the appropriate representation of 1st, 2nd, 3rd, and 4th order and higher streams in the basin. Sampling sites (approved during site reconnaissance activities) are taken in sequential order until 45 sites are sampled for algal community and water chemistry, 40 sites for bacteriological sampling, and 38 sites for biological sampling programs. If a site is considered "non-target" (i.e., dry, backwater, marsh/wetland, etc.) or unavailable to sample for some other reason (physical barrier, landowner denial, etc.), the next approved site on the list will be taken. The EMAP design uses a statistically valid number of randomly selected sites to assess and characterize the overall water quality and biotic integrity of the basin of study. To statistically estimate the percent of the basin attaining designated uses with a 95% confidence level, a minimum of 38 probabilistic sites will be sampled in the basin of interest.

B1.5.3 Watershed Characterization

For its watershed characterization studies, OWQ uses a modified geometric site selection process in order to get the necessary spatial representation of the entire study area. Sites within a watershed are selected based on a geometric progression of drainage areas starting with the area at the mouth of the mainstem stream and working upstream through the tributaries to the headwaters (sites $\geq$ 5 square miles). Monitoring sites are then "snapped" to the nearest bridge with additional sites located at pour points and, to the extent possible, sites of concern to the stakeholders.

Study areas are selected based upon TMDL development needs and where there is a successful CWA § 319 planning grant application. Due to staffing and laboratory constraints, no more than two watershed characterization studies are ongoing within a calendar year with one commencing in the spring (usually April) and the other in the fall (usually November). The watershed characterization monitoring project provides physical, chemical, and bacteriological data collected monthly for twelve months at the pour points and for the rest of the sites, April through October, which constitutes the recreational season. Biological data are collected once per year at each of the sites.

The water quality data collected through the watershed characterization monitoring provides the data needed to identify the sources and extent of impairment for TMDL development and for local watershed groups to designate critical areas and management decisions for their watershed management plans. The rigor of this monitoring design supports future performance measures monitoring to determine if improvements in water quality have occurred due to management and BMP implementation. For more detailed information, please refer to the most recent work plan.

B1.5.4 Fish Tissues and Sediment Contaminants Monitoring Program

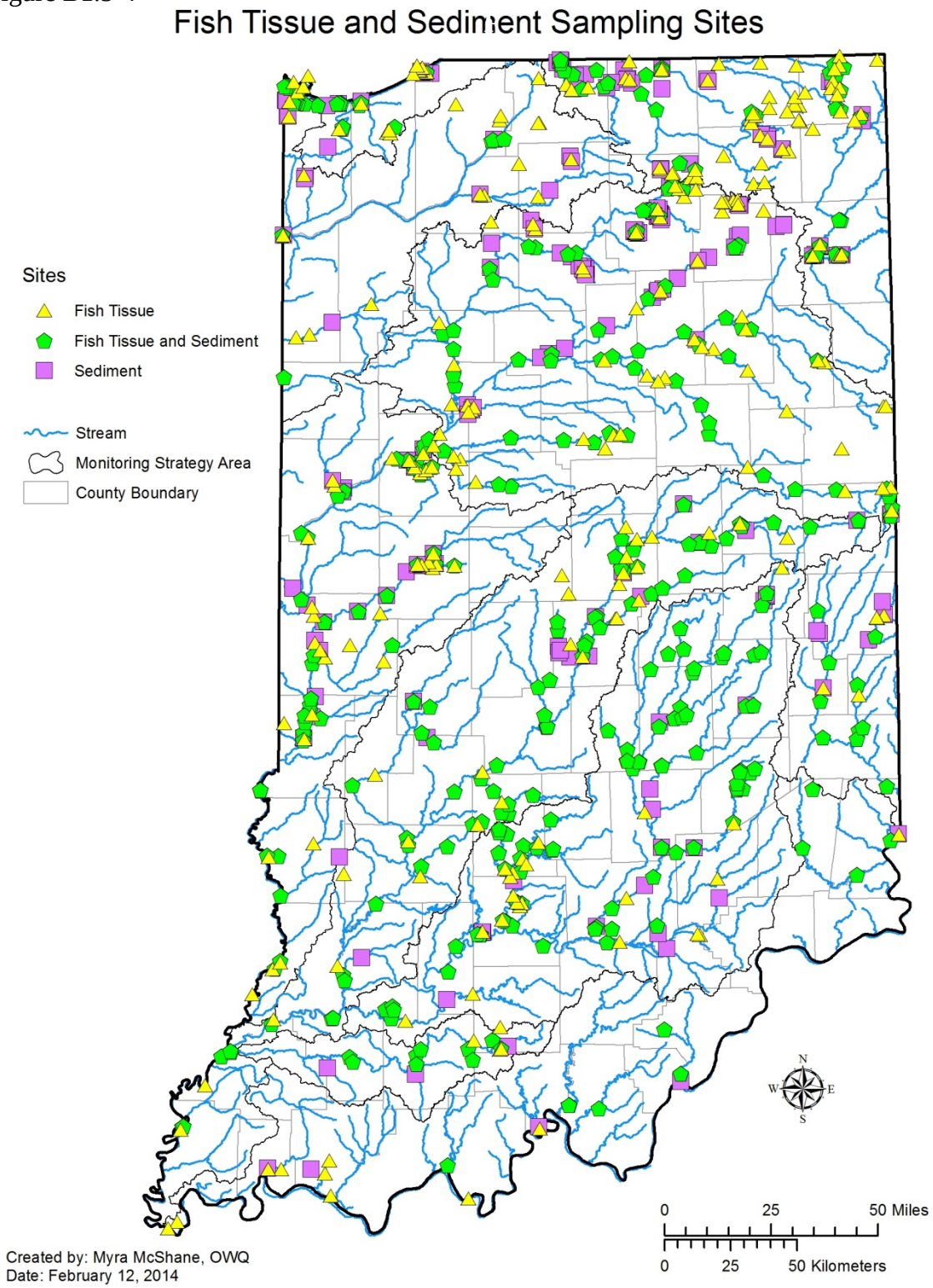
The fish tissue contaminants monitoring program currently prioritizes targeted lake and river sites based on the following criteria:

- Historical U.S. EPA monitoring program stations ("core" sites),
- Current status of fish consumption advisories or known contaminated stream reaches,
- New locations of interest that have never been sampled,
- Public access reservoirs and natural lakes,
- Locations where there is adequate historical data which can be used to assess trends,
- Unassessed stream reaches based on 10-digit HUC pour points,
- Sampling requests by other programs within and external to the IDEM,
- Special studies.

Generally, this program targets approximately three to five fish tissue samples from 35-45 sites per year. The number of sites and the samples collected from each site are highly variable and based on available WAPB resources and funds allocated in the laboratory service contract. Fish tissue collections can occur year round, although the most desirable sampling period is from late summer to early fall (i.e. August through October). The lipid content of many species (which is a reservoir for organic pollutants) is generally highest at this time. Also, water levels are typically lower during this time, thus simplifying collection procedures (U.S. EPA 2000c). **Figure B1.5-4** shows past sampling locations for fish tissues and sediments.

SECTION B1

Figure B1.5-4



SECTION B1

B1.5.5 Performance Measures Monitoring Program

Sample sites are selected from study areas in Indiana's 12-digit watersheds that are both: 1) cited on the 303(d) List of Impaired Waters and 2) where restoration activities have occurred using U.S. EPA's watershed approach, which can be found at https://www.epa.gov/sites/production/files/2015-06/documents/watershed-approach-framework.pdf. Each sampling and analysis workplan in this program details specific sites and the criteria for their selection.

B1.5.6 Cyanobacteria and Microcystin Monitoring Program

The site locations are selected based on the availability of a public swimming beach or recreational area at a state managed recreation area. The sampling and analysis workplan for each project in this program lists the selected sampling sites, plus lake names, AIMS Number, County Name, 8-Digit HUC, Quad Map, the latitudes and longitudes of each sampling site.

Each beach swimming area has composite samples taken in order to better represent the cyanobacteria populations in the swimming area. Staff will wade in to the lake until the water level is about waist high, will stand for a minute to let the water/sediment settle, and then take the sample using the integrated water column sampler. Samples will be collected in the morning and early afternoon when the cyanobacteria are believed to be the most prevalent.

B1.5.7 Hydrograph Controlled Release Evaluations

In Indiana, there are 65 NPDES permitted controlled discharge lagoons with hydrograph controlled release operations. Each HCR Facility has a five-year NPDES permit to which the facility must comply to meet both the federal permit and Indiana water quality standards. The NPDES permit limits are determined with a wasteload allocation, which specifies the level of treatment required to meet Indiana Water Quality Standards. Generally, a wasteload allocation is developed for downstream reaches of approximately six miles. This distance may vary depending on the size of the receiving stream and volume of discharge.

Priority for studying these facilities is based on the earliest expiration dates, i.e., those permits which expire closest to the current date will be first chosen to have flow equipment and receiving stream quality checked. This sampling design should be inclusive of the wasteload allocation stream reach for each facility. Additional details of HCR sites selected are in the sampling and analysis workplan for the project.

B1.5.8 Reference Site Monitoring Program

Reference sites are located in areas with the least amount of anthropogenic disturbance and are considered the most natural remaining areas within a specified geographic boundary. IDEM worked with U.S. EPA and Tetra Tech in March 2015 to develop a framework and criteria for reference site selection (U.S. EPA Assistance Agreement I 96555711-1 IDEM). IDEM provided Tetra Tech with 1458 sites previously sampled for fish and/or macroinvertebrates between 2003 and 2013 for possible reference site selection. Using land use factors as the primary filter, Tetra Tech provided a list of 324 reference sites. IDEM narrowed down the list further by using in-stream chemical and physical data as a secondary filter. A minimum of 20 reference sites are required in each of the natural environmental gradient classifications (ecoregion, stream size, etc.) to develop linear regression models showing change in biological assemblage structure given certain explanatory variables. Increasing the number of reference sites, however, will reduce variability in calibrating the IBI and setting biological criteria thresholds (U.S. EPA 2013, Tetra Tech personal communication). Based on the spatial distribution of the sites and available resources, IDEM will conduct site reconnaissance and sampling of reference sites with the goal of at least 20 reference sites each year over the next 10 years to refine biological indices and water quality criteria, as well as possibly develop other assessment indicators and thresholds. Additional detail about site selection is in each project sampling and analysis workplan.

B1.5.9 Thermo Verification Monitoring

Sampling locations are selected based on the locations of the permitted Electrical Generating Stations (EGSs). As these plants are continually upgrading their technology or being shut down, our sampling location priority could change within a few weeks of actual sampling events in an individual project. Each sampling and analysis workplan in this program details specific sites and the criteria for their selection.

B1.5.10 Special Projects Program

Sample sites are selected based on the DQOs of the special project. Each sampling and analysis workplan in this program details specific sites and the criteria for their selection.

SECTION B2

B2 SAMPLING METHODS REQUIREMENTS

Procedures for collection of water, sediments, and fish tissues samples are described in the following procedure manuals. Each manual addresses equipment, sampling procedures, QC samples and frequency, containers and calibration procedures. Sample containers, preservatives, and maximum holding times for water parameters cited in this QAPP shall comply with the requirements of **40 CFR part 136.3 (Table II)**. Sample containers, preservatives, and maximum holding times for sediment and fish tissues test compounds and parameters cited in this QAPP shall comply with the requirements of the applicable laboratory test method.

	Procedure Manuals (SOPs)	Matrix and Data Collected
1.	"*Surveys Section Field Procedure Manual"*. Revised June 2002, SOP Numbers: WQSSB/SOPs 1001-1019. (See **Appendix F**).	Water samples collection. Water field data acquisition.
2.	"Biological Studies Section Standard Operating Procedures Manual" (BSS-SOP), Dec. 1992, revised May 1994. SOP Numbers: WQSSB/SOP 2000-2013. (See **Appendix G**).	Fish tissue and sediment samples collection. Associated field data acquisition.

An index of the two sets of SOPs is provided with this QAPP (See **Appendix H** and **SOP References**).

SECTION B2

B2.1 Target Compounds and Parameters for Water Quality Monitoring Programs

B2.1.1 Water Quality Monitoring Programs

B2.1.1.1 Fixed Station Program Parameters:

Target compounds and parameters for specific sites are detailed in the sampling and analysis workplan for a Fixed Station Project. The parameters are chosen from the following tables.

Table B2.1.1.1 Fixed Station Parameters

General Chemistries	CAS Number or OWQ Identifier[3]	Method	IDEM CRQL (mg/L)
Alkalinity (as $CaCO_3$)	E-14506	EPA 310.2	10.0
Chloride	16887-00-6	SM4500Cl-E	1
Fluoride	16984-48-8	EPA 340.2	0.1
Cyanide (Total)	57-12-5	EPA 335.4	0.01
Cyanide (Weak Acid Dissociable)	57-12-5	SM4500CN- I	0.01
Cyanide (Amenable to Chlorination)	57-12-5	SM4500CN-G	0.01
Hardness (as $CaCO_3$)	E-11778	EPA 130.1	1
Solids, Dissolved Total (TDS)	E-10173	SM2540C	10.0
Solids, Suspended Total, (TSS)	E-10151	SM2540D	4.0
Solids, Total (TS)	E-10151	SM2540B	1.0
Sulfate	14808-79-8	EPA 375.2	0.5
Calcium	7440-70-2	SM 3500-Ca D	2.0
Magnesium	7439-95-4	EPA 200.7	95

Nutrients:	CAS Number or OWQ Identifier	Method	IDEM CRQL (mg/L)
TBOD5	E-10106T5	SM5210B	2.0
COD	E-10117	SM5220D	3.0
Nitrogen, Ammonia	7664-41-7	EPA 350.1	0.01
Nitrogen, Nitrate+Nitrite	E-10128	EPA 353.1	0.01
Phosphorus, Total	7723-14-0	EPA 365.1	0.01
TKN	E-10264	EPA 351.2	0.1
TOC	E-10195	SM5310B	1.0

[3] OWQ's Watershed Assessment and Planning Branch chemists assign non-numeric identifiers for parameters that do not have a CAS number assigned by the Chemical Abstracts Service of the American Chemical Society. These identifiers are in most cases derived from the U.S. EPA Identification Number (U.S. EPA substance Registry Services) or from the legacy U.S. EPA STORET number listed in the test method.

SECTION B2

Total and/or Dissolved Metals:	CAS Number or OWQ Identifier	Method	IDEM CRQL (µg/L)
Aluminum	7429-90-5	EPA 200.7	20.0
Arsenic	7440-38-2	EPA 200.8	2.0
Barium	7440-39-3	EPA 200.8	2.0
Boron	7440-42-8	EPA 200.7	20
Cadmium	7440-43-9	EPA 200.8	1.0
Chromium – Hexavalent	18540-29-9	SM3500Cr-D	10
Chromium, Total (VI + III)	7440-47-3	EPA 200.8	3.0
Copper	7440-50-8	EPA 200.8	2.0
Iron	7439-89-6	EPA 200.7	20
Lead	7439-92-1	EPA 200.8	2.0
Manganese	7439-96-5	EPA 200.8	0.5
Nickel	7439-92-1	EPA 200.8	1.5
Selenium	7440-02-0	EPA 200.8	4.0
Silica (Reactive)	7631-86-9	SM4500-Si D	6,000
Silver	7782-49-2	EPA 200.8	0.3
Sodium	7440-23-5	EPA 200.7	100
Strontium	7440-24-6	EPA 200.7	2.0
Zinc	7440-66-6	EPA 200.7	6.0

Bacteriology:	CAS Number or OWQ Identifier	Method	IDEM CRQL (MPN/100mL)
E. coli	ECOLI	SM9223B	1.0

SECTION B2

Pesticide and SVOC Parameters from EPA Method 525.2	CAS Number or OWQ Identifier	IDEM CRQL (µg/L)
4,4'-DDT	50-29-3	0.1
Acetochlor	34256-82-1	0.1
Alachlor	15972-60-8	0.1
Aldrin	309-00-2	0.1
Atrazine (Aatrex)	1912-24-9	0.1
Chlordane, Alpha-	5103-71-9	0.1
Chlordane, Gamma-	5103-74-2	0.1
Chlorpyrifos	2921-88-2	0.1
Clomazone	81777-89-1	0.1
Cyanazine (Bladex)	21725-46-2	0.1
Desethylatrazine	6190-65-4	1.0
Desisopropylatrazine	1007-28-9	1.0
Di(2-ethylhexyl) adipate	103-23-1	1.0
Dieldrin	60-57-1	0.1
Endrin	72-20-8	0.1
Heptachlor	76-44-8	0.1
Heptachlor Epoxide	1024-57-3	0.1
Lindane	58-89-9	0.1
Methoxychlor	72-43-5	0.1
Metolachlor	51218-45-2	0.1
Nonachlor, cis-	5103-73-1	0.1
Oxychlordane	27304-13-8	0.1
Pendimethalin	40487-42-1	0.1
Pentachlorophenol	87-86-5	0.1
Propachlor	1918-16-7	0.1
Simazine	122-34-9	0.1
trans-Nonachlor	39765-80-5	0.1
Benzo[a]pyrene	50-32-8	0.1
DEHP	117-81-7	1.0
Hexachlorobenzene	118-74-1	0.1
Hexachlorocyclopentadiene	77-47-4	0.1
Trifluralin	1582-09-8	0.1

SECTION B2

B2.1.1.2 Probabilistic Monitoring Program Parameters:

Target compounds and parameters for specific sites are detailed in the sampling and analysis workplan for a Probabilistic Monitoring Project. The parameters are chosen from the following tables. Alternate and equivalent test methods which meet or exceed the IDEM CRQLs may be used by the contractor laboratory with IDEM approval.

General Chemistries	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
Alkalinity (as $CaCO_3$)	E-14506	SM2320B	20.0
Chloride	16887-00-6	EPA 300.0	0.06
Cyanide (Total)	57-12-5	SM 4500-CN-E	0.010
Cyanide (Weak Acid Dissociable)	57-12-5	SM4500CN-I	0.010
Hardness (as $CaCO_3$)	E-11778	SM2340B	0.4
Solids, Dissolved Total (TDS)	E-10173	SM2540C	10.0
Solids, Suspended Total, (TSS)	E-10151	SM2540D	4.0
Solids, Total (TS)	E-10151	SM2540B	1.0
Sulfate	14808-79-8	EPA 300.0	0.05
Calcium	7440-70-2	EPA 200.7	0.020
Magnesium	7439-95-4	EPA 200.7	0.095

Nutrients:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
COD	E-10117	EPA 410.4	3.0
Nitrogen, Ammonia	7664-41-7	EPA 350.1	0.01
Nitrogen, Nitrate+Nitrite	E-10128	EPA 353.2	0.05
Phosphorus, Total	7723-14-0	EPA 365.1	0.01
TKN	E-10264	EPA 351.2	0.10
TOC	E-10195	SM5310C	1.0

Algal Biomass:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL
AFDM (Ash Free Dry Mass)	E-AFDM	SM10200I(5)	36 g/M^2
Chlorophyll a - Periphyton (attached)	E-PERI-C	EPA 445.0	0.3 mg/M^2
Chlorophyll a - Phytoplankton (total)	E-PHYTO-C	EPA 445.0	0.3 µg/L
Pheophytin - Periphyton (attached)	E-PERI-P	EPA 445.0	0.3 mg/M^2
Pheophytin - Phytoplankton (suspended)	E-PHYTO-P	EPA 445.0	0.3 µg/L
PIC (Particulate Inorganic Carbon)	E-PIC	EPA 440.0	33 mg/L
Total POC (Total Particulate Organic Carbon)	7440-44-0	EPA 440.0	33 mg/L
TPC (Total Particulate Carbon)	E-TPC	EPA 440.0	33 mg/L
TPN (Total Particulate Nitrogen)	E-TPN	EPA 440.0	200 mg/L

SECTION B2

Total & Dissolved Metals:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (µg/L)
Aluminum	7429-90-5	EPA 200.8	10.0
Antimony	7440-36-0	EPA 200.8	1.0
Arsenic	7440-38-2	EPA 200.8	2.0
Cadmium	7440-43-9	EPA 200.8	1.0
Chromium, Total (VI + III)	7440-47-3	EPA 200.8	3.0
Copper	7440-50-8	EPA 200.8	2.0
Lead	7439-92-1	EPA 200.8	2.0
Nickel	7439-92-1	EPA 200.8	1.5
Selenium	7440-02-0	EPA 200.8	4.0
Silver	7782-49-2	EPA 200.8	0.3
Zinc	7440-66-6	EPA 200.8	5.0

Bacteriology:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (MPN/100 mL)
E. coli	ECOLI	SM 9223B	1.0
Total *Coliforms*	TCOLI	SM 9223B	1.0

B2.1.1.3 Fish Tissues and Sediments Contaminants Monitoring Program

Parameters are grouped into tasks as detailed in the current RFP for the laboratory analyses of fish tissues and sediments (RFP 16-88). A specific sampling and analysis workplan will choose specific tasks from the contract awarded from the RFP. The Task Lists are as follows:

Task 1 General parameters for tissue percent moisture and percent lipid

Task 2 Generals parameters for sediments - percent solids, Total Volatile Solids (TVS), Total Organic Carbon (TOC), Ammonia as N, Acid Volatile Sulfides(AVS), Grain size and specific gravity.

Task 2B Nutrient parameters – Total Kjeldahl Nitrogen (TKN), nitrite plus nitrate (NO_2+NO_3), ortho-(reactive) phosphate, acid-hydrolyzable phosphorus, organic phosphorus, total phosphorus, loss on ignition.

Task 3 Total Polychlorinated biphenyls (PCB) (tissues only).

Task 3B PCB congeners.

Task 3C Polychlorinated Dioxins and Furans.

Task 4 Aroclors of PCBs (sediments only).

Task 5 Organochlorine pesticides.

Task 6 Cd, Pb, Hg, Se.

Task 6A Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn.

Task 6B Long list of metals.

Task 6C Cyanide (sediments only).

Task 6D AVS and simultaneously extracted metals (SEM) (sediments only).

Task 6E Tributyltin

SECTION B2

Task 6F	Total and Methyl-Mercury by Methods 1631 and 1630 respectively
Task 7	Acid extractable semi-volatile organic compounds.
Task 8	Base/neutral extractable semi-volatile organic compounds.
Task 9	Volatile organic compounds.
Task 10	Polynuclear aromatic hydrocarbons.
Task 11	Polybrominated diphenyl Ether (PBDE).
Task 12	Perfluorinated Compounds (PFCs).

SECTION B2

Table B2.1.1.3-1: Fish Tissue General Parameters

TASK 1

PERCENT LIPID and PERCENT MOISTURE

PARAMETER	BIOTA CRQL	UNITS
PERCENT LIPID	0.1	%
PERCENT MOISTURE	0.1	%

%=percentage units

TASK 2

GENERAL CHEMISTRY
TARGET PARAMETER LIST (TPL)

PARAMETER	CAS NUMBER or OWQ Identifier	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Percent Solids		NA	NA	1.0	%
Total Volatile Solids	E-11927	NA	NA	0.1	%
Total Organic Carbon[2]	E-10195	NA	NA	0.1	%
Total Ammonia as N	7664-41-7	NA	NA	11.0	mg/kg
Acid Volatile Sulfide	E-AVS	NA	NA	19.0	mg/kg
Grain Size Analysis	GRAINSIZE	NA	NA	1.0	%[@]
Specific Gravity	SPECGRAVITY	NA	NA	0.1	g/cm^{3} [@@]

NA Not Applicable.
@ A measure of the frequency distribution of the size ranges of particles.
@@ Ratio of the mass of a given volume of sediment material at a specific temperature to an equal volume of distilled water at the same stated temperature.
** dry weight basis.
2 based on high-temperature combustion after acid treatment (Plumb 1981)
% percentage units
mg/kg milligrams per kilogram

SECTION B2

TASK 2B
GENERAL CHEMISTRY
TARGET PARAMETER LIST (TPL)

PARAMETER	CAS NUMBER OR OWQ IDENTIFIER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Nitrite + Nitrate	E-10128	NA	NA	0.13	mg/kg
Total Kjeldahl Nitrogen	E-10264	NA	NA	6.3	mg/kg
Extractable* Nitrogen		NA	NA		mg/kg
Total Phosphorus	7723-14-0	NA	NA	3.2	mg/kg
Ortho (reactive) Phosphorus	14265-44-2	NA	NA		mg/kg
Acid Hydrolyzable Phosphorus		NA	NA		mg/kg
Organic Phosphorus	E17148453	NA	NA		mg/kg
Chemical Oxygen Demand	E-10117	NA	NA	5.0	mg/kg

NA Not Applicable.
* Biologically available.
** dry weight basis.
mg/kg milligrams per kilogram

Table B2.1.1.3-2: Fish Tissue Chemistry Total PCBs.

TASK 3
POLYCHLORINATED BIPHENYLS (PCB)
TARGET PARAMETER LIST (TPL)
Preparation Method 3540C (U.S. EPA 1996)
Method 8082A (U.S. EPA 2007c)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Total PCBs	1336-36-3	20.0	µg/kg	NA	NA
Aroclor 1016	12674-11-2	50.0	µg/kg	NA	NA
Aroclor 1210	147601-87-4	50.0	µg/kg	NA	NA
Aroclor 1216	151820-27-8	50.0	µg/kg	NA	NA
Aroclor 1221	11104-28-2	50.0	µg/kg	NA	NA
Aroclor 1231	37234-40-5	50.0	µg/kg	NA	NA
Aroclor 1232	11141-16-5	50.0	µg/kg	NA	NA
Aroclor 1240	71328-89-7	50.0	µg/kg	NA	NA
Aroclor 1242	53469-21-9	50.0	µg/kg	NA	NA
Aroclor 1248	12672-29-6	50.0	µg/kg	NA	NA
Aroclor 1250	165245-51-2	50.0	µg/kg	NA	NA
Aroclor 1252	89577-78-6	50.0	µg/kg	NA	NA

SECTION B2

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Aroclor 1254	11097-69-1	50.0	µg/kg	NA	NA
Aroclor 1260	11096-82-5	50.0	µg/kg	NA	NA
Aroclor 1262	37324-23-5	50.0	µg/kg	NA	NA
Aroclor 1268	11100-14-4	50.0	µg/kg	NA	NA
Aroclor (unspecified)	12767-79-2	50.0	µg/kg	NA	NA

µg/kg (ww)=micrograms per kilogram wet weight basis

Table B2.1.1.3-3: Fish Tissue Chemistry PCB Congener Compounds.

TASK 3B
POLYCHLORINATED BIPHENYL CONGENERS S (PCB)
TISSUES BY CAPILLARY CHROMATOGRAPHY
TARGET PARAMETER LIST (TPL)

Method 1668 Rev. B (U.S. EPA 2008a)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
PCB congeners	See Table Below	0.5 - 20	ng/kg	0.5 - 20	ng/kg

* wet weight basis ng/kg nanograms per kilogram
** dry weight basis

Table of PCB Congeners and Other Species

Descriptor	CAS NUMBER OR OWQ IDENTIFIER	Current BZ[4] & IUPAC Number	IUPAC Name	Type
CP1_---_--_--	2051-60-7	1	2-Chlorobiphenyl	Congener
CP0_---_--_--	2051-61-8	2	3-Chlorobiphenyl	Congener
CP0_---_--_--	2051-62-9	3	4-Chlorobiphenyl	Congener
---_---_--_--	13029-08-8	4	2,2'-Dichlorobiphenyl	Congener
CP1_---_--_--	16605-91-7	5	2,3-Dichlorobiphenyl	Congener
CP1_---_--_--	25569-80-6	6	2,3'-Dichlorobiphenyl	Congener
CP1_---_--_--	33284-50-3	7	2,4-Dichlorobiphenyl	Congener

4 BZ was named after Ballschmiter, K.; Zell, M. (1980). "Analysis of polychlorinated biphenyls (PCB) by glass capillary gas chromatography". *Fresenius' Zeitschrift für Analytische Chemie* **302**: 20–31.

SECTION B2

Table B2.1.1.3-3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
CP1_---_--_--	34883-43-7	8	2,4'-Dichlorobiphenyl	Congener
CP1_---_--_--	34883-39-1	9	2,5-Dichlorobiphenyl	Congener
---_---_--_--	33146-45-1	10	2,6-Dichlorobiphenyl	Congener
CP0_---_--_2M	2050-67-1	11	3,3'-Dichlorobiphenyl	Congener
CP0_---_--_--	2974-92-7	12	3,4-Dichlorobiphenyl	Congener
CP0_---_--_--	2974-90-5	13	3,4'-Dichlorobiphenyl	Congener
CP0_---_--_2M	34883-41-5	14	3,5-Dichlorobiphenyl	Congener
CP0_---_PP_--	2050-68-2	15	4,4'-Dichlorobiphenyl	Congener
---_---_--_--	38444-78-9	16	2,2',3-Trichlorobiphenyl	Congener
---_---_--_--	37680-66-3	17	2,2',4-Trichlorobiphenyl	Congener
---_---_--_--	37680-65-2	18	2,2',5-Trichlorobiphenyl	Congener
---_---_--_--	38444-73-4	19	2,2',6-Trichlorobiphenyl	Congener
CP1_---_--_2M	38444-84-7	20	2,3,3'-Trichlorobiphenyl	Congener
CP1_---_--_--	55702-46-0	21	2,3,4-Trichlorobiphenyl	Congener
CP1_---_--_--	38444-85-8	22	2,3,4'-Trichlorobiphenyl	Congener
CP1_---_--_2M	55720-44-0	23	2,3,5-Trichlorobiphenyl	Congener
---_---_--_--	55702-45-9	24	2,3,6-Trichlorobiphenyl	Congener
CP1_---_--_--	55712-37-3	25	2,3',4-Trichlorobiphenyl	Congener
CP1_---_--_2M	38444-81-4	26	2,3',5-Trichlorobiphenyl	Congener
---_---_--_--	38444-76-7	27	2,3',6-Trichlorobiphenyl	Congener
CP1_---_PP_--	7012-37-5	28	2,4,4'-Trichlorobiphenyl	Congener
CP1_---_--_--	15862-07-4	29	2,4,5-Trichlorobiphenyl	Congener
---_---_--_--	35693-92-6	30	2,4,6-Trichlorobiphenyl	Congener
CP1_---_--_--	16606-02-3	31	2,4',5-Trichlorobiphenyl	Congener
---_---_--_--	38444-77-8	32	2,4',6-Trichlorobiphenyl	Congener
CP1_---_--_--	38444-86-9	33	2,3',4'-Trichlorobiphenyl	Congener
CP1_---_--_2M	37680-68-5	34	2,3',5'-Trichlorobiphenyl	Congener
CP0_---_--_2M	37680-69-6	35	3,3',4-Trichlorobiphenyl	Congener
CP0_---_--_2M	38444-87-0	36	3,3',5-Trichlorobiphenyl	Congener
CP0_---_PP_--	38444-90-5	37	3,4,4'-Trichlorobiphenyl	Congener
CP0_---_--_2M	53555-66-1	38	3,4,5-Trichlorobiphenyl	Congener
CP0_---_--_2M	38444-88-1	39	3,4',5-Trichlorobiphenyl	Congener
---_4CL_--_2M	38444-93-8	40	2,2',3,3'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	52663-59-9	41	2,2',3,4-Tetrachlorobiphenyl	Congener
---_4CL_--_--	36559-22-5	42	2,2',3,4'-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	70362-46-8	43	2,2',3,5-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	41464-39-5	44	2,2',3,5'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	70362-45-7	45	2,2',3,6-Tetrachlorobiphenyl	Congener
---_4CL_--_--	41464-47-5	46	2,2',3,6'-Tetrachlorobiphenyl	Congener
---_4CL_PP_--	2437-79-8	47	2,2',4,4'-Tetrachlorobiphenyl	Congener

SECTION B2

Table B2.1.1.3-3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
---_4CL_--_--	70362-47-9	48	2,2',4,5-Tetrachlorobiphenyl	Congener
---_4CL_--_--	41464-40-8	49	2,2',4,5'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	62796-65-0	50	2,2',4,6-Tetrachlorobiphenyl	Congener
---_4CL_--_--	68194-04-7	51	2,2',4,6'-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	35693-99-3	52	2,2',5,5'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	41464-41-9	53	2,2',5,6'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	15968-05-5	54	2,2',6,6'-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	74338-24-2	55	2,3,3',4-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	41464-43-1	56	2,3,3',4'-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	70424-67-8	57	2,3,3',5-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	41464-49-7	58	2,3,3',5'-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	74472-33-6	59	2,3,3',6-Tetrachlorobiphenyl	Congener
CP1_4CL_PP_--	33025-41-1	60	2,3,4,4'-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	33284-53-6	61	2,3,4,5-Tetrachlorobiphenyl	Congener
---_4CL_--_--	54230-22-7	62	2,3,4,6-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	74472-34-7	63	2,3,4',5-Tetrachlorobiphenyl	Congener
---_4CL_--_--	52663-58-8	64	2,3,4',6-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	33284-54-7	65	2,3,5,6-Tetrachlorobiphenyl	Congener
CP1_4CL_PP_--	32598-10-0	66	2,3',4,4'-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	73575-53-8	67	2,3',4,5-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	73575-52-7	68	2,3',4,5'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	60233-24-1	69	2,3',4,6-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	32598-11-1	70	2,3',4',5-Tetrachlorobiphenyl	Congener
---_4CL_--_--	41464-46-4	71	2,3,4,6-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	41464-42-0	72	2,3,5,5-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	74338-23-1	73	2,3,5,6-Tetrachlorobiphenyl	Congener
CP1_4CL_PP_--	32690-93-0	74	2,4,4,5-Tetrachlorobiphenyl	Congener
---_4CL_PP_--	32598-12-2	75	2,4,4,6-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	70362-48-0	76	2,3,4,5-Tetrachlorobiphenyl	Congener
CP0_4CL_PP_2M	32598-13-3	77	3,3,4,4-Tetrachlorobiphenyl	Congener
CP0_4CL_--_2M	70362-49-1	78	3,3,4,5-Tetrachlorobiphenyl	Congener
CP0_4CL_--_2M	41464-48-6	79	3,3,4,5-Tetrachlorobiphenyl	Congener
CP0_4CL_--_2M	33284-52-5	80	3,3,5,5-Tetrachlorobiphenyl	Congener
CP0_4CL_PP_2M	70362-50-4	81	3,4,4,5-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	52663-62-4	82	2,2,3,3,4-Pentachlorobiphenyl	Congener
---_4CL_--_2M	60145-20-2	83	2,2,3,3,5-Pentachlorobiphenyl	Congener
---_4CL_--_2M	52663-60-2	84	2,2,3,3,6-Pentachlorobiphenyl	Congener
---_4CL_PP_--	65510-45-4	85	2,2,3,4,4-Pentachlorobiphenyl	Congener
---_4CL_--_2M	55312-69-1	86	2,2,3,4,5-Pentachlorobiphenyl	Congener
---_4CL_--_2M	38380-02-8	87	2,2,3,4,5-Pentachlorobiphenyl	Congener
---_4CL_--_--	55215-17-3	88	2,2,3,4,6-Pentachlorobiphenyl	Congener
---_4CL_--_--	73575-57-2	89	2,2,3,4,6-Pentachlorobiphenyl	Congener

SECTION B2

Table B2.1.1.3-3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
---_4CL_--_2M	68194-07-0	90	2,2,3,4,5-Pentachlorobiphenyl	Congener
---_4CL_--_--	68194-05-8	91	2,2',3,4',6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	52663-61-3	92	2,2',3,5,5'-Pentachlorobiphenyl	Congener
---_4CL_--_2M	73575-56-1	93	2,2',3,5,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	73575-55-0	94	2,2',3,5,6'-Pentachlorobiphenyl	Congener
---_4CL_--_2M	38379-99-6	95	2,2',3,5',6-Pentachlorobiphenyl	Congener
---_4CL_--_--	73575-54-9	96	2,2',3,6,6'-Pentachlorobiphenyl	Congener
---_4CL_--_2M	41464-51-1	97	2,2',3,4',5'-Pentachlorobiphenyl	Congener
---_4CL_--_--	60233-25-2	98	2,2',3,4',6'-Pentachlorobiphenyl	Congener
---_4CL_PP_--	38380-01-7	99	2,2',4,4',5-Pentachlorobiphenyl	Congener
---_4CL_PP_--	39485-83-1	100	2,2',4,4',6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	37680-73-2	101	2,2',4,5,5'-Pentachlorobiphenyl	Congener
---_4CL_--_--	68194-06-9	102	2,2',4,5,6'-Pentachlorobiphenyl	Congener
---_4CL_--_--	60145-21-3	103	2,2',4,5',6-Pentachlorobiphenyl	Congener
---_4CL_--_--	56558-16-8	104	2,2',4,6,6'-Pentachlorobiphenyl	Congener
CP1_4CL_PP_2M	32598-14-4	105	2,3,3',4,4'-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	70424-69-0	106	2,3,3',4,5-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	70424-68-9	107	2,3,3',4',5-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	70362-41-3	108	2,3,3',4,5'-Pentachlorobiphenyl	Congener
---_4CL_--_2M	74472-35-8	109	2,3,3',4,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	38380-03-9	110	2,3,3',4',6-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	39635-32-0	111	2,3,3',5,5'-Pentachlorobiphenyl	Congener
---_4CL_--_2M	74472-36-9	112	2,3,3',5,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	68194-10-5	113	2,3,3',5',6-Pentachlorobiphenyl	Congener
CP1_4CL_PP_2M	74472-37-0	114	2,3,4,4',5-Pentachlorobiphenyl	Congener
---_4CL_PP_--	74472-38-1	115	2,3,4,4',6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	18259-05-7	116	2,3,4,5,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	68194-11-6	117	2,3,4',5,6-Pentachlorobiphenyl	Congener
CP1_4CL_PP_2M	31508-00-6	118	2,3',4,4',5-Pentachlorobiphenyl	Congener
---_4CL_PP_--	56558-17-9	119	2,3',4,4',6-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	68194-12-7	120	2,3',4,5,5'-Pentachlorobiphenyl	Congener
---_4CL_--_2M	56558-18-0	121	2,3',4,5',6-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	76842-07-4	122	2,3,3',4',5'-Pentachlorobiphenyl	Congener
CP1_4CL_PP_2M	65510-44-3	123	2,3',4,4',5'-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	70424-70-3	124	2,3',4',5,5'-Pentachlorobiphenyl	Congener
---_4CL_--_2M	74472-39-2	125	2,3',4',5',6-Pentachlorobiphenyl	Congener
CP0_4CL_PP_2M	57465-28-8	126	3,3',4,4',5-Pentachlorobiphenyl	Congener
CP0_4CL_--_2M	39635-33-1	127	3,3',4,5,5'-Pentachlorobiphenyl	Congener
---_4CL_PP_2M	38380-07-3	128	2,2',3,3',4,4'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	55215-18-4	129	2,2',3,3',4,5-Hexachlorobiphenyl	Congener
---_4CL_--_2M	52663-66-8	130	2,2',3,3',4,5'-Hexachlorobiphenyl	Congener

SECTION B2

Table B2.1.1.3-3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
---_4CL_--_2M	61798-70-7	131	2,2',3,3',4,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	38380-05-1	132	2,2',3,3',4,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	35694-04-3	133	2,2',3,3',5,5'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	52704-70-8	134	2,2',3,3',5,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	52744-13-5	135	2,2',3,3',5,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	38411-22-2	136	2,2',3,3',6,6'-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	35694-06-5	137	2,2',3,4,4',5-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	35065-28-2	138	2,2',3,4,4',5'-Hexachlorobiphenyl	Congener
---_4CL_PP_--	56030-56-9	139	2,2',3,4,4',6-Hexachlorobiphenyl	Congener
---_4CL_PP_--	59291-64-4	140	2,2',3,4,4',6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	52712-04-6	141	2,2',3,4,5,5'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	41411-61-4	142	2,2',3,4,5,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	68194-15-0	143	2,2',3,4,5,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	68194-14-9	144	2,2',3,4,5',6-Hexachlorobiphenyl	Congener
---_4CL_--_--	74472-40-5	145	2,2',3,4,6,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	51908-16-8	146	2,2',3,4',5,5'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	68194-13-8	147	2,2',3,4',5,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	74472-41-6	148	2,2',3,4',5,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	38380-04-0	149	2,2',3,4',5',6-Hexachlorobiphenyl	Congener
---_4CL_--_--	68194-08-1	150	2,2',3,4',6,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	52663-63-5	151	2,2',3,5,5',6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	68194-09-2	152	2,2',3,5,6,6'-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	35065-27-1	153	2,2',4,4',5,5'-Hexachlorobiphenyl	Congener
---_4CL_PP_--	60145-22-4	154	2,2',4,4',5,6'-Hexachlorobiphenyl	Congener
---_4CL_PP_--	33979-03-2	155	2,2',4,4',6,6'-Hexachlorobiphenyl	Congener
CP1_4CL_PP_2M	38380-08-4	156	2,3,3',4,4',5-Hexachlorobiphenyl	Congener
CP1_4CL_PP_2M	69782-90-7	157	2,3,3',4,4',5'-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	74472-42-7	158	2,3,3',4,4',6-Hexachlorobiphenyl	Congener
CP1_4CL_--_2M	39635-35-3	159	2,3,3',4,5,5'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	41411-62-5	160	2,3,3',4,5,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	74472-43-8	161	2,3,3',4,5',6-Hexachlorobiphenyl	Congener
CP1_4CL_--_2M	39635-34-2	162	2,3,3',4',5,5'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	74472-44-9	163	2,3,3',4',5,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	74472-45-0	164	2,3,3',4',5',6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	74472-46-1	165	2,3,3',5,5',6-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	41411-63-6	166	2,3,4,4',5,6-Hexachlorobiphenyl	Congener
CP1_4CL_PP_2M	52663-72-6	167	2,3',4,4',5,5'-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	59291-65-5	168	2,3',4,4',5',6-Hexachlorobiphenyl	Congener
CP0_4CL_PP_2M	32774-16-6	169	3,3',4,4',5,5'-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	35065-30-6	170	2,2',3,3',4,4',5-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	52663-71-5	171	2,2',3,3',4,4',6-Heptachlorobiphenyl	Congener

SECTION B2

Table B2.1.1.3-3 Task 3B continued

Descriptor	CAS NUMBER OR OWQ IDENTIFIER	Current BZ & IUPAC Number	IUPAC Name	Type
---_4CL_--_2M	52663-74-8	172	2,2',3,3',4,5,5'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	68194-16-1	173	2,2',3,3',4,5,6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	38411-25-5	174	2,2',3,3',4,5,6'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	40186-70-7	175	2,2',3,3',4,5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-65-7	176	2,2',3,3',4,6,6'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-70-4	177	2,2',3,3',4,5',6'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-67-9	178	2,2',3,3',5,5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-64-6	179	2,2',3,3',5,6,6'-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	35065-29-3	180	2,2',3,4,4',5,5'-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	74472-47-2	181	2,2',3,4,4',5,6-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	60145-23-5	182	2,2',3,4,4',5,6'-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	52663-69-1	183	2,2',3,4,4',5',6-Heptachlorobiphenyl	Congener
---_4CL_PP_--	74472-48-3	184	2,2',3,4,4',6,6'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52712-05-7	185	2,2',3,4,5,5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	74472-49-4	186	2,2',3,4,5,6,6'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-68-0	187	2,2',3,4',5,5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	74487-85-7	188	2,2',3,4',5,6,6'-Heptachlorobiphenyl	Congener
CP1_4CL_PP_2M	39635-31-9	189	2,3,3',4,4',5,5'-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	41411-64-7	190	2,3,3',4,4',5,6-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	74472-50-7	191	2,3,3',4,4',5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	74472-51-8	192	2,3,3',4,5,5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	69782-91-8	193	2,3,3',4',5,5',6-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	35694-08-7	194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl	Congener
---_4CL_PP_2M	52663-78-2	195	2,2',3,3',4,4',5,6-Octachlorobiphenyl	Congener
---_4CL_PP_2M	42740-50-1	196	2,2',3,3',4,4',5,6'-Octachlorobiphenyl	Congener
---_4CL_PP_2M	33091-17-7	197	2,2',3,3',4,4',6,6'-Octachlorobiphenyl	Congener
---_4CL_--_2M	68194-17-2	198	2,2',3,3',4,5,5',6-Octachlorobiphenyl	Congener
---_4CL_--_2M	52663-75-9	199	2,2',3,3',4,5,5',6'-Octachlorobiphenyl	Congener
---_4CL_--_2M	52663-73-7	200	2,2',3,3',4,5,6,6'-Octachlorobiphenyl	Congener
---_4CL_--_2M	40186-71-8	201	2,2',3,3',4,5',6,6'-Octachlorobiphenyl	Congener
---_4CL_--_2M	2136-99-4	202	2,2',3,3',5,5',6,6'-Octachlorobiphenyl	Congener
---_4CL_PP_2M	52663-76-0	203	2,2',3,4,4',5,5',6-Octachlorobiphenyl	Congener
---_4CL_PP_2M	74472-52-9	204	2,2',3,4,4',5,6,6'-Octachlorobiphenyl	Congener
---_4CL_PP_2M	74472-53-0	205	2,3,3',4,4',5,5',6-Octachlorobiphenyl	Congener
---_4CL_PP_2M	40186-72-9	206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	Congener
---_4CL_PP_2M	52663-79-3	207	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl	Congener
---_4CL_--_2M	52663-77-1	208	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	Congener
---_---_--_--	2051-24-3	209	Decachlorobiphenyl	Congener
	27323-18-8		Monochlorobiphenyl	Homolog
	25512-42-9		Dichlorobiphenyl	Homolog
	25323-68-6		Trichlorobiphenyl	Homolog

SECTION B2

Table B2.1.1.3-3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
	26914-33-0		Tetrachlorobiphenyl	Homolog
	25429-29-2		Pentachlorobiphenyl	Homolog
	26601-64-9		Hexachlorobiphenyl	Homolog
	28655-71-2		Heptachlorobiphenyl	Homolog
	55722-26-4		Octachlorobiphenyl	Homolog
	53742-07-7		Nonachlorobiphenyl	Homolog
	1336-36-3		Polychlorinated biphenyl (PCB)	Category

Table B2.1.1.3-4: Fish Tissue Chemistry Polychlorinated Dioxins And Furans.

TASK 3C
POLYCHLORINATED DIOXINS AND FURANS
TARGET PARAMETER LIST (TPL)

Method 1613 Rev. B (U.S. EPA 1994b)

		BIOLOGICAL		SEDIMENT	
PARAMETER	**CAS NUMBER**	**CRQL**	**UNITS***	**CRQL**	**UNITS****
2,3,7,8-TCDF	51207-31-9	1.0	ng/kg	1.0	ng/kg
2,3,7,8-TCDD (Dioxin)	1746-01-6	1.0	ng/kg	1.0	ng/kg
1,2,3,7,8-PeCDF	57117-41-6	2.5	ng/kg	2.5	ng/kg
2,3,4,7,8-PeCDF	57117-31-4	2.5	ng/kg	2.5	ng/kg
1,2,3,7,8-PeCDD	40321-76-4	2.5	ng/kg	2.5	ng/kg
1,2,3,4,7,8-HxCDF	70648-26-9	5.0	ng/kg	5.0	ng/kg
1,2,3,6,7,8-HxCDF	57117-44-9	5.0	ng/kg	5.0	ng/kg
2,3,4,6,7,8-HxCDF	60851-34-5	5.0	ng/kg	5.0	ng/kg
1,2,3,4,7,8-HxCDD	39227-28-6	5.0	ng/kg	5.0	ng/kg
1,2,3,6,7,8-HxCDD	57653-85-7	5.0	ng/kg	5.0	ng/kg
1,2,3,7,8,9-HxCDD	19408-74-3	5.0	ng/kg	5.0	ng/kg
1,2,3,7,8,9-HxCDF	72918-21-9	5.0	ng/kg	5.0	ng/kg
1,2,3,4,6,7,8-HpCDF	67562-39-4	5.0	ng/kg	5.0	ng/kg
1,2,3,4,6,7,8-HpCDD	35822-46-9	5.0	ng/kg	5.0	ng/kg
1,2,3,4,7,8,9-HpCDF	55673-89-7	5.0	ng/kg	5.0	ng/kg
OCDD	3268-87-9	5.0	ng/kg	5.0	ng/kg
OCDF	39001-02-0	5.0	ng/kg	5.0	ng/kg

* wet weight basis
** dry weight basis
TCDD = Tetrachlorodibenzo-dioxin
TCDF = Tetrachlorodibenzofuran
PeCDD = Pentachlorodibenzo-p-dioxin
PeCDF = Pentachlorodibenzofuran
HxCDD = Hexachlorodibenzo-p-dioxin
HxCDF = Hexachlorodibenzofuran
HpCDD = Heptachlorodibenzo-p-dioxin
HpCDF = Heptachlorodibenzofuran
OCDD = Octachlorodibenzo-p-dioxin
OCDF = Octachlorodibenzofuran
ng/kg (ww)=nanograms per kilogram wet weight basis

SECTION B2

Table B2.1.1.3-5: Polychlorinated Biphenyls (PCB) Aroclors

TASK 4
TARGET PARAMETER LIST (TPL)

Method 8082A: (U.S. EPA 2007c)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Aroclor - 1016	12674-11-2	NA*	NA*	20.0	µg/kg
Aroclor - 1221	11104-28-2	NA*	NA*	20.0	µg/kg
Aroclor - 1232	11141-16-5	NA*	NA*	20.0	µg/kg
Aroclor - 1242	53469-21-9	NA*	NA*	20.0	µg/kg
Aroclor - 1248	12672-29-6	NA*	NA*	20.0	µg/kg
Aroclor - 1254	11097-69-1	NA*	NA*	20.0	µg/kg
Aroclor - 1260	11096-82-5	NA*	NA*	20.0	µg/kg
Aroclor - 1262	37324-23-5	NA*	NA*	20.0	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B2.1.1.3-6: Fish Tissue Chemistry Organochlorine Pesticides

TASK 5
ORGANOCHLORINE PESTICIDES
TARGET PARAMETER LIST (TPL)

Method 8081B (U.S. EPA 2007b)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Aldrin	309-00-2	2.5	µg/kg	2.5	µg/kg
BHC, alpha-	319-84-6	2.5	µg/kg	2.5	µg/kg
BHC, beta-	319-85-7	2.5	µg/kg	2.5	µg/kg
BHC, delta-	319-86-8	2.5	µg/kg	2.5	µg/kg
BHC, gamma-	58-89-9	2.5	µg/kg	2.5	µg/kg
Chlordane, gamma(trans)	5103-74-2	2.5	µg/kg	2.5	µg/kg
Chlordane, alpha(cis)	5103-71-9	2.5	µg/kg	2.5	µg/kg
DDD, o,p'-	53-19-0	2.5	µg/kg	2.5	µg/kg
DDD, p,p'-	72-54-8	5.0	µg/kg	5.0	µg/kg
DDE, o,p'-	3424-82-6	2.5	µg/kg	2.5	µg/kg
DDE, p,p'-	72-55-9	5.0	µg/kg	5.0	µg/kg
DDT, o,p'-	789-02-6	2.5	µg/kg	2.5	µg/kg
DDT, p,p'-	50-29-3	5.0	µg/kg	5.0	µg/kg
Dieldrin	60-57-1	5.0	µg/kg	5.0	µg/kg

SECTION B2

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Endosulfan I	959-98-8	2.5	µg/kg	2.5	µg/kg
Endosulfan II	33213-65-9	5.0	µg/kg	5.0	µg/kg
Endosulfan sulfate	1031-07-8	5.0	µg/kg	5.0	µg/kg
Endrin	72-20-8	5.0	µg/kg	5.0	µg/kg
Endrin aldehyde	7421-93-4	5.0	µg/kg	5.0	µg/kg
Endrin ketone	53494-70-5	5.0	µg/kg	5.0	µg/kg
Heptachlor	76-44-8	2.5	µg/kg	2.5	µg/kg
Heptachlor Epoxide	1024-57-3	2.5	µg/kg	2.5	µg/kg
Hexachlorobenzene	118-74-1	2.5	µg/kg	2.5	µg/kg
Methoxychlor	72-43-5	25.0	µg/kg	25.0	µg/kg
Mirex	2385-85-5	5.0	µg/kg	5.0	µg/kg
cis- Nonachlor	5103-73-1	5.0	µg/kg	5.0	µg/kg
trans- Nonachlor	39765-80-5	5.0	µg/kg	5.0	µg/kg
Oxychlordane	27304-13-8	5.0	µg/kg	5.0	µg/kg
Pentachloroanisole	1825-21-4	2.5	µg/kg	2.5	µg/kg
Toxaphene	8001-35-2	75.0	µg/kg	75.0	µg/kg

* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B2.1.1.3-7: Fish Tissue Chemistry Cd, Pb, Hg and Se

TASK 6
INORGANICS
TARGET PARAMETER LIST (TPL)

Method 6020A (U.S. EPA 2007a)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Cadmium	7440-43-9	10.0	µg/kg	200.0	µg/kg
Lead	7439-92-1	70.0	µg/kg	500.0	µg/kg
Mercury	7439-97-6	20.0	µg/kg	20.0	µg/kg
Selenium	7782-49-2	100	µg/kg	500	µg/kg

* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

SECTION B2

Table B2.1.1.3-8: Fish Tissue Chemistry Metals Medium List.

TASK 6A
INORGANICS
TARGET PARAMETER LIST (TPL)

Method 6020A (U.S. EPA 2007a)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Cadmium	7440-43-9	10.0	µg/kg	200	µg/kg
Chromium	7440-47-3	100	µg/kg	800	µg/kg
Copper	7440-50-8	100	µg/kg	500	µg/kg
Lead	7439-92-1	70.0	µg/kg	500	µg/kg
Mercury	7439-97-6	20.0	µg/kg	20	µg/kg
Nickel	7440-02-0	1,000	µg/kg	250	µg/kg
Selenium	7782-49-2	100	µg/kg	500	µg/kg
Zinc	7440-66-6	2,000	µg/kg	500	µg/kg

* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B2.1.1.3-9: Fish Tissue Chemistry Metals Long List.

TASK 6B
INORGANICS
TARGET PARAMETER LIST (TPL)

Method 6020A (U.S. EPA 2007a)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Aluminum	7429-90-5	5,000	µg/kg	1,500	µg/kg
Antimony	7440-36-0	2,000	µg/kg	1,000	µg/kg
Arsenic	7440-38-2	1,000	µg/kg	2,000	µg/kg
Barium	7440-39-3	5,000	µg/kg	1,500	µg/kg
Beryllium	7440-41-7	500	µg/kg	1,500	µg/kg
Cadmium	7440-43-9	10.0	µg/kg	200	µg/kg
Calcium	7440-70-2	500,000	µg/kg	5,000	µg/kg
Chromium	7440-47-3	100	µg/kg	800	µg/kg
Cobalt	7440-48-4	5,000	µg/kg	200	µg/kg
Copper	7440-50-8	100	µg/kg	500	µg/kg
Iron	7439-89-6	5,000	µg/kg	5,000	µg/kg
Lead	7439-92-1	70.0	µg/kg	500	µg/kg
Magnesium	7439-95-4	500,000	µg/kg	3,000	µg/kg

SECTION B2

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Manganese	7439-96-5	1,500	µg/kg	200	µg/kg
Mercury	7439-97-6	20.0	µg/kg	20.0	µg/kg
Nickel	7440-02-0	1,000	µg/kg	250	µg/kg
Potassium	7440-09-7	500,000	µg/kg	60,000	µg/kg
Selenium	7782-49-2	100	µg/kg	500	µg/kg
Silver	7440-22-4	500	µg/kg	200	µg/kg
Sodium	7440-23-5	10,000	µg/kg	6,000	µg/kg
Thallium	7440-28-0	1,000	µg/kg	500	µg/kg
Vanadium	7440-62-2	2,000	µg/kg	1,000	µg/kg
Zinc	7440-66-6	2,000	µg/kg	500	µg/kg

* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B2.1.1.3-10: Fish Tissue Chemistry Inorganics.

TASK 6C
INORGANICS
TARGET PARAMETER LIST (TPL)

EPA Method OIA-1677 (U.S. EPA 2004b)
EPA Method 9012B (U.S. EPA 2004a)
EPA Method 9014 (U.S. EPA 1996)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Total Cyanide	57-12-5	NA	NA	250	µg/kg

NA Not Applicable.
** dry weight basis
µg/kg micrograms per kilogram

SECTION B2

TASK 6D
ACID VOLATILE SULFIDE (AVS) AND SIMULTANEOUSLY EXTRACTED METALS (SEM)
TARGET PARAMETER LIST (TPL)

Method Draft: (U.S. EPA 1991a**)**

PARAMETER	CAS NUMBER OR OWQ IDENTIFIER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Acid Volatile Sulfide@	E-AVS	NA	NA	20.0	µg/kg
Cadmium @	7440-43-9	NA	NA	500	µg/kg
Copper @	7440-50-8	NA	NA	500	µg/kg
Lead @	7439-92-1	NA	NA	500	µg/kg
Mercury @	7439-97-6	NA	NA	20.0	µg/kg
Nickel @	7440-02-0	NA	NA	500	µg/kg
Zinc @	7440-66-6	NA	NA	500	µg/kg

NA Not Applicable.
** dry weight basis
µg/kg micrograms per kilogram
@ Must also be reported in micromoles/gram (µmole/g) dry sediment weight basis. The sample data summary report must include a proper calculation of the ratio of simultaneously extracted metals to acid volatile sulfides as described in Section 14 page 16 of the analytical method (U.S. EPA, 1991).

Table B2.1.1.3-11: Fish Tissue Chemistry Organotin.

TASK 6E
ORGANOTIN
TARGET PARAMETER LIST (TPL)

Method 8323 (U.S. EPA 2003)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Tributyltin	688-73-3	10.0	µg/kg	10.0	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

SECTION B2

Table B2.1.1.3-12: Fish Tissue Chemistry Total Mercury and Methyl Mercury

TASK 6F
Total Mercury
Methyl Mercury

Method 1630 (U.S. EPA 2001b)
Method 1631 (U.S. EPA 2002b)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Mercury	7439-97-6	1.0	µg/kg	1.0	µg/kg
Methyl Mercury	22967-92-6	1.0	µg/kg	1.0	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B2.1.1.3-13: Fish Tissue Chemistry Acid Extractable Semivolatile Organic Compounds

TASK 7
ACID EXTRACTABLE SEMIVOLATILE ORGANICS
TARGET PARAMETER LIST (TPL)

Method 8270D (U.S. EPA 2007d)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Benzoic acid	65-85-0	330	µg/kg	660	µg/kg
Chlorophenol, 2-	95-57-8	330	µg/kg	660	µg/kg
Dichlorophenol, 2,4-	120-83-2	330	µg/kg	660	µg/kg
Dimethylphenol, 2,4-	105-67-9	330	µg/kg	660	µg/kg
Nitrophenol, 2-	88-75-5	330	µg/kg	660	µg/kg
Dinitrophenol, 2,4-	51-28-5	330	µg/kg	660	µg/kg
Methylphenol, 2-	95-48-7	330	µg/kg	660	µg/kg
Methylphenol, 4- -	106-44-5	330	µg/kg	660	µg/kg
4-Chloro-3-Methylphenol	59-50-7	330	µg/kg	660	µg/kg
2-Methyl-4,6-dinitrophenol	534-52-1	330	µg/kg	660	µg/kg
Nitrophenol, 4-	100-02-7	330	µg/kg	660	µg/kg
Pentachlorophenol	87-86-5	330	µg/kg	660	µg/kg
Phenol	108-95-2	330	µg/kg	660	µg/kg
Trichlorophenol, 2,4,5-	95-95-4	330	µg/kg	660	µg/kg
Trichlorophenol, 2,4,6-	88-06-02	330	µg/kg	660	µg/kg

* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B2.1.1.3-14: Fish Tissue Chemistry.

TASK 8
BASE/NEUTRAL EXTRACTABLE SEMIVOLATILE ORGANICS
TARGET PARAMETER LIST (TPL)

Method 8270D (U.S. EPA 2007d)

PARAMETER	CAS NUMBER	BIOLOGICAL		SEDIMENT	
		CRQL	UNITS*	CRQL	UNITS**
Acenaphthylene	208-96-8	330	µg/kg	660	µg/kg
Acenaphthene	83-32-9	330	µg/kg	660	µg/kg
Anthracene	120-12-7	330	µg/kg	660	µg/kg
Benzo(a)anthracene	56-55-3	330	µg/kg	660	µg/kg
Benzo(a)pyrene	50-32-8	330	µg/kg	660	µg/kg
Benzo(b)fluoranthene	205-99-2	330	µg/kg	660	µg/kg
Benzo(k)fluoranthene	207-08-9	330	µg/kg	660	µg/kg
Benzo(g,h,i)perylene	191-24-2	330	µg/kg	660	µg/kg
Benzyl alcohol	100-51-6	330	µg/kg	660	µg/kg
Bis(2-chloroethoxy) Methane	111-91-1	330	µg/kg	660	µg/kg
Bis(2-chloroethyl) Ether	111-44-4	330	µg/kg	660	µg/kg
Oxybis-(1-Chloropropane), 2,2'-	108-60-1	330	µg/kg	660	µg/kg
Bis(2-ethylhexyl) Phthalate	117-81-7	330	µg/kg	660	µg/kg
Bromophenyl Phenyl Ether, 4-	101-55-3	330	µg/kg	660	µg/kg
Butylbenzylphthalate	85-68-7	330	µg/kg	660	µg/kg
Carbazole	86-74-8	330	µg/kg	660	µg/kg
Chloroaniline, 4-	106-47-8	330	µg/kg	660	µg/kg
Chloronaphthalene, 2-	91-58-7	330	µg/kg	660	µg/kg
Chlorophenyl Phenyl Ether, 4-	7005-72-3	330	µg/kg	660	µg/kg
Chrysene	218-01-9	330	µg/kg	660	µg/kg
Dibenzo(a,h)anthracene	53-70-3	330	µg/kg	660	µg/kg
Dibenzofuran	132-64-9	330	µg/kg	660	µg/kg
Di-N-butylphthalate	84-74-2	330	µg/kg	660	µg/kg
Diethylphthalate	84-66-2	330	µg/kg	660	µg/kg
Dimethylphthalate	131-11-3	330	µg/kg	660	µg/kg
Di-N-Octylphthalate	117-84-0	330	µg/kg	660	µg/kg
Dichlorobenzene, 1,2-	95-50-1	330	µg/kg	660	µg/kg
Dichlorobenzene, 1,3-	541-73-1	330	µg/kg	660	µg/kg
Dichlorobenzene, 1,4-	106-46-7	330	µg/kg	660	µg/kg
Dichlorobenzidine, 3,3'-	91-94-1	330	µg/kg	660	µg/kg
Dinitrotoluene, 2,4-	121-14-2	330	µg/kg	660	µg/kg

SECTION B2

Table B2.1.1.3-14 Task 8 continued

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Dinitrotoluene, 2,6-	606-20-2	330	µg/kg	660	µg/kg
Fluorene	86-73-7	330	µg/kg	660	µg/kg
Fluoranthene	206-44-0	330	µg/kg	660	µg/kg
Hexachlorobenzene	118-74-1	330	µg/kg	660	µg/kg
Hexachlorobutadiene	87-68-3	330	µg/kg	660	µg/kg
Hexachlorocyclopentadiene	77-47-4	330	µg/kg	660	µg/kg
Hexachloroethane	67-72-1	330	µg/kg	660	µg/kg
Indeno(1,2,3-cd)pyrene	193-39-5	330	µg/kg	660	µg/kg
Isophorone	78-59-1	330	µg/kg	660	µg/kg
Methylnaphthalene, 2-	91-57-6	330	µg/kg	660	µg/kg
Naphthalene	91-20-3	330	µg/kg	660	µg/kg
Nitroaniline, 2-	88-74-4	330	µg/kg	660	µg/kg
Nitroaniline, 3-	99-09-2	330	µg/kg	660	µg/kg
Nitroaniline, 4-	100-01-6	330	µg/kg	660	µg/kg
Nitrobenzene	98-95-3	330	µg/kg	660	µg/kg
Nitrosodiphenylamine, N-(1)	86-30-6	330	µg/kg	660	µg/kg
Nitroso-di-n-propylamine, -N	621-64-7	330	µg/kg	660	µg/kg
Phenanthrene	85-01-8	330	µg/kg	660	µg/kg
Pyrene	129-00-0	330	µg/kg	660	µg/kg
Trichlorobenzene, 1,2,4-	120-82-1	330	µg/kg	660	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

SECTION B2

Table B2.1.1.3-15: Fish Tissue Chemistry Volatile Organic Compounds.

Task 9
VOLATILE ORGANICS
TARGET PARAMETER LIST (TPL)

Method 8260C (U.S. EPA 2006)

		BIOLOGICAL		SEDIMENT	
PARAMETER	**CAS NUMBER**	**CRQL**	**UNITS***	**CRQL**	**UNITS****
Acetone	67-64-1	10.0	µg/kg	10.0	µg/kg
Benzene	71-43-2	5.0	µg/kg	5.0	µg/kg
Bromodichloromethane	75-27-4	5.0	µg/kg	5.0	µg/kg
Bromomethane	74-83-9	10.0	µg/kg	10.0	µg/kg
Butanone, 2- (MEK)	78-93-3	10.0	µg/kg	10.0	µg/kg
Carbon Disulfide	75-15-0	5.0	µg/kg	5.0	µg/kg
Chlorobenzene	108-90-7	5.0	µg/kg	5.0	µg/kg
Chloroethane	75-00-3	10.0	µg/kg	10.0	µg/kg
Chloroethyl-Vinyl-Ether, 2-	110-75-8	10.0	µg/kg	10.0	µg/kg
Chloromethane	74-87-3	10.0	µg/kg	10.0	µg/kg
Dibromochloromethane	124-48-1	5.0	µg/kg	5.0	µg/kg
Dichloroethane, 1,1-	75-34-3	5.0	µg/kg	5.0	µg/kg
Dichloroethane, 1,2,-	107-06-2	5.0	µg/kg	5.0	µg/kg
Dichloroethene, 1,1-	75-35-4	5.0	µg/kg	5.0	µg/kg
Dichloroethene, 1,2- (total)	540-59-0	5.0	µg/kg	5.0	µg/kg
Dichloromethane (Methylene chloride)	75-09-2	5.0	µg/kg	5.0	µg/kg
Dichloropropane,1,2-	78-87-5	5.0	µg/kg	5.0	µg/kg
Dichloropropene, cis-1,3-	10061-01-5	5.0	µg/kg	5.0	µg/kg
Dichloropropene, trans-1,3-	10061-02-6	5.0	µg/kg	5.0	µg/kg
Ethylbenzene	100-41-4	5.0	µg/kg	5.0	µg/kg
Hexanone, 2- (MBK)	591-78-6	10.0	µg/kg	10.0	µg/kg
Methyl-2-pentanone, 4-	108-10-1	10.0	µg/kg	10.0	µg/kg
Styrene	100-42-5	5.0	µg/kg	5.0	µg/kg
Tetrachloroethane, 1,1,2,2-	79-34-5	5.0	µg/kg	5.0	µg/kg
Tetrachloroethene,	127-18-4	5.0	µg/kg	5.0	µg/kg
Tetrachloromethane (Carbon tetrachloride)	56-23-5	5.0	µg/kg	5.0	µg/kg
Tribromomethane (Bromoform)	75-25-2	5.0	µg/kg	5.0	µg/kg
Trichloroethane, 1,1,1-	71-55-6	5.0	µg/kg	5.0	µg/kg
Trichloroethane, 1,1,2-	79-00-5	5.0	µg/kg	5.0	µg/kg
Trichloroethene	79-01-6	5.0	µg/kg	5.0	µg/kg
Trichloromethane (Chloroform)	67-66-3	5.0	µg/kg	5.0	µg/kg

SECTION B2

Table B2.1.1.3-15 Task 9 continued

PARAMETER	CAS NUMBER	BIOLOGICAL		SEDIMENT	
		CRQL	UNITS*	CRQL	UNITS**
Toluene	108-88-3	5.0	µg/kg	5.0	µg/kg
Vinyl Acetate	108-05-4	10.0	µg/kg	10.0	µg/kg
Vinyl Chloride	75-01-4	10.0	µg/kg	10.0	µg/kg
Xylenes, Total	1330-20-7	5.0	µg/kg	5.0	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

SECTION B2

Table B2.1.1.3-16: Fish Tissue Chemistry Acid Extractable Polynuclear Aromatic Hydrocarbon Compounds.

TASK 10
POLYNUCLEAR AROMATIC HYDROCARBONS
TARGET PARAMETER LIST (TPL)

Method GCMS-SIM HP-5973
Method 8270D (U.S. EPA 2007d)
Method 8310 (U.S. EPA 1986)

PARAMETER	CAS NUMBER	BIOLOGICAL		SEDIMENT	
		CRQL	UNITS*	CRQL	UNITS**
Naphthalene	91-2-03	100	µg/kg	33.0	µg/kg
1-Methyl Naphthalene	90-12-0	100	µg/kg	16.0	µg/kg
2-Methyl Naphthalene	91-57-6	100	µg/kg	16.0	µg/kg
Acenaphthylene	208-96-8	125	µg/kg	67.0	µg/kg
Acenaphthene	83-32-9	50.0	µg/kg	33.0	µg/kg
Fluorene	86-73-7	10.0	µg/kg	3.3	µg/kg
Phenanthrene	85-01-8	5.0	µg/kg	3.3	µg/kg
Anthracene	120-12-7	7.5	µg/kg	3.3	µg/kg
Chrysene	218-01-9	5.0	µg/kg	3.3	µg/kg
Fluoranthene	206-44-0	7.5	µg/kg	5.0	µg/kg
Pyrene	129-00-0	2.0	µg/kg	3.3	µg/kg
Benzo (a) anthracene	56-55-3	5.0	µg/kg	3.3	µg/kg
Benzo (b) fluoranthene	205-99-2	5.0	µg/kg	3.3	µg/kg
Benzo (k) fluoranthene	207-08-9	5.0	µg/kg	3.3	µg/kg
Benzo (a) pyrene	50-32-8	10.0	µg/kg	3.3	µg/kg
Dibenzo (a,h) anthracene	53-70-3	15.0	µg/kg	6.7	µg/kg
Benzo (g,h,i) perylene	191-24-2	12.5	µg/kg	6.7	µg/kg
Indeno (1,2,3-c,d) Pyrene	193-39-5	7.5	µg/kg	6.7	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

SECTION B2

Table B2.1.1.3-17: Fish Tissue Chemistry Brominated Diphenyl Ether Compounds.

TASK 11
POLYBROMINATED DIPHENYL ETHERS (PBDE)
TARGET PARAMETER LIST

Method 1614 (DRAFT) Tissues and Soils by HRGC/HRMS (U.S. EPA 2010b)

Congener	IUPAC #	OWQ Identifier Number[5]	MDL µg/kg (ww)	CRQL µg/kg (ww)
2-MonoBDE	1	BDE-1	0.5	1.5
3-MonoBDE	2	BDE-2	0.48	1.5
4-MonoBDE	3	BDE-3	0.48	1.5
2,4-DiBDE	7	BDE-7	0.03	0.1
2,4'-DiBDE	8	BDE-8	0.03	0.1
2,6-DiBDE	10	BDE-10	0.03	0.1
3,3'-DiBDE	11	BDE-11	0.00	0.1
3,4-DiBDE	12	BDE-12	0.03	0.1
3,4'-DiBDE	13	BDE-13	0.03	0.1
4,4'-DiBDE	15	BDE-15	0.03	0.1
2,2',4-TriBDE	17	BDE-17	0.03	0.1
2,3',4-TriBDE	25	BDE-25	0.03	0.1
2,4,4'-TriBDE	28	BDE-28	0.03	0.1
2,4,6-TriBDE	30	BDE-30	0.03	0.1
2,4',6-TriBDE	32	BDE-32	0.03	0.1
2',3,4-TriBDE	33	BDE-33	0.00	0.1
3,3',4-TriBDE	35	BDE-35	0.03	0.1
3,4,4'-TriBDE	37	BDE-37	0.03	0.1
2,2',4,4'-TetraBDE	47	BDE-47	0.02	0.1
2,2',4,5'-TetraBDE	49	BDE-49	0.02	0.1
2,3',4,4'-TetraBDE	66	BDE-66	0.03	0.1
2,3',4',6-TetraBDE	71	BDE-71	0.02	0.1
2,4,4',6-TetraBDE	75	BDE-75	0.02	0.1
3,3',4,4'-TetraBDE	77	BDE-77	0.02	0.1
2,2',3,4,4'-PentaBDE	85	BDE-85	0.03	0.1
2,2',4,4',5-PentaBDE	99	BDE-99	0.03	0.1
2,2',4,4',6-PentaBDE	100	BDE-100	0.02	0.1
2,3,3',4,4'-PentaBDE	105	BDE-105	0.02	0.1
2,3,4,5,6-PentaBDE	116	BDE-116	0.02	0.1
2,3',4,4',6-PentaBDE	119	BDE-119	0.02	0.1
3,3',4,4',5-PentaBDE	126	BDE-126	0.02	0.1
2,2',3,4,4',5'-HexaBDE	138	BDE-138	0.08	0.2
2,2',3,4,4',6'-HexaBDE	140	BDE-140	0.06	0.2

5 Non-numeric CAS Numbers have been assigned by IDEM/WABP chemists for parameters which do not have a CAS Number assigned by the Chemical Abstracts Service of the American Chemical Society.

SECTION B2

Congener	IUPAC #	OWQ Identifier Number[6]	MDL µg/kg (ww)	CRQL µg/kg (ww)
2,2',4,4',5,5'-HexaBDE	153	BDE-153	0.07	0.2
2,2',4,4',5,6'-HexaBDE	154	BDE-154	0.05	0.2
2,2',4,4',6,6'-HexaBDE	155	BDE-155	0.06	0.2
2,3,4,4',5,6-HexaBDE	166	BDE-166	0.00	0.2
2,2',3,4,4',5,6-HeptaBDE	181	BDE-181	0.07	0.2
2,2',3,4,4',5',6-HeptaBDE	183	BDE-183	0.05	0.2
2,3,3',4,4',5,6-HeptaBDE	190	BDE-190	0.10	0.3
2,2',3,3',4,4',5,5',6-NonaBDE	206	BDE-206	0.14	0.5
2,2',3,3',4,4',5,6,6'-NonaBDE	207	BDE-207	0.14	0.5
2,2',3,3',4,5,5',6,6'-NonaBDE	208	BDE-208	0.14	0.5
2,2',3,3',4,4',5,5',6,6'-DecaBDE	209	BDE-209	1.10	3.5

IUPAC=International Union of Pure and Applied Chemistry
MDL=method detection limit DL=detection limit.

Table B2.1.1.3-18: Fish Tissue Chemistry Perfluoroalkyl Acids (PFAA).

TASK 12
TARGET PARAMETER LIST (TPL)

Method: WI ESS ORG 1480 (WI ESS 2010) [1]
Axys Method MLA-043 Rev 08 Ver 06 [2]

PARAMETER	CAS Number	BIOLOGICAL CRQL	UNITS**
Perfluoro-1-octanesulfonate (C8, PFOS)*	1763-23-1	0.50	µg/kg ww
Perfluoro-1-butanesulfonate (C4, PFBS)*	375-73-5	0.50	µg/kg ww
Perfluoro-1-hexanesulfonate (C6, PFHxS)*	355-46-4	0.50	µg/kg ww
Perfluoro-1-heptanesulfonate (C7,pFHpS)	375-92-8	0.50	µg/kg ww
Perfluoro-1-decanesulfonate (C10, PFDS)	335-77-3	0.50	µg/kg ww
Perfluoro-n-octanoic acid (C8, PFOA)*	45285-51-6	0.50	µg/kg ww
Perfluoro-n-butanoic acid(C4 PFBA)	375-22-4	0.50	µg/kg ww
Perfluoro-n-pentanoic acid (C5, PFPeA)	2706-90-3	0.50	µg/kg ww
Perfluoro-n-hexanoic acid (C6, PFHxA)*	307-24-4	0.50	µg/kg ww
Perfluoro-n-heptanoic acid (C7, PFHpA)	375-85-9	0.50	µg/kg ww

6 Non-numeric CAS Numbers have been assigned by IDEM/WABP chemists for parameters which do not have a CAS Number assigned by the Chemical Abstracts Service of the American Chemical Society.

SECTION B2

PARAMETER	CAS Number	BIOLOGICAL CRQL	UNITS**
Perfluoro-n-nonanoic acid (C9, PFNA)*	375-95-1	0.50	µg/kg ww
Perfluoro-n-decanoic acid (C10, PFDA)*	335-76-2	0.50	µg/kg ww
Perfluoro-n-undodecanoic acid (C11, PFUnA)	2058-94-8	0.50	µg/kg ww
Perfluoro-n-dodecanoic acid (C12, PFDoA)	307-55-1	0.50	µg/kg ww
Perfluoro-n-tridecanoic acid (C13, PFTrDA)	72629-94-8	0.50	µg/kg ww
Perfluoro-n-tetradecanoic acid (C14, PFTeDA)	376-06-7	0.50	µg/kg ww
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	0.50	µg/kg ww

* Commonly found in the environment

** All results reported as µg/kg wet weight

[1] Pace Analytical – Wisconsin Method WI ESS ORG 1480, "Analysis of Perfluorinated Compounds in Fish Tissue by HPLC-MS/MS, Matrix: Tissue", Nov. 2010.

[2] AXYS Analytical Services Ltd. Test method, adapted from EPA method 537.

SECTION B2

B2.1.1.4 Watershed Characterization Program Parameters:

Target compounds and parameters for specific sites are detailed in the sampling and analysis workplan for a Probabilistic Monitoring Project. The parameters are chosen from the following tables. Other parameters may be added for a project to meet the goals and objectives detailed in the sampling and analysis workplan. Alternate and equivalent test methods which meet or exceed the IDEM CRQLs may be used by the contractor laboratory with IDEM approval.

General Chemistries	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
Alkalinity (as $CaCO_3$)	E-14506	SM2320B	20.0
Chloride	16887-00-6	EPA 300.0	0.06
Hardness (as $CaCO_3$)	E-11778	SM2340B	0.4
Solids, Dissolved Total (TDS)	E-10173	SM2540C	10.0
Solids, Suspended Total, (TSS)	E-10151	SM2540D	4.0
Solids, Total (TS)	E-10151	SM2540B	1.0
Sulfate	14808-79-8	EPA 300.0	0.05
Calcium	7440-70-2	EPA 200.7	0.020
Magnesium	7439-95-4	EPA 200.7	0.095

Nutrients:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
COD	E-10117	EPA 410.4	3.0
Nitrogen, Ammonia	7664-41-7	EPA 350.1	0.01
Nitrogen, Nitrate+Nitrite	E-10128	EPA 353.2	0.05
Phosphorus, Total	7723-14-0	EPA 365.1	0.01
TKN	E-10264	EPA 351.2	0.10
TOC	E-10195	SM5310C	1.0

Bacteriology:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (MPN/100mL)
E. coli	ECOLI	SM 9223B	1.0
Total *Coliforms*	TCOLI	SM 9223B	1.0

SECTION B2

B2.1.1.5 Cyanobacteria and Cyanotoxin Monitoring in Selected Lakes Parameters:

Target compounds and parameters for specific sites are detailed in the sampling and analysis workplan for a project in this program. The parameters are chosen from the following tables. In addition, other cyanotoxins may be added in future years to better characterize risks to human health, animal health, and aquatic life. Alternate and equivalent test methods which meet or exceed the IDEM CRQLs may be used by the contractor laboratory with IDEM approval.

Nutrients and Cyanotoxins	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL
Nitrogen, Ammonia	7664-41-7	SM4500NH3-G	0.1 mg/L
Nitrogen, Nitrate+Nitrite	E-10128	SM4500NO3-F	0.5 mg/L
Phosphorus, Total	7723-14-0	SM4500P-E	0.03 mg/L
TKN	E-10264	SM4500N(Org)-	0.3 mg/L
Phosphorus, ortho (Dissolved)	14265-44-2	EPA 365.2	0.01 mg/L
Cylindrospermopsin	143545-90-8	Abraxis-522011	0.05 µg/L
Microcystin-LR	101043-37-2	Abraxis-520011	0.15 µg/L
Anatoxin-a	64285-06-9	Abraxis-520060	0.010 µg/L
Total plankton count & species distribution	Not applicable		Cells/ml
Algae, blue-green (phylum cyanophyta) density	E52457108		Cells/ml

B2.1.1.6 Reference Site Monitoring Program Parameters:

Target compounds and parameters for specific sites are detailed in the sampling and analysis workplan for a Reference Site Monitoring Project. The parameters are chosen from the following tables.

General Chemistries	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
Alkalinity (as $CaCO_3$)	E-14506	SM2320B	20.0
Chloride	16887-00-6	EPA 300.0	0.06
Cyanide (Total)	57-12-5	SM 4500-CN-E	0.010
Cyanide (Weak Acid Dissociable)	57-12-5	SM4500CN-I	0.010

SECTION B2

General Chemistries	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
Hardness (as $CaCO_3$)	E-11778	SM2340B	0.4
Solids, Dissolved Total (TDS)	E-10173	SM2540C	10.0
Solids, Suspended Total, (TSS)	E-10151	SM2540D	4.0
Solids, Total (TS)	E-10151	SM2540B	1.0
Sulfate	14808-79-8	EPA 300.0	0.05
Calcium	7440-70-2	EPA 200.7	0.020
Magnesium	7439-95-4	EPA 200.7	0.095

Nutrients:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
COD	E-10117	EPA 410.4	3.0
Nitrogen, Ammonia	7664-41-7	EPA 350.1	0.01
Nitrogen, Nitrate+Nitrite	E-10128	EPA 353.2	0.05
Phosphorus, Total	7723-14-0	EPA 365.1	0.01
TKN	E-10264	EPA 351.2	0.10
TOC	E-10195	SM5310C	1.0

Algal Biomass:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL
AFDM (Ash Free Dry Mass)	E-AFDM	SM10200I(5)	36 g/M^2
Chlorophyll a - Periphyton (attached)	E-PERI-C	EPA 445.0	0.3 mg/M^2
Chlorophyll a - Phytoplankton (total)	E-PHYTO-C	EPA 445.0	0.3 µg/L
Pheophytin - Periphyton (attached)	E-PERI-P	EPA 445.0	0.3 mg/M^2
Pheophytin - Phytoplankton (suspended)	E-PHYTO-P	EPA 445.0	0.3 µg/L
PIC (Particulate Inorganic Carbon)	E-PIC	EPA 440.0	33 mg/L
Total POC (Total Particulate Organic Carbon)	7440-44-0	EPA 440.0	33 mg/L
TPC (Total Particulate Carbon)	E-TPC	EPA 440.0	33 mg/L
TPN (Total Particulate Nitrogen)	E-TPN	EPA 440.0	200 mg/L

Total & Dissolved Metals:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (µg/L)
Aluminum	7429-90-5	EPA 200.8	10.0
Antimony	7440-36-0	EPA 200.8	1.0
Arsenic	7440-38-2	EPA 200.8	2.0
Cadmium	7440-43-9	EPA 200.8	1.0

SECTION B2

Total & Dissolved Metals:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (µg/L)
Chromium, Total (VI + III)	7440-47-3	EPA 200.8	3.0
Copper	7440-50-8	EPA 200.8	2.0
Lead	7439-92-1	EPA 200.8	2.0
Nickel	7439-92-1	EPA 200.8	1.5
Selenium	7440-02-0	EPA 200.8	4.0
Silver	7782-49-2	EPA 200.8	0.3
Zinc	7440-66-6	EPA 200.8	5.0

Bacteriology:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (MPN/100mL)
E. coli	ECOLI	SM 9223B	1.0
Total *Coliforms*	TCOLI	SM 9223B	1.0

B2.1.1.7 Program Parameters for:

- **Watershed Characterization**
- **Performance Measures Monitoring**
- **Special Projects**

Target compounds, matrices, and parameters for each of the these Surface Water Quality Monitoring Programs and Projects are listed in **Table B2.1.1.8-1**. Parameters, test methods, and CRQLs for each specific project are detailed in the project-specific workplan after consideration of potential sources of pollution, matrix, data quality objectives, and intended data use.

Table B2.1.1.8-1 Target Compounds and Parameters for Indiana Surface Water Quality Monitoring Programs.

Matrices Analyzed for Each Program

PARAMETER **Metals (Total and/or Dissolved)**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Aluminum	7429-90-5	w,s	w
Antimony	7440-36-0	w,s	w
Arsenic	7440-38-2	w,s	w
Barium	7440-39-3		w
Beryllium	7440-41-7	w,s	w
Boron	7440-42-8		w
Cadmium	7440-43-9	w,s	w

SECTION B2

PARAMETER **Metals (Total and/or Dissolved)**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Calcium	7440-70-2	w,s	w
Chromium, Hexavalent	7440-47-3	w	w
Chromium, total	7440-47-3	w,s	w
Cobalt	7440-48-4		w
Copper	7440-50-8	w,s	w
Iron	7439-89-6	w,s	w
Lead	7439-92-1	w,s	w
Magnesium	7439-95-4	w,s	w
Manganese	7439-96-5	w,s	w
Mercury	7439-97-6	w,s	w
Molybdenum	7439-98-7		w
Nickel	7440-02-0	w,s	w
Potassium	7440-09-7		w
Selenium	7782-49-2	w,s	w
Silver	7440-22-4	w,s	w
Sodium	7440-23-5		w
Strontium	7440-24-6		
Thallium	7440-28-0	w,s	w
Titanium	7440-32-6		w
Vanadium	7440-62-2		w
Zinc	7440-66-6	w,s	w

PARAMETER **Inorganic Chemicals, Nutrients, and Physical Properties**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Alkalinity	E-14506	w	w
Biochemical Oxygen DemandCarbonaceous - 5 day (CBOD5)	E-10106C5		
Biochemical Oxygen Demand,Total - 5 day (TBOD5)	E-10106T5	w	w
Chemical Oxygen Demand (COD)	E-10117	w	w
Chloride	7782-50-5	w	w
Cyanide	57-12-5		w
Fluoride	16984-48-8	w	w
Grain Size Analysis	GRAINSIZE	s	s
Hardness (as $CaCO_3$)	E-11778	w	w
Nitrogen, Ammonia	7664-41-7	w	w
Nitrogen, Nitrate	14797-55-8	w	
Nitrogen, Nitrate + Nitrite	E-10128		w
Nitrogen, Nitrite	14797-65-0	w	w
Nitrogen, Total (TKN)	E-10264	w	w

SECTION B2

PARAMETER **Inorganic Chemicals, Nutrients, and Physical Properties**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Oils and Grease	E-10140	w	w
pH	E-10139	w	w
Phenolics, Total	E-10253	w	w
Phosphorus, Total	7723-14-0	w	w
Solids, Total Dissolved (TDS)	E-10173	w	w
Solids, Total Suspended (TSS)	E-10151	w	
Solids, Total Residue (TS)	E-10151	w	
Solids, Total Volatile	E-11927		
Solids, Volatile Suspended	VSSOLIDS		
Specific Conductance	E-10184	w	w
Specific Gravity	SPECGRAVITY		
Sulfate	14808-79-8	w	
Sulfide	18496-25-8	w	w
Sulfide, Acid Volatile	E-AVS		
Total Organic Carbon (TOC)	E-10195	w	
Total Organic Halogens (TOX)	59473-04-0	w	
Depth, average		w	
Dissolved Oxygen (DO)	E-14539	w	
Time of Travel		w	w
Sediment Oxygen Demand (SOD)[7]		s	
Stream Flow		w	
Stream Velocity, Average		w	
Stream Width		w	w
Turbidity	E-10617	w	
Water Temperature	E-TEMPERATUR	w	

PARAMETER **Volatile Organic Compounds**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Acetone	67-64-1		
Benzene	71-43-2	w	
Bromodichloromethane	75-27-4	w	w
Bromoform	75-25-2	w	w
Bromomethane	74-83-9		
Carbon disulfide	75-15-0		
Carbon Tetrachloride	56-23-5	w	w
Chlorobenzene	108-90-7	w	w

[7] "Standard Operating Procedures Manual," SOP 1034, Revision 0, Dec. 1992, pp. 80-83.

SECTION B2

PARAMETER **Volatile Organic Compounds**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Chloroethane	75-00-3		
Chloroethyl Vinyl Ether,2-	110-75-8		
Chloroform	67-66-3	w	w
Chloromethane	74-87-3		
Dibromochloromethane	124-48-1	w	w
Dichlorobenzene, 1,2	95-50-1	w	w
Dichlorobenzene, 1,3	541-73-1	w	w
Dichlorobenzene, 1,4	106-46-7	w	w
Dichlorodifluoromethane	75-71-8		
Dichloroethane, 1,1-	75-34-3	w	
Dichloroethane, 1,2-	107-06-2	w	w
Dichloroethene, 1,1-	75-35-4	w	
Dichloroethene, trans-1,2-	156-60-5	w	
Dichloroethene, 1,2- Total	540-59-0		
Dichloropropane, 1,2	78-87-5	w	
Dichloropropene, cis-1,3-	10061-01-5	w	
Dichloropropene,trans-1,3-	10061-02-6	w	
Ethylbenzene	100-41-4	w	w
Methylene Chloride	75-09-2	w	w
Tetrachloroethane, 1,1,2,2-	79-34-5	w	w
Tetrachloroethene	127-18-4	w	
Toluene	108-88-3	w	w
Trichloroethane, 1,1,1-	71-55-6	w	w
Trichloroethane, 1,1,2-	79-00-5	w	
Trichloroethene	79-01-6	w	w
Trichlorofluoromethane	75-69-4	w	
Vinyl Chloride	75-01-4	w	
Methyl ethyl ketone	78-93-3		
4- Methyl-2-propanone (MIBK)	108-10-1		
Styrene	100-42-5		
2-Hexanone	591-78-6		
Vinyl acetate	108-05-4		
Xylenes, total	1330-20-7		

PARAMETER **Semi- Volatile Organic Compounds**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Acenaphthene	83-32-9	w,s	w
Acenaphthylene	208-96-8	w,s	w
Aniline	62-53-3	w,s	w
Anthracene	120-12-7	w,s	w
Benzidine	92-87-5	w,s	w

SECTION B2

PARAMETER **Semi- Volatile Organic Compounds**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Benzo (a) anthracene	56-55-3	w,s	w
Benzo (a) pyrene	50-32-8	w	w
Benzo (b) fluoranthene	205-99-2	w	w
Benzo (g,h,i) perylene	191-24-2	w	w
Benzo (k) fluoranthene	207-08-9	w	w
Benzoic Acid	65-85-0	w	w
Bis(2-chloroethoxy)Methane	111-91-1	w	w
Bis(2-chloroethyl)Ether	111-44-4	w	w
Bis(2-chloroisopropyl) Ether	108-60-1	w	w
Bis(2-chloromethyl) Ether	542-88-1	w	
Bis(2-ethylhexyl)Phthalate	117-81-7	w	w
Bromopheny Phenyl Ether,4-	101-55-3	w	w
Butyl Benzyl Phthalate	85-68-7	w	w
Carbazole	86-74-8		
Chloro-3-methyl-phenol, 4-(PCMC)	59-50-7	w	w
Chloroaniline, 4-	106-47-8	w	w
Chloronaphthalene, 2-	91-58-7	w	w
Chlorophenol, 2-	95-57-8	w	w
Chlorophenol, 3-	108-43-0		
Chlorophenyl Phenyl Ether, 4-	7005-72-3	w	w
Chrysene	218-01-9	w	w
Di-n-butyl Phthalate	84-74-2	w	w
Di-n-octyl Phthalate	117-84-0	w	w
Dibenzo(a,h)anthracene	120-12-7	w	w
Dibenzofuran	53-70-3	w	w
Dibutyl Phthalate	84-74-2	w	w
Dichlorobenzene, 1,2-	95-50-1	w	w
Dichlorobenzene, 1,3-5	41-73-1	w	w
Dichlorobenzene, 1,4-	106-46-7	w	w
Dichlorobenzidine, 3,3'-	91-94-1	w	w
Dichlorophenol, 2,4-	120-83-2	w	w
Diethyl Phthalate	84-66-2	w	w
Dimethyl Phthalate	131-11-3	w	w
Dimethylphenol, 2,4-	105-67-9	w	w
Dinitrophenol, 2,4-	51-28-5	w	w
Dinitrotoluene, 2,4-	121-14-2	w	w
Dinitrotoluene, 2,6-	606-20-2	w	w
Diphenylhydrazine, 1,2-	122-66-7	w	w
Fluoranthene	206-44-0	w	w
Fluorene	86-73-7	w	w
Hexachlorobenzene	118-74-1	w	w
Hexachlorobutadiene	87-68-3	w	w
Hexachlorocyclopentadiene	77-47-4	w	w
Hexachloroethane	67-72-1	w	w
Indeno(1,2,3-cd)pyrene	193-39-5	w	w
Isophorone	78-59-1	w	w

SECTION B2

PARAMETER **Semi- Volatile Organic Compounds**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Methyl-4,6-dinitrophenol 2-	534-52-1	w	w
Methylnaphthalene, 1-	90-12-0	w	w
Methylnaphthalene,	2-91-57-6	w	w
Methylphenol,	2-95-48-7	w	w
Methylphenol, 4-	106-44-5	w	w
Naphthalene	91-20-3	w	w
Nitroaniline, 2-	88-74-4	w	w
Nitroaniline, 3-	99-09-2	w	w
Nitroaniline, 4-	100-01-6	w	w
Nitrobenzene	98-95-3	w	w
Nitrophenol, 2-	88-75-5	w	w
Nitrophenol, 4-	100-02-7	w	w
Nitrosodi-n-propyl amine,N-	621-64-7	w	w
N-Nitrosodi-n-butylamine	924-16-3	w	w
N-Nitrosodiethylamine	55-18-5	w	w
N-Nitrosodimethylamine	62-75-9	w	w
N-Nitrosodiphenylamine	86-30-6	w	w
N-Nitrosopyrrolidine	930-55-2	w	w
Oxybis-(1-chloropropane), 2,2'-	108-60-1	w	w
Pentachloroanisole, 2,3,4,5,6-	1825-21-4	w	w
Pentachlorobenzene	608-93-5	w	w
Pentachlorophenol	87-86-5	w	w
Phenanthrene	85-01-8	w	w
Phenol	108-95-2	w	w
Pyrene	129-00-0	w	w
Tetrachlorobenzene,1,2,4,5-	95-94-3	w	w
Trichlorobenzene, 1,2,4-	120-82-1	w	w
Trichlorophenol, 2,4,5-	95-95-4	w	w
Trichlorophenol, 2,4,6	88-06-2	w	w

PARAMETER **Pesticides**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Aldrin	309-00-2	w,s	w,s
BHC, Alpha-	319-84-6	w,s	w,s
BHC, Beta-	319-85-7	w,s	w,s
BHC, Delta-	319-86-8	w,s	w,s
BHC, Gamma- (Lindane)	58-89-9	w,s	w,s
Chlordane, Alpha-	5103-71-9	w,s	w,s
Chlordane, Gamma-	5103-74-2	w,s	w,s
DDD, 2,4'-	53-19-0		w,s
DDD, 4,4'-	72-54-8	w,s	w,s
DDE, 2,4'-	3424-82-6		w,s
DDE, 4,4'-	72-55-9	w,s	w,s
DDT, 2,4'-	789-02-6		w,s

SECTION B2

PARAMETER **Pesticides**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
DDT, 4,4'-	50-29-3	w,s	w,s
Dieldrin	60-57-1	w,s	w,s
Endosulfan I	959-98-8	w,s	w,s
Endosulfan II	3213-65-9	w,s	w,s
Endosulfan Sulfate	1031-07-8	w,s	w,s
Endrin	72-20-8	w,s	w,s
Endrin Aldehyde	7421-93-4	w,s	w,s
Endrin Ketone	534594-70-5	w,s	w,s
Heptachlor	76-44-8	w,s	w,s
Heptachlor Epoxide	1024-57-3	w,s	w,s
Methoxychlor	72-43-5	w,s	w,s
Nonachlor, cis-	5103-73-1		w,s
Nonachlor, trans-	39765-80-5		w,s
Oxychlordane	112-30-0	w,s	w,s
Pentachloroanisole	1825-21-4		w,s
Toxaphene	8001-35-2	w,s	w,s

PARAMETER **Polychlorinated Biphenyl (PCBs)**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
Aroclor-1016	12674-11-2	w	
Aroclor-1221	11104-28-2	w	
Aroclor-1232	11141-16-5	w	
Aroclor-1242	53469-21-9	w	
Aroclor-1248	12672-29-6	w	
Aroclor-1254	11097-69-1	w	
Aroclor-1260	11096-82-5	w	
Aroclor-1264	Aroclor-1264	w	
Total PCBs	1336-36-3	w	

PARAMETER **Bacteriology**	CAS NUMBER or OWQ Identifier	TMDLs & SPECIAL PROJECTS PROGRAMS	IMPROVEMENTS IN WATER QUALITY PROGRAM
E. coli	ECOLI	w	w
Coliforms, Total	TCOLI	w	w

w = water media
s = sediment media

SECTION B2

Table B2.1.1.8-2
Field Parameters

PARAMETER Field Parameters to be Measured	Test Method	Measurement Range	Accuracy
* Chlorophyll (YSI Datasonde)	YSI Method YSI6025	0 – 40 µg/L	Not Specified by Manufacturer
* Chloride (YSI Datasonde)	YSI Method YSI-ISE	0 – 1000 mg/L	± 15 % of reading or 5 mg/L (whichever is greater)
Conductivity or Specific conductance	SM2510B	0 – 100 µS/cm	± 0.5 % of reading + 1.0 µS/cm
Dissolved Oxygen (Hydrolab or YSI Datasonde)	SM4500-OG	0 – 50 mg/L	± 2 % of reading or 0.2 mg/L (whichever is greater)
Dissolved Oxygen (Optical Luminescence Probe)	ASTM D888(C)	0 – 50 mg/L	± 2 % of reading or 0.2 mg/L (whichever is greater)
Dissolved Oxygen (Winkler Titration)	SM4500-OC	0 – 50 mg/L	± 0.050 mg/L
Dissolved Oxygen, Percent Saturation, Membrane Electrode (Hydrolab or YSI Datasonde)	SM4500-OG	0 – 500% Air saturation	0-200% air saturation, ± 2 % of reading or 2% (whichever is greater)
Dissolved Oxygen, Percent Saturation, (Optical Luminescence Probe)	ASTM D888(C)	0 – 500% Air saturation	0-200% air saturation, ± 2 % of reading or 2% (whichever is greater)
pH (field pH meter)	SM4500H-B	1.5 – 13 SU	± 0.01 SU
pH (data sonde)	EPA 150.2	1.5 – 13 SU	± 0.01 SU
Temperature (Thermometer)	SM2550B(1)	- 5 to 110° C	± 0.5° C
Temperature (Thermister)	SM2550B(2)	- 5 to 50° C	± 0.15° C
Total Residual Chlorine (Hach Pocket Colorimeter Test)	SM4500Cl-G(4)C	0.02 – 2 mg/L	± 0.1 mg/L
Turbidity (HACH or LaMotte Turbidimeter)	EPA 180.1 or SM2130B	0 - 1000 NTU	± 1 % of reading or 2 NTU (whichever is greater)
Turbidity (Hydrolab or YSI Datasonde)	SM2130BMod	0 - 1000 NTU	± 5 % of reading or 2 NTU (whichever is greater)

* Denotes analytes which are semi-quantitative.

SECTION B3

B3 CUSTODY PROCEDURES

Chain-of-custody is the the chronological documentation or paper trail, showing the seizure, custody, control, transfer, analysis, and disposition of physical or electronic evidence. This is accomplished through a combination of field and laboratory records that demonstrate possession and transfer of custody. Procedures for chain of custody for Field activities, Laboratory activities, and final evidence files are discussed in this section.

B3.1 Field Activities

Sample custody procedures for field testing and sample acquisition are described in the "Biological Studies Section Standard Operating Procedures Manual" (**Appendix G**), WQSSB/ SOP 2004 , the "Surveys Section Field Procedure Manual", Section 2.1.7 (**Appendix F)**, and in the "Surveillance Group Standard Operating Procedures Manual," (**Appendix H**), WQSSB/ SOP 1063. The manuals contain field chain-of-custody procedures for all field collection samples. See the indexes in **Appendix F** and **Appendix G**. WAPB (previously called as WQSSB) SOPs have already been submitted to U.S. EPA Region 5.

B3.2 Laboratory Activities

Each contract laboratory performing analyses for the WAPB water quality monitoring programs is responsible for implementing chain-of-custody procedures that meet IDEM chain-of-custody requirements Compliance with the IDEM RFQs, and RFPs ensure that acceptable laboratory chain-of-custody procedures are in place before samples are collected.

B3.3 Final Evidence Files

Case files for permitted dischargers are maintained by the IDEM OWQ, 100 N. Senate Avenue, Indianapolis, Indiana. The file room custodian has responsibility for final custody of case records, which are periodically stored in the IDEM Virtual File Cabinet (VFC). OWQ currently keeps all case files.

Data collected for water quality assessment and characterization are maintained by the WAPB. Reports are assessed, qualified, and entered into the AIMS II Database, with a hard copy of the database kept to maintain accuracy and backup. Reports containing raw data are cataloged and stored for future needs. Electronic database files are maintained indefinitely.

SECTION B4

B4 ANALYTICAL PROCEDURES

Analytical procedures are written instructions which describe how to prepare a sample for analysis, prepare and calibrate test measurement equipment, perform a test, and calculate results. Field analytical procedures generate analytical data on site to be used in decision-making processes involving sample selection, site screening, and field measurements for some parameters (pH, dissolved oxygen, turbidity, temperature, etc.). Laboratory analytical procedures produce data under more controlled conditions, and therefore, usually provide lower detection limits and greater precision than field data. Both field and laboratory data provide information that help in Data Quality Assessment (DQA) for the purpose of meeting defined project data quality objectives (DQOs).

B4.1 Analytical Parameters

Specific test parameters, sample matrices, Contract Required Reporting Limits (CRQLs) and acceptable U.S. EPA test methods for analyses of water, sediment, and fish tissues samples are excerpted from the IDEM RFQs, or IDEM RFPs and provided in **Table B4-1.** Precision and accuracy requirements were previously detailed in **Section A7, Table A7-1**. See **Appendix B, Appendix C,** and **Appendix D** (IDEM RFP 16-74, IDEM RFP 16-88, and IDEM RFP 5-60), for more details.

B4.2 Standard Operating Procedures

B4.2.1 Field Analytical Procedures

Targeted Monitoring Section field staff generate analytical data in the field using field equipment and standard operating procedures detailed in the *Surveys Section Field Procedure Manual. Revised June 2002* (**Appendix F)**. Analytical procedures are based on EPA-600/4-79-020 "*Methods for Chemical Analysis of Water and Wastes."* Biological and sediment samples collected for the Probabilistic Monitoring Section are collected according to "*Assessment Branch SOP 2004"* (**Appendix G**). Field SOPs follow Technical SOP Guidance established by IDEM Office of Program Support.

B4.2.2 Laboratory Analytical Procedures

- Fixed Station Monitoring Program
- Probabilistic Monitoring Program
- TMDL Sampling Program
- Fish Tissues and Sediment Contaminants Monitoring Program

SECTION B4

- Watershed Characterization Program for Watershed Planning
- Performance Monitoring to Identify Improvements In Water Quality
- Cyanobacteria and Microcystin Monitoring Program
- Reference Site Monitoring Program
- Special Projects Program

Each laboratory performing analytical tests for the OWQ WAPB is required to provide copies of SOPs upon request of the OWQ. Availability of laboratory SOPs is confirmed through laboratory proposal review and on-site audit, during the RFP process and annually thereafter. Written SOPs for all test methods and standard procedures including sample preparation and cleanup methods (if separate from the determinative SOP), determinative test methods, initial and continuing calibrations and frequencies, and confirmatory methods are required. **Table B4-1** lists the CRQLs and acceptable U.S. EPA analytical test methods for each target compound. Parameters and analytical methods selected from **Table B4-1** for each specific project is detailed in the project workplan after consideration of potential sources of pollution, matrix, method sensitivity and selectivity, and intended data use.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Algal Biomass									
AFDM	E-AFDM[3]	T	36	g/M2					USGS B352085
AFDM		T	36	g/M2					SM10200I(5)
Chlorophyll a	479-61-8	T	1	mg/L					EPA 446.0
	479-61-8	T	1	µg/L					SM10200H
	479-61-8	T	1	µg/L					YSI6025 [4]
Periphyton Chlorophyll a	E-PERI-C	A (Attached)	0.3	mg/M2					EPA 445.0
Periphyton Pheophytin	E-PERI-P	A	0.3	mg/M2					EPA 445.0
PIC	E-PIC	T	33	µg/L					EPA 440.0
Seston Chlorophyll a	E-PHYTO-C	T	0.3	µg/L					EPA 445.0
Seston Pheophytin	E-PHYTO-P	T	0.3	µg/L					EPA 445.0
TPC	E-TPC	T	33	µg/L					EPA 440.0
TPCN	7440-44-0	T	33	µg/L					EPA 440.0
TPN	E-TPN	T	200	mg/L					EPA 440.0
Bacteriology [5]									
Anatoxin-a	64285-06-9	T	0.01	µg/L					Abraxis-520060 [6]
	64285-06-9	T	0.01	µg/L					Abraxis-520050[7]
Coliform, Fecal	FCOLI	T	1	CFU/100mL					SM9221E
	FCOLI	T	1	CFU/100mL					SM9222B
	FCOLI	T	1	CFU/100mL					SM9222D
Coliforms (Total)	TCOLI	T	1	CFU/100mL					SM9221B
	TCOLI	T	1	CFU/100mL					SM9221C
	TCOLI	T	1	CFU/100mL					SM9222B
	TCOLI	T	1	CFU/100mL					SM9222C
	TCOLI	T	1	MPN/100mL					SM9223B [8]
Cylindrospermopsin	143545-90-8	T	0.05	µg/L					Abraxis-522011 [6]
E. coli	ECOLI	T	1	CFU/100mL					EPA 1103.1
	ECOLI	T	1	CFU/100mL					SM9213D
	ECOLI	T	1	CFU/100mL					SM9221F

1. CRQLs listed are the higher values of laboratory reported MDL or method MDL times a factor of 3.18 as recommended in U.S. EPA wastewater compliance guidance. Typically the resulting values are rounded to number nearest to (1, 2, or 5) x 10^n, where n is an integer. CRQLs are equivalent to PQLs, MLs, RLs, or Method Reporting Limits (MRLs) in various methods and EPA guidance documentation.

2 "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA-600 4-79-020. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986, updates and amendments. "Standard Methods for the Examination of water and Wastewater," 21st Edition, 2005, updates and amendments.

3 Non-numeric CAS Numbers are have been assigned by IDEM/WAPB chemists for parameters which do not have a CAS Number assigned by the Chemical Abstracts Service of the American Chemical Society. Non-numeric CAS Numbers may be derived from the EPA Identification Number (EPA substance Registry Services) or from the legacy EPA Storet number listed in the test method.

4 YSI Datasonde Parameter.

5 "Standard Methods for the Examination of Water and Wastewater," 21st Edition, 2005 or most recent update.

6 Abraxis ELISA method.

7 Abraxis RBA kit – 96T microtiter plate (part # 520050).

8 Also known as MMO-MUG test, Colilert® Quanti-Tray® test for Coliform / *E. coli*, IDEXX Laboratories, Inc.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Bacteriology									
E. coli	ECOLI	T	1	CFU/100mL					SM9222B
	ECOLI	T	1	CFU/100mL					SM9222D
	ECOLI	T	1	CFU/100mL					SM9222G
	ECOLI	T	1	MPN/100mL					SM9223B
Fecal *Streptococcus*	FSTREP	T	1	MPN/100mL					SM9230C
HPC (Hetotrophic Plate Count)	E-HPC	T	1	MPN/100mL					SM9215
Microcystin-LR	101043-37-2	T	0.15	µg/L					Abraxis-520011[6]
Dioxins[9]									
1,2,3,4,6,7,8-HpCDD	35822-46-9	T					5	ng/Kg ww	EPA 1613
	35822-46-9	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	35822-46-9	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
1,2,3,4,6,7,8-HpCDF	67562-39-4	T					5	ng/Kg ww	EPA 1613
	67562-39-4	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	67562-39-4	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
1,2,3,4,7,8,9-HpCDF	55673-89-7	T					5	ng/Kg ww	EPA 1613
	55673-89-7	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	55673-89-7	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
1,2,3,4,7,8-HxCDD	39227-28-6	T					5	ng/Kg ww	EPA 1613
	39227-28-6	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	39227-28-6	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
1,2,3,4,7,8-HxCDF	70648-26-9	T					5	ng/Kg ww	EPA 1613
	70648-26-9	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	70648-26-9	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
1,2,3,6,7,8-HxCDD	57653-85-7	T					5	ng/Kg ww	EPA 1613
	57653-85-7	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	57653-85-7	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
1,2,3,6,7,8-HxCDF	57117-44-9	T					5	ng/Kg ww	EPA 1613
	57117-44-9	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	57117-44-9	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
1,2,3,7,8,9-HxCDD	19408-74-3	T					5	ng/Kg ww	EPA 1613
	19408-74-3	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	19408-74-3	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
1,2,3,7,8,9-HxCDF	72918-21-9	T					5	ng/Kg ww	EPA 1613
	72918-21-9	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	72918-21-9	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
1,2,3,7,8-PeCDD	40321-76-4	T					5	ng/Kg ww	EPA 1613
	40321-76-4	T			2.5	ng/Kg dw	2.5	ng/Kg ww	SW846 8080
	40321-76-4	T			2.5	ng/Kg dw	2.5	ng/Kg ww	SW846 8082
1,2,3,7,8-PeCDF	57117-41-6	T					5	ng/Kg ww	EPA 1613
	57117-41-6	T			2.5	ng/Kg dw	2.5	ng/Kg ww	SW846 8080
	57117-41-6	T			2.5	ng/Kg dw	2.5	ng/Kg ww	SW846 8082
2,3,4,6,7,8-HxCDF	60851-34-5	T					5	ng/Kg ww	EPA 1613
	60851-34-5	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	60851-34-5	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
2,3,4,7,8-PeCDF	57117-31-4	T					5	ng/Kg ww	EPA 1613
	57117-31-4	T			2.5	ng/Kg dw	2.5	ng/Kg ww	SW846 8080
	57117-31-4	T			2.5	ng/Kg dw	2.5	ng/Kg ww	SW846 8082

9 "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA-600 4-79-020. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986, updates and amendments.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues Acceptable Test CRQL*	*Units*	*Method(s)[2]*
Dioxins									
2,3,7,8-TCDD (Dioxin)	1746-01-6	T					1	ng/Kg ww	EPA 1613
	1746-01-6	T			1	ng/Kg dw	1	ng/Kg ww	SW846 8080
	1746-01-6	T			1	ng/Kg dw	1	ng/Kg ww	SW846 8082
2,3,7,8-TCDF	51207-31-9	T					1	ng/Kg ww	EPA 1613
	51207-31-9	T			1	ng/Kg dw	1	ng/Kg ww	SW846 8080
	51207-31-9	T			1	ng/Kg dw	1	ng/Kg ww	SW846 8082
OCDD	3268-87-9	T					10	ng/Kg ww	EPA 1613
	3268-87-9	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	3268-87-9	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
OCDF	39001-02-0	T					10	ng/Kg ww	EPA 1613
	39001-02-0	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8080
	39001-02-0	T			5	ng/Kg dw	5	ng/Kg ww	SW846 8082
General Chemistry and Physical Properties[10]									
% Sat [11]	E-%Sat	T	0.01	%					ASTM D888-09(C)
% Sat, Membrane Electrode	E-%Sat	T	0.01	%					SM4500-OG
% Water Column Oxic	L-WCOXIC	T	0.1	%					SM4500-OG
1% Light Level	L-LightLev1	T	0.1	feet					LightMeter[12]
Acidity (as $CaCO_3$)	E-00435	T	20	mg/L					SM2310B
Alkalinity (as $CaCO_3$)	E-14506	T	3	mg/L					EPA 310.1
	E-14506	T	10	mg/L					EPA 310.2
	E-14506	T	20	mg/L					SM2320B
Bromate	15541-45-4	D	0.06	mg/L					EPA 300.0
Bromide	24959-67-9	D	0.03	mg/L					EPA 300.0
Bromine	7726-95-6	T	10	mg/L					EPA 320.1
Chlorate	14866-68-3	D	0.01	mg/L					EPA 300.0
Chloride	16887-00-6	D	0.06	mg/L					EPA 300.0
	16887-00-6	T	1	mg/L	6	mg/Kg dw			EPA 325.2
	16887-00-6	T	1	mg/L					EPA 325.3
	16887-00-6	T	477	mg/L					SM4500CL(-)-
	16887-00-6	T	0.03	mg/L					SM4500Cl-D
	16887-00-6	T	1	mg/L	6	mg/Kg dw			SM4500Cl-E
	16887-00-6	T	15	mg/L					YSI-ISE [13]
Chlorine (Total)	7782-50-5	F	600	mg/L					SM4500Cl-D4B
	7782-50-5	T	600	mg/L					SM4500Cl-D4C
	7782-50-5	T	32	µg/L					SM4500Cl-E
	7782-50-5	F	57	µg/L					SM4500Cl-F33
	7782-50-5	T	57	µg/L					SM4500Cl-F34
	7782-50-5	F	32	µg/L					SM4500Cl-G4C
	7782-50-5	T	32	µg/L					SM4500Cl-G4H
Chlorite	14998-27-7	D	0.03	mg/L					EPA 300.0

10 "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA-600 4-79-020. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986, updates and amendments. ASTM Test Methods, updates and amendments. "Standard Methods for the Examination of water and Wastewater," 19th Edition, 1995.

11 Hydrolab or YSI Datasonde Parameter

12 Hoosier River Watch Method

13 YSI Datasonde Parameter.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
General Chemistry and Physical Properties									
Clay	Clay	T			0.1	%			ASTM D422
Clay/Silt	Clay/Silt	T			0.1	%			ASTM D422
Cyanide (Chlorine Amenable)	57-12-5	T	0.01	mg/L					EPA 335.1
	57-12-5	T	0.01	mg/L					SM4500CN-G
Cyanide (Total)	57-12-5	T	0.01	mg/L					EPA 335.2
	57-12-5	T	0.01	mg/L					EPA 335.3
	57-12-5	T	0.01	mg/L	0.25	mg/Kg dw			EPA 335.4
	57-12-5	T	0.01	mg/L					OIA-1678
Cyanide (Total)	57-12-5	T	0.16	mg/L					SM4500CN-C
	57-12-5	T	0.16	mg/L					SM4500CN-E
	57-12-5	T	0.16	mg/L					SM4500CN-F
	57-12-5	T	0.01	mg/L	0.25	mg/Kg dw			SW846 9010
	57-12-5	T	0.01	mg/L	0.25	mg/Kg dw			SW846 9012
	57-12-5	T			0.25	mg/Kg dw			SW846 9014
Cyanide (Weak Acid Dissociable)	57-12-5	F	0.002	mg/L					OIA-1677
	57-12-5	F	0.01	mg/L					SM4500CN-I
Dissolved Oxygen (DO), [14]	E-14539	T	0.05	mg/L					ASTM D888-09(C)
	E-14539	T	0.03	mg/L					SM4500-OG
DO, Winkler	E-14539	T	0.2	mg/L					SM4500-OC
DO,Modified Winkler [15]	E-14539	T	1	mg/L					HACH OX-2P
Fluoride	16984-48-8	D	0.03	mg/L					EPA 300.0
	16984-48-8	T	0.1	mg/L					EPA 340.2
	16984-48-8	T	0.1	mg/L					SM4500F(-)-B
	16984-48-8	T	0.1	mg/L					SM4500F(-)-C
	16984-48-8	T	0.01	mg/L					SM4500F(-)-D
	16984-48-8	T	0.1	mg/L					SM4500F(-)-E
Grain size analysis	GRAINSIZE	T			1	%			ASTM D854
	GRAINSIZE	T			1	%			USGS '77
Grain size, Sieve #10	Sieve10	T			0.1	%			ASTM D422
Grain size, Sieve #100	Sieve100	T			0.1	%			ASTM D422
Grain size, Sieve #140	Sieve140	T			0.1	%			ASTM D422
Grain size, Sieve #20	Sieve20	T			0.1	%			ASTM D422
Grain size, Sieve #200	Sieve200	T			0.1	%			ASTM D422
Grain size, Sieve #4	Sieve4	T			0.1	%			ASTM D422
Grain size, Sieve #40	Sieve40	T			0.1	%			ASTM D422
Grain size, Sieve #60	Sieve60	T			0.1	%			ASTM D422
Gravel	Gravel	T			0.1	%			ASTM D422
Hardness (as $CaCO_3$)	E-11778	T	1	mg/L					EPA 130.1
	E-11778	T	1	mg/L					EPA 130.2
	E-11778	T	0.4	mg/L					SM2340
	E-11778	T	0.4	mg/L					SM2340B
	E-11778	T	0.4	mg/L					SM2340C
Light Trans @ 3 ft.	L-TRANS3	T	1	%T					LightMeter

14 Hydrolab or YSI Datasonde Parameter

15 Hach Dissolved Oxygen Test Kit OX-2P

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
General Chemistry and Physical Properties									
Lipids	LIPID	T					0.1	%	EnChemSVO-59[16]
	LIPID	T					0.1	%	EPA 160.1
	LIPID	T					0.1	%	ISDH [17]
Oil and Grease	E-10140	T	5	mg/L					EPA 1664
	E-10140	T	5	mg/L					EPA 413.1
	E-10140	T	5	mg/L					SM5520C
	E-10140	T	5	mg/L					SW846 9071B
pH (Field) [18]	E-00400	T	0.1	SU					EPA 150.1
	E-00400	T	0.1	SU					EPA 150.2
pH (Lab)	E-10139	T	0.1	SU					SM4500H-B
	E-10139	T	0.1	SU					EPA 150.1
Sand	Sand	T			0.1	%			ASTM D422
Secchi Depth	SECCHI	T	0.01	m					Secchi [11]
Silt	Silt	T			0.1	%			ASTM D422
Solids	SOLIDS	T			0.1	%	0.1	%	SM2540G
Solids, Suspended Total, (TSS)	E-10151	T	4	mg/L					EPA 160.2
	E-10151	T	4	mg/L					SM2540D
Solids, Total (TS)	E-10151	T	1	mg/L	1	%			EPA 160.3
	E-10151	T	1	mg/L					SM2540B
Solids, Total Dissolved (TDS)	E-10173	D	10	mg/L					EPA 160.1
	E-10173	D	10	mg/L					SM2540C
Solids, Total Volatile (TVS)	E-11927	T	10	mg/L	1	%			EPA 160.4
	E-11927	T	10	mg/L					SM2540E
Solids, Volatile Suspended	VSSOLIDS	T	10	mg/L					EPA 160.4
	VSSOLIDS	T	10	mg/L					SM2540E
Specific Conductance (Field)	E-10184	T	1	umho/cm					SM2510B
Specific Conductance (Lab)	E-10184	T	1	umho/cm					EPA 120.1
	E-10184	T	1	umho/cm					SM2510A
Specific Gravity	SPECGRAVITY	T			0.1	g/cm3			ASTM D422
	SPECGRAVITY	T			0.1	g/cm3			SM2710F
	SPECGRAVITY	T			0.1	g/cm3			USGS '77
Sulfate	14808-79-8	D	0.05	mg/L					EPA 300.0
	14808-79-8	T	0.5	mg/L					EPA 375.2
	14808-79-8	T	0.5	mg/L					EPA 375.4
	14808-79-8	T	0.5	mg/L					SM4500-SO4F
	14808-79-8	T			32	mg/Kg dw			SW846 9036
	14808-79-8	T			5	mg/Kg dw			SW846 9038
Sulfide	18496-25-8	T	1	mg/L	1.3	mg/Kg dw			EPA 376.2
	18496-25-8	T	1	mg/L	25	mg/Kg dw			SW846 9030
	18496-25-8	T			0.2	mg/Kg dw			SW846 9034
Sulfide, Acid Volatile	E-AVS	S			19	mg/Kg dw			U.S. EPA91
Surfactants	E-14562	T	0.25	mg/L					EPA 425.1
	E-14562	T	0.25	mg/L					SM5540C

16 EnChem Lab (now Pace Labs – WI) In house standard procedure.

17 ISDH methods for fish tissue analysis are based on “Trace Metal Methods for Fish,” Patricia McMurray, Ed. Indiana State Board of Health, Rev 9/90.

18 pH measured to the value ± 0.10 SU.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
General Chemistry and Physical Properties									
Surfactants, Anionic (MBAS)	E-14562	T	30	µg/L					SM5540-C
Surfactants, Nonionic (CTAS)	E-14562	T	100	µg/L					SM5540-D
Temperature (Thermister) [19]	E-TEMPERATUR	T	0.1	°C					SM2550B(2)
Temperature (Thermometer)	E-TEMPERATUR	T	0.1	°C					SM2550B(1)
TPH - IR	68334-30-5	T	1	mg/L					EPA 418.1
Turbidity (Field) [20]	E-10617	T	0.02	NTU					SM2130B Mod
Turbidity (Hach)	E-10617	T	0.05	NTU					EPA 180.1
Turbidity (Lab)	E-10617	T	0.05	NTU					EPA 180.1
	E-10617	T	0.02	NTU					SM2130B
Metals[21]									
Aluminum (Dissolved)	7429-90-5	D	0.3	µg/L					EPA 1638
	7429-90-5	D	20	µg/L					EPA 200.7
	7429-90-5	D	4	µg/L					EPA 200.8
Aluminum (Total)	7429-90-5	T	0.3	µg/L					EPA 1638
	7429-90-5	T	20	µg/L	5	mg/Kg dw	5	mg/Kg ww	EPA 200.7
	7429-90-5	T	10	µg/L	1.5	mg/Kg dw			EPA 200.8
	7429-90-5	T			3	mg/Kg dw	5000	µg/Kg ww	SW846 6010
	7429-90-5	T			1.5	mg/Kg dw	5000	µg/Kg ww	SW846 6020
Antimony (Dissolved)	7440-36-0	D	0.02	µg/L					EPA 1638
	7440-36-0	D	1	µg/L					EPA 200.8
Antimony (Total)	7440-36-0	T	0.02	µg/L					EPA 1638
	7440-36-0	T	15	µg/L	5	mg/Kg dw	2	mg/Kg ww	EPA 200.7
	7440-36-0	T	1	µg/L	1	mg/Kg dw			EPA 200.8
	7440-36-0	T	9.5	µg/L					EPA 204.2
	7440-36-0	T			2	mg/Kg dw	2000	µg/Kg ww	SW846 6010
	7440-36-0	T			1	mg/Kg dw	2000	µg/Kg ww	SW846 6020
	7440-36-0	T			1	mg/Kg dw			SW846 7041
Antimony (SEM) [22]	7440-36-0	S			0.5	mg/Kg dw			EPA 200.7
	7440-36-0	S			0.5	mg/Kg dw			EPA 200.8
	7440-36-0	S			0.5	mg/Kg dw			EPA 204.2
Arsenic	7440-38-2	D	0.4	µg/L					EPA 1638
	7440-38-2	D	10	µg/L					EPA 200.7
	7440-38-2	D	2	µg/L					EPA 200.8
	7440-38-2	D	180	µg/L					EPA 200.9
	7440-38-2	S			2	mg/Kg dw			SW846 6020
	7440-38-2	T	0.4	µg/L					EPA 1638
	7440-38-2	T	2	µg/L	2	mg/Kg dw			EPA 200.8
	7440-38-2	T	2.5	µg/L					EPA 200.9
	7440-38-2	T	3.2	µg/L			1	mg/Kg ww	EPA 206.2
	7440-38-2	T	2	µg/L					EPA 206.3
	7440-38-2	T			2	mg/Kg dw	1000	µg/Kg ww	SW846 6010
	7440-38-2	T			2	mg/Kg dw	1000	µg/Kg ww	SW846 6020
	7440-38-2	T			1	mg/Kg dw			SW846 7060A

19 Hydrolab or YSI Datasonde Parameter.

20 Hydrolab or YSI Datasonde Parameter.

21 "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA-600 4-79-020. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986.

22 SEM parameters (Simultaneously Extractable Metals) based on draft EPA document "Draft Analytical Method for Determination of Acid Volatile Sulfide in Sediment," H.E. Allen and G. Fu, University of Delaware, December 1991.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Metals									
Barium	7440-39-3	D	2.5	µg/L					EPA 1638
	7440-39-3	D	2	µg/L					EPA 200.8
	7440-39-3	D	2	µg/L					EPA 200.7
	7440-39-3	T	2.5	µg/L					EPA 1638
	7440-39-3	T	2	µg/L	5	mg/Kg dw	5	mg/Kg ww	EPA 200.7
	7440-39-3	T	2	µg/L	1.5	mg/Kg dw			EPA 200.8
	7440-39-3	T	100	µg/L					EPA 208.1
	7440-39-3	T			0.2	mg/Kg dw	5000	µg/Kg ww	SW846 6010
	7440-39-3	T			1.5	mg/Kg dw	5000	µg/Kg ww	SW846 6020
Beryllium	7440-41-7	D	0.04	µg/L					EPA 1638
	7440-41-7	T	0.04	µg/L					EPA 1638
	7440-41-7	T	1	µg/L	1.5	mg/Kg dw	0.5	mg/Kg ww	EPA 200.7
	7440-41-7	T	1	µg/L	0.5	mg/Kg dw			EPA 200.8
	7440-41-7	T			0.1	mg/Kg dw	500	µg/Kg ww	SW846 6010
	7440-41-7	T			0.5	mg/Kg dw	500	µg/Kg ww	SW846 6020
Boron	7440-42-8	T	20	µg/L	5	mg/Kg dw			EPA 200.7
	7440-42-8	T	5	µg/L					EPA 200.8
Cadmium	7440-43-9	D	0.1	µg/L					EPA 1638
	7440-43-9	T	0.1	µg/L					EPA 1638
	7440-43-9	D	2	µg/L					EPA 200.7
	7440-43-9	S			0.5	mg/Kg dw			EPA 200.7
	7440-43-9	T	15	µg/L	1	mg/Kg dw	0.01	mg/Kg ww	EPA 200.7
	7440-43-9	D	1	µg/L					EPA 200.8
	7440-43-9	S			0.5	mg/Kg dw			EPA 200.8
	7440-43-9	T	1	µg/L	1	mg/Kg dw			EPA 200.8
	7440-43-9	S			0.01	mg/Kg dw			EPA 213.2
	7440-43-9	T	0.32	µg/L					EPA 213.2
	7440-43-9	S			0.5	mg/Kg dw			SW846 6010
	7440-43-9	T	15	µg/L	0.2	mg/Kg dw	10	µg/Kg ww	SW846 6010
	7440-43-9	S			0.5	mg/Kg dw			SW846 6020
	7440-43-9	T			1	mg/Kg dw	10	µg/Kg ww	SW846 6020
	7440-43-9	T	15	µg/L	1	mg/Kg dw	0.01	mg/Kg ww	SW846 7131A
Calcium	7440-70-2	T	20	µg/L	5	mg/Kg dw	500	mg/Kg ww	EPA 200.7
	7440-70-2	T	40	µg/L					EPA 200.8
	7440-70-2	D	20	µg/L					SM3120B
	7440-70-2	T	2000	µg/L					SM3500Ca-D
	7440-70-2	T			2	mg/Kg dw	50000	µg/Kg ww	SW846 6010
	7440-70-2	T			5	mg/Kg dw	50000	µg/Kg ww	SW846 6020
Calcium (as $CaCO_3$)	471-34-1	T	1	mg/L					EPA 215.2
	471-34-1	T	2	mg/L					SM3500Ca-D
Chromium	7440-47-3	D	1.5	µg/L					EPA 1638
	7440-47-3	T	1.5	µg/L					EPA 1638
	7440-47-3	D	10	µg/L					EPA 200.7
	7440-47-3	S			0.5	mg/Kg dw			EPA 200.7
	7440-47-3	T	10	µg/L	5	mg/Kg dw	0.1	mg/Kg ww	EPA 200.7
	7440-47-3	D	3	µg/L					EPA 200.8
	7440-47-3	S			0.5	mg/Kg dw			EPA 200.8
	7440-47-3	T	3	µg/L	1.5	mg/Kg dw			EPA 200.8
	7440-47-3	S			0.1	mg/Kg dw			EPA 218.2
	7440-47-3	T	3	µg/L					EPA 218.2
	7440-47-3	T	10	µg/L					SM3500Cr-D
	7440-47-3	T			0.8	mg/Kg dw	100	µg/Kg ww	SW846 6010
	7440-47-3	T			1.5	mg/Kg dw	100	µg/Kg ww	SW846 6020
	7440-47-3	T	20	µg/L	5	mg/Kg dw	0.1	mg/Kg ww	SW846 7191

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Metals									
Chromium, Hexavalent	18540-29-9	D	0.5	µg/L					EPA 1636
	18540-29-9	T	10	µg/L	10	mg/Kg dw			EPA 218.4
	18540-29-9	T	1	µg/L					EPA 218.6
	18540-29-9	T	0.01	mg/L					SM3500Cr-D
Chromium, Trivalent	16065-83-1	D	3	µg/L					EPA 200.8
	16065-83-1	T	3	µg/L					EPA 200.8
Cobalt	7440-48-4	T	10	µg/L	70	mg/Kg dw	5	mg/Kg ww	EPA 200.7
	7440-48-4	T	0.5	µg/L	0.2	mg/Kg dw			EPA 200.8
	7440-48-4	T			0.4	mg/Kg dw	5000	µg/Kg ww	SW846 6010
	7440-48-4	T			0.2	mg/Kg dw	5000	µg/Kg ww	SW846 6020
	7440-48-4	T	20	µg/L	70	mg/Kg dw	5	mg/Kg ww	SW846 7421
Copper	7440-50-8	D	0.2	µg/L					EPA 1638
	7440-50-8	T	0.2	µg/L					EPA 1638
	7440-50-8	D	10	µg/L	2	mg/Kg dw	0.1	mg/Kg ww	EPA 200.7
	7440-50-8	S			0.5	mg/Kg dw			EPA 200.7
	7440-50-8	T	10	µg/L	2	mg/Kg dw	0.1	mg/Kg ww	EPA 200.7
	7440-50-8	D	2	µg/L					EPA 200.8
	7440-50-8	S			0.5	mg/Kg dw			EPA 200.8
	7440-50-8	T	2	µg/L	1	mg/Kg dw			EPA 200.8
	7440-50-8	D	2	µg/L					EPA 200.9
	7440-50-8	T	2	µg/L					EPA 200.9
	7440-50-8	S			0.1	mg/Kg dw			EPA 220.2
	7440-50-8	T	3.2	µg/L					EPA 220.2
	7440-50-8	S			0.5	mg/Kg dw			SW846 6010
	7440-50-8	T			0.5	mg/Kg dw	100	µg/Kg ww	SW846 6010
	7440-50-8	S			0.5	mg/Kg dw			SW846 6020
	7440-50-8	T			1	mg/Kg dw	100	µg/Kg ww	SW846 6020
	7440-50-8	D	20	µg/L	2	mg/Kg dw	0.1	mg/Kg ww	SW846 7211
	7440-50-8	T	20	µg/L	2	mg/Kg dw	0.1	mg/Kg ww	SW846 7211
Iron	7439-89-6	D	0.01	µg/L					EPA 1638
	7439-89-6	T	0.01	µg/L					EPA 1638
	7439-89-6	D	20	µg/L	1	mg/Kg dw	5	mg/Kg ww	EPA 200.7
	7439-89-6	T	20	µg/L	1	mg/Kg dw	5	mg/Kg ww	EPA 200.7
	7439-89-6	T	0.01	µg/L					EPA 200.8
	7439-89-6	T	120	µg/L					EPA 236.1
	7439-89-6	D	0.01	µg/L					SM3120B
	7439-89-6	T	0.01	µg/L					SM3120B
	7439-89-6	T	100	µg/L					SM3500Fe-B
	7439-89-6	T			6	mg/Kg dw	5000	µg/Kg ww	SW846 6010
	7439-89-6	T			5	mg/Kg dw	5000	µg/Kg ww	SW846 6020
Lead	7439-92-1	D	0.05	µg/L					EPA 1638
	7439-92-1	T	0.05	µg/L					EPA 1638
	7439-92-1	S			0.5	mg/Kg dw			EPA 200.7
	7439-92-1	T	10	µg/L	15	mg/Kg dw			EPA 200.7
	7439-92-1	D	2	µg/L	0.05	mg/Kg dw	0.07	mg/Kg ww	EPA 200.8
	7439-92-1	S			0.5	mg/Kg dw			EPA 200.8
	7439-92-1	T	2	µg/L	1	mg/Kg dw	0.07	mg/Kg ww	EPA 200.8
	7439-92-1	D	2.2	µg/L					EPA 200.9
	7439-92-1	T	2.2	µg/L					EPA 200.9
	7439-92-1	D			5	mg/Kg dw	0.07	mg/Kg ww	EPA 239.2
	7439-92-1	S			0.1	mg/Kg dw			EPA 239.2
	7439-92-1	T	3.2	µg/L	5	mg/Kg dw	0.07	mg/Kg ww	EPA 239.2
	7439-92-1	S			0.5	mg/Kg dw			SW846 6010
	7439-92-1	T			2	mg/Kg dw	70	µg/Kg ww	SW846 6010
	7439-92-1	S			0.5	mg/Kg dw			SW846 6020
	7439-92-1	T			1	mg/Kg dw	70	µg/Kg ww	SW846 6020

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Metals									
Lithium	7439-93-2	T	5	µg/L					EPA 200.7
Magnesium	7439-95-4	T	95	µg/L	30	mg/Kg dw	500	mg/Kg ww	EPA 200.7
	7439-95-4	T	200	µg/L					EPA 200.8
	7439-95-4	T			3	mg/Kg dw	50000	µg/Kg ww	SW846 6010
	7439-95-4	T			3	mg/Kg dw	50000	µg/Kg ww	SW846 6020
Magnesium Carbonate	13717-00-5	T	0.4	mg/L					SM3500-MgE
	13717-00-5	T	700	µg/L					SW846 6010
Manganese	7439-96-5	D	0.03	µg/L					EPA 1638
	7439-96-5	T	0.03	µg/L					EPA 1638
	7439-96-5	D	2	µg/L	2	mg/Kg dw	105	mg/Kg ww	EPA 200.7
	7439-96-5	T	2	µg/L	2	mg/Kg dw	105	mg/Kg ww	EPA 200.7
	7439-96-5	D	0.5	µg/L	0.2	mg/Kg dw			EPA 200.8
	7439-96-5	T	0.5	µg/L	0.2	mg/Kg dw			EPA 200.8
	7439-96-5	D	40	µg/L					SM3120B
	7439-96-5	T	0.05	mg/L					SM3500-MnB
	7439-96-5	T			0.2	mg/Kg dw	1500	µg/Kg ww	SW846 6010
	7439-96-5	T			0.2	mg/Kg dw	1500	µg/Kg ww	SW846 6020
Mercury	7439-97-6	D	0.2	ng/L					EPA 1631
	7439-97-6	T	0.2	ng/L				ng/Kg ww	EPA 1631
	7439-97-6	S			0.05	mg/Kg dw			EPA 200.7
	7439-97-6	S			0.05	mg/Kg dw			EPA 245.1
	7439-97-6	T	0.2	µg/L	0.2	mg/Kg dw	0.05	mg/Kg ww	EPA 245.1
	7439-97-6	T	0.2	µg/L	0.2	mg/Kg dw	0.05	mg/Kg ww	EPA 245.2
	7439-97-6	T	0.2	µg/L	0.2	mg/Kg dw	0.05	mg/Kg ww	EPA 245.5
	7439-97-6	T	0.2	µg/L					SM3112B
	7439-97-6	S			0.05	mg/Kg dw			SW846 6010
	7439-97-6	T					50	µg/Kg ww	SW846 6010
	7439-97-6	T			1	mg/Kg dw	50	µg/Kg ww	SW846 6020
	7439-97-6	S			0.2	mg/Kg dw			SW846 7470A
	7439-97-6	S			0.2	mg/Kg dw			SW846 7471A
	7439-97-6	T			0.2	mg/Kg dw	0.05	µg/Kg ww	SW846 7471A
Methyl Mercury	22967-92-6	T					50	µg/Kg ww	AOAC 988.11
	22967-92-6	D	0.3	ng/L					EPA 1630 (Draft)
	22967-92-6	T	0.3	ng/L					EPA 1630 (Draft)
Molybdenum	7439-98-7	T	10	µg/L	8	mg/Kg dw			EPA 200.7
	7439-98-7	T	1	µg/L	0.5	mg/Kg dw			EPA 200.8
	7439-98-7	T			8	mg/Kg dw			SW846 6010
Nickel	7440-02-0	D	1	µg/L					EPA 1638
	7440-02-0	T	1	µg/L					EPA 1638
	7440-02-0	D	5	µg/L					EPA 200.7
	7440-02-0	S			0.5	mg/Kg dw			EPA 200.7
	7440-02-0	T	5	µg/L	15	mg/Kg dw	1	mg/Kg ww	EPA 200.7
	7440-02-0	D	1	µg/L					EPA 200.8
	7440-02-0	S			0.5	mg/Kg dw			EPA 200.8
	7440-02-0	T	1.5	µg/L	1	mg/Kg dw			EPA 200.8
	7440-02-0	T	5	µg/L	0.25	mg/Kg dw			EPA 200.9
	7440-02-0	T	5	µg/L	0.25	mg/Kg dw			EPA 249.1
	7440-02-0	S			0.1	mg/Kg dw			EPA 249.2
	7440-02-0	T	3.2	µg/L	0.25	mg/Kg dw			EPA 249.2
	7440-02-0	S			0.5	mg/Kg dw			SW846 6010
	7440-02-0	T	250	µg/L	15	mg/Kg dw	1	mg/Kg ww	SW846 6010
	7440-02-0	S			0.5	mg/Kg dw			SW846 6020
	7440-02-0	T			1	mg/Kg dw	1000	µg/Kg ww	SW846 6020

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Metals									
Nickel	7440-02-0	T	5	µg/L	0.25	mg/Kg dw			SW846 7521
Potassium	7440-09-7	T	100	µg/L	100	mg/Kg dw	500	mg/Kg ww	EPA 200.7
	7440-09-7	T	30	µg/L					SM3111B
	7440-09-7	T	3.1	mg/L					SM3500-KD
	7440-09-7	T	200	µg/L	60	mg/Kg dw	50000	µg/Kg ww	SW846 6010
	7440-09-7	T			60	mg/Kg dw	50000	µg/Kg ww	SW846 6020
Selenium	7782-49-2	D	1	µg/L					EPA 1638
	7782-49-2	T	1	µg/L					EPA 1638
	7782-49-2	D	4	µg/L					EPA 200.8
	7782-49-2	T	4	µg/L	1	mg/Kg dw			EPA 200.8
	7782-49-2	D	2	µg/L					EPA 200.9
	7782-49-2	T	2	µg/L					EPA 200.9
	7782-49-2	T	6.4	µg/L					EPA 270.2
	7782-49-2	T			5	mg/Kg dw	100	µg/Kg ww	SW846 6010
	7782-49-2	S			1	mg/Kg dw			SW846 6020
	7782-49-2	T			1	mg/Kg dw	110	µg/Kg ww	SW846 6020
	7782-49-2	T			1	mg/Kg dw			SW846 7740
SEM	SEM	S			1	mg/Kg dw			SW846 6010
	SEM	S			1	µg/Kg dw			SW846 6020
SEM/AVS	SEM/AVS	S			0.01	Ratio			SW846 6010
	SEM/AVS	S			0.01	Ratio			U.S. EPA91
Silica (Reactive)	7631-86-9	D	10	µg/L					EPA 200.7
	7631-86-9	T	30	µg/L					EPA 200.7
	7631-86-9	D	6	mg/L					EPA 370.1
	7631-86-9	T	6	mg/L					SM4500-SiD
Silicon	7440-21-3	D	30	µg/L					EPA 200.7
	7440-21-3	T	30	µg/L					EPA 200.7
Silver	7440-22-4	D	0.1	µg/L					EPA 1638
	7440-22-4	T	0.1	µg/L					EPA 1638
	7440-22-4	T	7	µg/L	5	mg/Kg dw	0.5	mg/Kg ww	EPA 200.7
	7440-22-4	D	0.3	µg/L					EPA 200.8
	7440-22-4	T	0.3	µg/L	0.2	mg/Kg dw			EPA 200.8
	7440-22-4	T	10	µg/L					SM3110B
	7440-22-4	T			0.3	mg/Kg dw	500	µg/Kg ww	SW846 6010
	7440-22-4	T			0.2	mg/Kg dw	500	µg/Kg ww	SW846 6020
	7440-22-4	T			10	mg/Kg dw			SW846 7761
Sodium	7440-23-5	T	100	µg/L	10	mg/Kg dw	500	mg/Kg ww	EPA 200.7
	7440-23-5	D	30	µg/L					SM3120B
	7440-23-5	T	310	µg/L					SM3500-NaD
	7440-23-5	T	100	µg/L	6	mg/Kg dw	50000	µg/Kg ww	SW846 6010
	7440-23-5	T			6	mg/Kg dw	10000	µg/Kg ww	SW846 6020
Strontium	7440-24-6	T	2	µg/L					EPA 200.7
	7440-24-6	T	1	µg/L					EPA 200.8
Thallium	7440-28-0	D	0.02	µg/L					EPA 1638
	7440-28-0	T	0.02	µg/L					EPA 1638
	7440-28-0	T	10	µg/L	40	mg/Kg dw	1	mg/Kg ww	EPA 200.7
	7440-28-0	T	1	µg/L	0.5	mg/Kg dw			EPA 200.8
	7440-28-0	T	2.5	µg/L					EPA 200.9
	7440-28-0	T	0.5	µg/L					EPA 279.2
	7440-28-0	T			0.2	mg/Kg dw	1000	µg/Kg ww	SW846 6010
	7440-28-0	T			0.5	mg/Kg dw	1000	µg/Kg ww	SW846 6020
	7440-28-0	T			40	mg/Kg dw			SW846 7841

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Metals									
Tin	7440-31-5	T	80	µg/L					EPA 200.7
Tin (as Tributyl Tin)	688-73-3	T			10	µg/Kg dw	10	µg/Kg ww	Battelle[23]
Titanium	7440-32-6	T	32	µg/L	100	mg/Kg dw			EPA 283.2
Vanadium	7440-62-2	T	24	µg/L	5	mg/Kg dw	5	mg/Kg ww	EPA 200.7
	7440-62-2	T	2	µg/L	3.2	mg/Kg dw			EPA 200.8
	7440-62-2	T			1	mg/Kg dw	5000	µg/Kg ww	SW846 6010
	7440-62-2	T			3.2	mg/Kg dw	5000	µg/Kg ww	SW846 6020
Zinc	7440-66-6	D	0.5	µg/L					EPA 1638
	7440-66-6	T	0.5	µg/L					EPA 1638
	7440-66-6	D	6	µg/L	1	mg/Kg dw	2	mg/Kg ww	EPA 200.7
	7440-66-6	S			0.5	mg/Kg dw			EPA 200.7
	7440-66-6	T	6	µg/L	1	mg/Kg dw	2	mg/Kg ww	EPA 200.7
	7440-66-6	D	5	µg/L					EPA 200.8
	7440-66-6	S			0.5	mg/Kg dw			EPA 200.8
	7440-66-6	T	5	µg/L	1	mg/Kg dw			EPA 200.8
	7440-66-6	T	20	µg/L					EPA 289.1
	7440-66-6	S			0.01	mg/Kg dw			EPA 289.2
	7440-66-6	D	10	µg/L	1	mg/Kg dw	2	mg/Kg ww	SW846 6010
	7440-66-6	S			0.5	mg/Kg dw			SW846 6010
	7440-66-6	T	10	µg/L	1	mg/Kg dw	2	mg/Kg ww	SW846 6010
	7440-66-6	S			0.5	mg/Kg dw			SW846 6020
	7440-66-6	T			1	mg/Kg dw	2000	µg/Kg ww	SW846 6020
Nutrients[24]									
Biochemical Oxygen Demand, Ultimate (Total)	E-10106TU	T	2	mg/L					SM5210C
Biochemical Oxygen Demand (Total) 5-day	E-10106T5	T	2	mg/L					EPA 405.1
	E-10106T5	T	2	mg/L					SM5210B
Biochemical Oxygen Demand, Carbonaceous 5-day	E-10106C5	T	2	mg/L					EPA 405.1
	E-10106C5	T	2	mg/L					SM5210B
Biochemical Oxygen Demand, Ultimate (Total)	E-10106TU	T	2	mg/L					SM5210C
Biochemical Oxygen Demand, Ultimate, Carbonaceous	E-10106CU	T	2	mg/L					SM5210C
Chemical Oxygen Demand	E-10117	T	5	mg/L					ASTM D1252-00(B) [25]
	E-10117	T	50	mg/L					EPA 410.1
	E-10117	T	5	mg/L					EPA 410.2
	E-10117	T	3	mg/L					EPA 410.4
	E-10117	T			5	mg/Kg dw			EPA 410.4M
	E-10117	T	5	mg/L					HACH8328
	E-10117	T	50	mg/L					SM5220B
	E-10117	T	3	mg/L					SM5220C

23 Battelle Test Method, Uhler A.D., and G.S. Durell. 1989.

24 "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA-600 4-79-020. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986, updates and amendments. "Standard Methods for the Examination of water and Wastewater," 19th Edition, 1995.

25 ASTM Standards. Vol 11.01, American Standard Test Methods International, updates and amendments.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
	E-10117	T	3	mg/L					SM5220D
Nutrients									
Dissolved Organic Carbon (DOC)	E-DOC	D	1	mg/L					SM5310B
	E-DOC	D	1	mg/L					SM5310C
Nitrogen, Ammonia	7664-41-7	D	0.01	mg/L					EPA 350.1
	7664-41-7	T	0.01	mg/L	11	mg/Kg dw			EPA 350.1
	7664-41-7	T	0.03	mg/L	11	mg/Kg dw			EPA 350.3
	7664-41-7	T	0.01	mg/L	11	mg/Kg dw			SM4500NH3-D
	7664-41-7	T	0.01	mg/L					SM4500NH3-F
	7664-41-7	T	0.01	mg/L	11	mg/Kg dw			SM4500NH3-G
Nitrogen, Nitrate	14797-55-8	D	0.01	mg/L					EPA 300.0
	14797-55-8	T	1	mg/L					EPA 352.1
	14797-55-8	T	0.03	mg/L					EPA 353.2
	14797-55-8	T	0.03	mg/L					SM4500NO3-D
	14797-55-8	T	0.03	mg/L					SM4500NO3-E
	14797-55-8	T	1.5	mg/L					SM4500NO3-F
Nitrogen, Nitrate+Nitrite	E-10128	T	0.01	mg/L					EPA 353.1
	E-10128	D	0.05	mg/L					EPA 353.2
	E-10128	T	0.05	mg/L	0.13	mg/Kg dw			EPA 353.2
Nitrogen, Nitrite	14797-65-0	D	0.01	mg/L					EPA 300.0
	14797-65-0	T	0.03	mg/L					EPA 353.2
	14797-65-0	T	0.01	mg/L					EPA 354.1
	14797-65-0	T	0.03	mg/L					SM4500NO2-B
	14797-65-0	T	1.5	mg/L					SM4500NO3-F
Phosphorus, ortho	14265-44-2	D	0.01	mg/L					EPA 300.0
	14265-44-2	D	0.01	mg/L					EPA 365.1
	14265-44-2	T	0.01	mg/L					EPA 365.2
Phosphorus, Total	7723-14-0	T	0.01	mg/L	3.2	mg/Kg dw			EPA 365.1
	7723-14-0	T	0.01	mg/L	3.2	mg/Kg dw			EPA 365.2
	7723-14-0	T	0.03	mg/L					SM4500P-E
	7723-14-0	D	0.01	mg/L					SM4500P-F
	7723-14-0	T	0	mg/L					SM4500P-F
TKN	E-10264	T	0.03	mg/L					ASTM D3590-02
	E-10264	T	0.1	mg/L	6.3	mg/Kg dw			EPA 351.2
	E-10264	T	0.03	mg/L	6.3	mg/Kg dw			EPA 351.4
	E-10264	T	0.03	mg/L	6.3	mg/Kg dw			SM4500N(Org)-
	E-10264	T	0.03	mg/L					SM4500N(Org)-
TOC	E-10195	T	1	mg/L					EPA 415.1
	E-10195	T	0.05	mg/L					EPA 415.2
	E-10195	T	1	mg/L	0.1	mg/Kg dw			SM5310
	E-10195	T	1	mg/L					SM5310B
	E-10195	T	1	mg/L					SM5310C
	E-10195	T	1	mg/L	0.1	%			SW846 9060
TOC	E-10195	T			0.1	%			Walkey-Black
Total Organic Halogen (TOX)	59473-04-0	T	0.05	mg/L					SW846 9020
	59473-04-0	T	0.05	mg/L					SW846 9022

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Polybrominated Biphenyl Ethers (PBDEs)[26]									
13C12-2,2',3,4,4',6-HexaBDE	HBDE-139L	T					0.01	µg/Kg ww	EPA 1614
13C-2,2',3,3',4,4',5,5',6,6'-DecaBDE	DBDE-209L	T					0.01	µg/Kg ww	EPA 1614
13C-2,2',3,3',4,4',5,5',6'-NoDBDE	BDE-206L	T						µg/Kg ww[27]	EPA 1614
13C-2,2',3,3',5,5',6,6'-OcDBDE	BDE-202L	T						µg/Kg ww	EPA 1614
13C-2,2',3,4,4',5,5'-HpDBDE	BDE-180L	T					0.01	µg/Kg ww	EPA 1614
13C-2,2',3,4,4',5',6-HeptaBDE	HBDE-183L	T					0.01	µg/Kg ww	EPA 1614
13C-2,2',4,4',5,5'-HexaBDE	HBDE-153L	T					0.01	µg/Kg ww	EPA 1614
13C-2,2',4,4',5,6'-HexaBDE	HBDE-154L	T					0.01	µg/Kg ww	EPA 1614
13C-2,2',4,4',5-PentaBDE	PBDE-99L	T					0.01	µg/Kg ww	EPA 1614
13C-2,2',4,4',6-PentaBDE	PBDE-100L	T					0.01	µg/Kg ww	EPA 1614
13C-2,2',4,4'-TetraBDE	TBDE-47L	T					0.01	µg/Kg ww	EPA 1614
13C-2,2',4,5,5'-PeBDE	BDE-101L	T						µg/Kg ww	EPA 1614
13C-2,3',4,4',5-PeBDE	BDE-118L	T						µg/Kg ww	EPA 1614
13C-2,4,4'-TriBDE	TBDE-28L	T					0.02	µg/Kg ww	EPA 1614
13C-2,4'-DiBDE	BDE-8L	T					0.01	µg/Kg ww	EPA 1614
13C-3,3',4,4',5-PentaBDE	PBDE-126L	T					0.01	µg/Kg ww	EPA 1614
13C-3,3',4,4'-TetraBDE	PBDE-77L	T					0.01	µg/Kg ww	EPA 1614
13C-4,4'-DiBDE	DBDE-15L	T					0.01	µg/Kg ww	EPA 1614
13C-4-MonoBDE	MBDE-3L	T					0.02	µg/Kg ww	EPA 1614
2,2',3,3',4,4',5,5',6,6'-DecaBDE	BDE-209	T						µg/Kg ww	EPA 1614
2,2',3,3',4,4',5,5',6-NonaBDE	BDE-206	T						µg/Kg ww	EPA 1614
2,2',3,3',4,4',5,6,6'-NonaBDE	BDE-207	T						µg/Kg ww	EPA 1614
2,2',3,3',4,4'-HexaBDE	BDE-128	T					0.02	µg/Kg ww	EPA 1614
2,2',3,3',4,5,5',6,6'-NonaBDE	BDE-208	T						µg/Kg ww	EPA 1614
2,2',3,4,4',5,5',6-OctaBDE	BDE-203	T					0.02	µg/Kg ww	EPA 1614
2,2',3,4,4',5',6-HeptaBDE	BDE-183	T					0.01	µg/Kg ww	EPA 1614
2,2',3,4,4',5,6-HeptaBDE	BDE-181	T					0.01	µg/Kg ww	EPA 1614
2,2',3,4,4',5'-HexaBDE	BDE-138	T					0.01	µg/Kg ww	EPA 1614
2,2',3,4,4',6'-HexaBDE	BDE-140	T					0.01	µg/Kg ww	EPA 1614
2,2',3,4,4'-PentaBDE	BDE-85	T					0.01	µg/Kg ww	EPA 1614
2,2',4,4',5,5'-HexaBDE	BDE-153	T					0.01	µg/Kg ww	EPA 1614
2,2',4,4',5,6'-HexaBDE	BDE-154	T					0.01	µg/Kg ww	EPA 1614
2,2',4,4',5-PentaBDE	BDE-99	T					0.01	µg/Kg ww	EPA 1614
2,2',4,4',6,6'-HexaBDE	BDE-155	T					0.01	µg/Kg ww	EPA 1614
2,2',4,4',6-PentaBDE	BDE-100	T					0.01	µg/Kg ww	EPA 1614
2,2',4,4'-TetraBDE	BDE-47	T					0.01	µg/Kg ww	EPA 1614
2,2',4,5'-TetraBDE	BDE-49	T					0.01	µg/Kg ww	EPA 1614
2,2',4,6'-TetraBDE	BDE-51	T					0.01	µg/Kg ww	EPA 1614

26 U.S. EPA. 2010b. Method 1614 DRAFT: Brominated Diphenyl Ethers in Water, Soil, Sediment, and Tissue by HRGC/HRMS. U.S. Environmental Protection Agency. Washington, DC.

27 IDEM CRQL is blank for one of the following reasons:
- a. The parameter is not a listed compound for the test method.
- b. The method is acceptable for external data (secondary data) import but not for WAPB data collection.
- c. Compound is detected but not quanified by the test method.
- d. A CRQL does not apply to this parameter.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
PBDEs									
2,2',4-TriBDE	BDE-17	T					0.02	µg/Kg ww	EPA 1614
2,3,3',4,4',5,6-HeptaBDE	BDE-190	T					0.01	µg/Kg ww	EPA 1614
2,3,3',4,4'-PentaBDE	BDE-105	T					0.01	µg/Kg ww	EPA 1614
2,3,4,4',5,6-HexaBDE	BDE-166	T					0.01	µg/Kg ww	EPA 1614
2,3',4,4',5-PentaBDE	BDE-118	T					0.02	µg/Kg ww	EPA 1614
2,3',4,4',6-PentaBDE	BDE-119	T					0.01	µg/Kg ww	EPA 1614
2,3',4,4'-TetraBDE	BDE-66	T					0.01	µg/Kg ww	EPA 1614
2,3,4,5,6-PentaBDE	BDE-116	T					0.02	µg/Kg ww	EPA 1614
2,3',4',6-TetraBDE	BDE-71	T					0.01	µg/Kg ww	EPA 1614
2',3,4-TriBDE	BDE-33	T					0.02	µg/Kg ww	EPA 1614
2,3',4-TriBDE	BDE-25	T					0.02	µg/Kg ww	EPA 1614
2,4,4',6-TetraBDE	BDE-75	T					0.01	µg/Kg ww	EPA 1614
2,4,4'-TriBDE	BDE-28	T					0.02	µg/Kg ww	EPA 1614
2,4',6-TriBDE	BDE-32	T					0.02	µg/Kg ww	EPA 1614
2,4,6-TriBDE	BDE-30	T					0.02	µg/Kg ww	EPA 1614
2,4'-DiBDE	BDE-8	T					0.01	µg/Kg ww	EPA 1614
2,4-DiBDE	BDE-7	T					0.01	µg/Kg ww	EPA 1614
2,6-DiBDE	BDE-10	T					0.02	µg/Kg ww	EPA 1614
2-MonoBDE	BDE-1	T					0.02	µg/Kg ww	EPA 1614
3,3',4,4',5-PentaBDE	BDE-126	T					0.01	µg/Kg ww	EPA 1614
3,3',4,4'-TetraBDE	BDE-77	T					0.01	µg/Kg ww	EPA 1614
3,3',4,5'-TetraBDE	BDE-79	T					0.01	µg/Kg ww	EPA 1614
3,3',4-TriBDE	BDE-35	T					0.02	µg/Kg ww	EPA 1614
3,3'-DiBDE	BDE-11	T					0.01	µg/Kg ww	EPA 1614
3,4,4'-TriBDE	BDE-37	T					0.02	µg/Kg ww	EPA 1614
3,4'-DiBDE	BDE-13	T					0.01	µg/Kg ww	EPA 1614
3,4-DiBDE	BDE-12	T					0.01	µg/Kg ww	EPA 1614
3-MonoBDE	BDE-2	T					0.02	µg/Kg ww	EPA 1614
4,4'-DiBDE	BDE-15	T					0.01	µg/Kg ww	EPA 1614
4-MonoBDE	BDE-3	T					0.02	µg/Kg ww	EPA 1614
BDE 119/120	BDE-119/120	T					0.01	µg/Kg ww	EPA 1614
BDE 12/13	BDE-12/13	T					0.01	µg/Kg ww	EPA 1614
BDE 28/33	BDE-28/33	T					0.02	µg/Kg ww	EPA 1614
BDE 8/11	BDE-8/11	T					0.01	µg/Kg ww	EPA 1614
BDE-138/166	BDE-138/166	T					0.01	µg/Kg ww	EPA 1614
BDE-17/25	BDE-17/25	T						µg/Kg ww	EPA 1614
Polychlorinated Biphenyls (PCBs)[28]									
2,2',3,3',4,4' hexaCB	38380-07-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
	38380-07-3	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	38380-07-3	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',3,3',4,4',5,5',6 nonaCB	40186-72-9	T					10	ng/Kg ww	EPA 1613
	40186-72-9	T			100	ng/Kg dw		µg/Kg ww	EPA 1668A
	40186-72-9	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	40186-72-9	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082

28 "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA-600 4-79-020. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986, and any subsequent updates and amendments.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues Acceptable Test CRQL*	*Units*	*Method(s)[2]*
PCBs									
2,2',3,3',4,4',5,5'-Octachlorobiphenyl	35694-08-7	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,4',5,6 octaCB	52663-78-2	T					10	ng/Kg ww	EPA 1613
	52663-78-2	T			100	ng/Kg dw		µg/Kg ww	EPA 1668A
	52663-78-2	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	52663-78-2	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl	52663-79-3	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',3,3',4,4',5,6'-Octachlorobiphenyl	42740-50-1	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,4',6,6'-Octachlorobiphenyl	33091-17-7	T			100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	52663-77-1	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',3,3',4,5,5',6'-Octachlorobiphenyl	52663-75-9	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,5,5',6-Octachlorobiphenyl	68194-17-2	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,5,5'-Heptachlorobiphenyl	52663-74-8	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',3,3',4,5,6,6'-Octachlorobiphenyl	52663-73-7	T			100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,5',6'-Heptachlorobiphenyl	52663-70-4	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,5',6-Heptachlorobiphenyl	40186-70-7	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',3,3',4,5,6'-Heptachlorobiphenyl	38411-25-5	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,5,6-Heptachlorobiphenyl	68194-16-1	T			100	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',3,3',4,5'-Hexachlorobiphenyl	52663-66-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,5-Hexachlorobiphenyl	55215-18-4	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,6,6'-Heptachlorobiphenyl	52663-65-7	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',3,3',4,6'-Hexachlorobiphenyl	38380-05-1	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4,6-Hexachlorobiphenyl	61798-70-7	T			100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',4-Pentachlorobiphenyl	52663-62-4	T			100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',5,5',6,6'-Octachlorobiphenyl	2136-99-4	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',3,3',5,5',6-Heptachlorobiphenyl	52663-67-9	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',3,3',5,5'-Hexachlorobiphenyl	35694-04-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',5,6,6'-Heptachlorobiphenyl	52663-64-6	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',3,3',5,6'-Hexachlorobiphenyl	52744-13-5	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',5,6-Hexachlorobiphenyl	52704-70-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',5-Pentachlorobiphenyl	60145-20-2	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',6,6'-Hexachlorobiphenyl	38411-22-2	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,3',6-Pentachlorobiphenyl	52663-60-2	T			60	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
PCBs									
2,2',3,3',4,4',5 heptaCB	35065-30-6	T	60	pg/L					EPA 1668
	35065-30-6	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	35065-30-6	T			10	ng/Kg dw			SW846 8080
	35065-30-6	T			10	ng/Kg dw			SW846 8082
2,2',3,3'-Tetrachlorobiphenyl	38444-93-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4,4',5' hexaCB	35065-28-2	T					10	ng/Kg ww	EPA 1613
	35065-28-2	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	35065-28-2	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	35065-28-2	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',3,4,4',5,5' heptaCB	35065-29-3	T	60	pg/L					EPA 1668
	35065-29-3	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	35065-29-3	T			10	ng/Kg dw			SW846 8080
	35065-29-3	T			10	ng/Kg dw			SW846 8082
2,2',3,4,4',5,5',6-Octachlorobiphenyl	52663-76-0	T			55	ng/Kg dw		µg/Kg ww	EPA 1668A
2,2',3,4,4',5',6 heptaCB	52663-69-1	T					10	ng/Kg ww	EPA 1613
	52663-69-1	T			100	ng/Kg dw		µg/Kg ww	EPA 1668A
	52663-69-1	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	52663-69-1	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',3,4,4',5,6,6'-Octachlorobiphenyl	74472-52-9	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4,4',5,6'-Heptachlorobiphenyl	60145-23-5	T			50	ng/Kg dw	0.38	µg/Kg ww	EPA 1668A
2,2',3,4,4',5,6-Heptachlorobiphenyl	74472-47-2	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,2',3,4,4',5-Hexachlorobiphenyl	35694-06-5	T			100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4,4',6,6' heptaCB	74472-48-3	T					10	ng/Kg ww	EPA 1613
	74472-48-3	T			100	ng/Kg dw		µg/Kg ww	EPA 1668A
	74472-48-3	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	74472-48-3	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',3,4,4',6'-Hexachlorobiphenyl	59291-64-4	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4,4',6-Hexachlorobiphenyl	56030-56-9	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4,4'-Pentachlorobiphenyl	65510-45-4	T			20	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4',5 pentaCB	68194-07-0	T			100	ng/Kg dw		µg/Kg ww	EPA 1668A
	68194-07-0	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	68194-07-0	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',3,4,5' pentaCB	38380-02-8	T					10	ng/Kg ww	EPA 1613
	38380-02-8	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	38380-02-8	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	38380-02-8	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',3,4',5,5',6 heptaCB	52663-68-0	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	52663-68-0	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	52663-68-0	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',3,4,5,5',6-Heptachlorobiphenyl	52712-05-7	T			100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4',5,5'-Hexachlorobiphenyl	51908-16-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4,5,5'-Hexachlorobiphenyl	52712-04-6	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4',5,6,6'-Heptachlorobiphenyl	74487-85-7	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
PCBs									
2,2',3,4,5,6,6'-Heptachlorobiphenyl	74472-49-4	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',3,4',5',6-Hexachlorobiphenyl	38380-04-0	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,2',3,4',5,6'-Hexachlorobiphenyl	74472-41-6	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4',5,6-Hexachlorobiphenyl	68194-13-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4,5',6-Hexachlorobiphenyl	68194-14-9	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,2',3,4,5,6'-Hexachlorobiphenyl	68194-15-0	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,2',3,4,5,6-Hexachlorobiphenyl	41411-61-4	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,2',3,4',5'-Pentachlorobiphenyl	41464-51-1	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,2',3,4,5-Pentachlorobiphenyl	55312-69-1	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4',6,6'-Hexachlorobiphenyl	68194-08-1	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4,6,6'-Hexachlorobiphenyl	74472-40-5	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4',6-Pentachlorobiphenyl	68194-05-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4,6'-Pentachlorobiphenyl	73575-57-2	T			75	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4,6-Pentachlorobiphenyl	55215-17-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4'-Tetrachlorobiphenyl	36559-22-5	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,4-Tetrachlorobiphenyl	52663-59-9	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,5' tetraCB	41464-39-5	T					10	ng/Kg ww	EPA 1613
	41464-39-5	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	41464-39-5	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	41464-39-5	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',3,5,5',6 hexaCB	52663-63-5	T					10	ng/Kg ww	EPA 1613
	52663-63-5	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	52663-63-5	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	52663-63-5	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',3,5,5'-Pentachlorobiphenyl	52663-61-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,5,6,6'-Hexachlorobiphenyl	68194-09-2	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,5',6-Pentachlorobiphenyl	38379-99-6	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,2',3,5,6'-Pentachlorobiphenyl	73575-55-0	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,5,6-Pentachlorobiphenyl	73575-56-1	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,5-Tetrachlorobiphenyl	70362-46-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,6,6'-Pentachlorobiphenyl	73575-54-9	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,6'-Tetrachlorobiphenyl	41464-47-5	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3,6-Tetrachlorobiphenyl	70362-45-7	T			20	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',3-Trichlorobiphenyl	38444-78-9	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',4,4',5,5' hexaCB	35065-27-1	T					10	ng/Kg ww	EPA 1613
	35065-27-1	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	35065-27-1	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	35065-27-1	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',4,4',5-Pentachlorobiphenyl	38380-01-7	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',4,4',6,6'-Hexachlorobiphenyl	33979-03-2	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',4,4',6-Pentachlorobiphenyl	39485-83-1	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',4,5' tetraCB	41464-40-8	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	41464-40-8	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	41464-40-8	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',4,5,5' pentaCB	37680-73-2	T			100	ng/Kg dw		µg/Kg ww	EPA 1668A
	37680-73-2	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	37680-73-2	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
PCBs									
2,2',4,5',6-Pentachlorobiphenyl	60145-21-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',4,5,6'-Pentachlorobiphenyl	68194-06-9	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,2',4,5-Tetrachlorobiphenyl	70362-47-9	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,2',4,6,6'-Pentachlorobiphenyl	56558-16-8	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',4,6'-Tetrachlorobiphenyl	68194-04-7	T			20	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',4,6-Tetrachlorobiphenyl	62796-65-0	T			20	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',4-Trichlorobiphenyl	37680-66-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',5 triCB	37680-65-2	T					10	ng/Kg ww	EPA 1613
	37680-65-2	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	37680-65-2	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	37680-65-2	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',5,5' tetraCB	35693-99-3	T					10	ng/Kg ww	EPA 1613
	35693-99-3	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	35693-99-3	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	35693-99-3	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,2',5,6'-Tetrachlorobiphenyl	41464-41-9	T			20	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,2',6,6'-Tetrachlorobiphenyl	15968-05-5	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2',6-Trichlorobiphenyl	38444-73-4	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,2'-Dichlorobiphenyl	13029-08-8	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,3,3',4,4' pentaCB	32598-14-4	T	400	pg/L					EPA 1668
	32598-14-4	T			20	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	32598-14-4	T			10	ng/Kg dw			SW846 8080
	32598-14-4	T			10	ng/Kg dw			SW846 8082
2,3,3',4,4',5 hexaCB	38380-08-4	T	60	pg/L					EPA 1668
	38380-08-4	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	38380-08-4	T			10	ng/Kg dw			SW846 8080
	38380-08-4	T			10	ng/Kg dw			SW846 8082
2,3,3',4,4',5' hexaCB	69782-90-7	T	60	pg/L					EPA 1668
	69782-90-7	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	69782-90-7	T			10	ng/Kg dw			SW846 8080
	69782-90-7	T			10	ng/Kg dw			SW846 8082
2,3,3',4,4',5,5' heptaCB	39635-31-9	T	60	pg/L					EPA 1668
	39635-31-9	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	39635-31-9	T			10	ng/Kg dw			SW846 8080
	39635-31-9	T			10	ng/Kg dw			SW846 8082
2,3,3',4,4',5,5',6-Octachlorobiphenyl	74472-53-0	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,3,3',4,4',5',6-Heptachlorobiphenyl	74472-50-7	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,3,3',4,4',5,6-Heptachlorobiphenyl	41411-64-7	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,3',4,4',6 hexaCB	74472-42-7	T					10	ng/Kg ww	EPA 1613
	74472-42-7	T			20	ng/Kg dw		µg/Kg ww	EPA 1668A
	74472-42-7	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	74472-42-7	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,3,3',4',5,5',6-Heptachlorobiphenyl	69782-91-8	T			100	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,3,3',4,5,5',6-Heptachlorobiphenyl	74472-51-8	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Water Units*	*Sediment CRQL*	*Sediment Units*	*Fish Tissues CRQL*	*Fish Tissues Units*	*Acceptable Test Method(s)[2]*
PCBs									
2,3,3',4',5,5'-Hexachlorobiphenyl	39635-34-2	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',4,5,5'-Hexachlorobiphenyl	39635-35-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',4',5',6-Hexachlorobiphenyl	74472-45-0	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,3',4',5,6-Hexachlorobiphenyl	74472-44-9	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,3',4,5',6-Hexachlorobiphenyl	74472-43-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',4,5,6-Hexachlorobiphenyl	41411-62-5	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,3',4',5'-Pentachlorobiphenyl	76842-07-4	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,3,3',4',5-Pentachlorobiphenyl	70424-68-9	T			100	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,3,3',4,5'-Pentachlorobiphenyl	70362-41-3	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,3',4,5-Pentachlorobiphenyl	70424-69-0	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,3,3',4',6-Pentachlorobiphenyl	38380-03-9	T			100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',4,6-Pentachlorobiphenyl	74472-35-8	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,3',4'-Tetrachlorobiphenyl	41464-43-1	T			125	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',4-Tetrachlorobiphenyl	74338-24-2	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',5,5',6-Hexachlorobiphenyl	74472-46-1	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',5,5'-Pentachlorobiphenyl	39635-32-0	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',5',6-Pentachlorobiphenyl	68194-10-5	T			100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',5,6-Pentachlorobiphenyl	74472-36-9	T			100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',5'-Tetrachlorobiphenyl	41464-49-7	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',5-Tetrachlorobiphenyl	70424-67-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,3',6-Tetrachlorobiphenyl	74472-33-6	T			20	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,3'-Trichlorobiphenyl	38444-84-7	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3',4,4' tetraCB	32598-10-0	T					10	ng/Kg ww	EPA 1613
	32598-10-0	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	32598-10-0	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	32598-10-0	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2',3,4,4',5 pentaCB	65510-44-3	T	40	pg/L					EPA 1668
	65510-44-3	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	65510-44-3	T			10	ng/Kg dw			SW846 8080
	65510-44-3	T			10	ng/Kg dw			SW846 8082
2,3',4,4',5 pentaCB	31508-00-6	T	60	pg/L					EPA 1668
	31508-00-6	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	31508-00-6	T			10	ng/Kg dw			SW846 8080
	31508-00-6	T			10	ng/Kg dw			SW846 8082
2,3',4,4',5,5' hexaCB	52663-72-6	T	60	pg/L					EPA 1668
	52663-72-6	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	52663-72-6	T			10	ng/Kg dw			SW846 8080
	52663-72-6	T			10	ng/Kg dw			SW846 8082
2,3',4,4',5',6 hexaCB	59291-65-5	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	59291-65-5	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	59291-65-5	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,3,4,4',5,6-Hexachlorobiphenyl	41411-63-6	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3',4,4',6 pentaCB	56558-17-9	T					10	ng/Kg ww	EPA 1613
	56558-17-9	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	56558-17-9	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	56558-17-9	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,3,4,4',6-Pentachlorobiphenyl	74472-38-1	T			100	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,4,4'-Tetrachlorobiphenyl	33025-41-1	T			60	ng/Kg dw		µg/Kg ww	EPA 1668A

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues Acceptable Test CRQL*	*Units*	*Method(s)[2]*
PCBs									
2,3',4',5 tetraCB	32598-11-1	T					10	ng/Kg ww	EPA 1613
	32598-11-1	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	32598-11-1	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	32598-11-1	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,3',4',5,5'-Pentachlorobiphenyl	70424-70-3	T			100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3',4,5,5'-Pentachlorobiphenyl	68194-12-7	T			75	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3',4',5',6-Pentachlorobiphenyl	74472-39-2	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3',4,5',6-Pentachlorobiphenyl	56558-18-0	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,4',5,6-Pentachlorobiphenyl	68194-11-6	T			20	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,4,5,6-Pentachlorobiphenyl	18259-05-7	T			20	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3',4',5'-Tetrachlorobiphenyl	70362-48-0	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3',4,5'-Tetrachlorobiphenyl	73575-52-7	T			75	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3',4,5-Tetrachlorobiphenyl	73575-53-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,4',5-Tetrachlorobiphenyl	74472-34-7	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,4,5-Tetrachlorobiphenyl	33284-53-6	T			50	ng/Kg dw	0.15	µg/Kg ww	EPA 1668A
2,3',4',6-Tetrachlorobiphenyl	41464-46-4	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3',4,6-Tetrachlorobiphenyl	60233-24-1	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,4',6-Tetrachlorobiphenyl	52663-58-8	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,4,6-Tetrachlorobiphenyl	54230-22-7	T			20	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3',4'-Trichlorobiphenyl	38444-86-9	T			20	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3',4-Trichlorobiphenyl	55712-37-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,4'-Trichlorobiphenyl	38444-85-8	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,4-Trichlorobiphenyl	55702-46-0	T			20	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3',5,5'-Tetrachlorobiphenyl	41464-42-0	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3',5',6-Tetrachlorobiphenyl	74338-23-1	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,5,6-Tetrachlorobiphenyl	33284-54-7	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3',5'-Trichlorobiphenyl	37680-68-5	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3',5-Trichlorobiphenyl	38444-81-4	T			20	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3,5-Trichlorobiphenyl	55720-44-0	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3',6-Trichlorobiphenyl	38444-76-7	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,3,6-Trichlorobiphenyl	55702-45-9	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3'-Dichlorobiphenyl	25569-80-6	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,3-Dichlorobiphenyl	16605-91-7	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
	16605-91-7	T	0.5	µg/L					EPA 525.2
2,4' diCB	34883-43-7	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	34883-43-7	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	34883-43-7	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,4,4' triCB	7012-37-5	T					10	ng/Kg ww	EPA 1613
	7012-37-5	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	7012-37-5	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	7012-37-5	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,4,4',5 tetraCB	32690-93-0	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	32690-93-0	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	32690-93-0	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
2,4,4',6-Tetrachlorobiphenyl	32598-12-2	T			20	ng/Kg dw		µg/Kg ww	EPA 1668A
2,4',5-Trichlorobiphenyl	16606-02-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
PCBs									
2,4,5-Trichlorobiphenyl	15862-07-4	T			20	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
	15862-07-4	T	0.1	µg/L					EPA 525.2
2,4',6-Trichlorobiphenyl	38444-77-8	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,4,6-Trichlorobiphenyl	35693-92-6	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
2,4-Dichlorobiphenyl	33284-50-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
2,5-Dichlorobiphenyl	34883-39-1	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
2,6-Dichlorobiphenyl	33146-45-1	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
3,3',4,4' tetraCB	32598-13-3	T	5	pg/L					EPA 1668
	32598-13-3	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
	32598-13-3	T			10	ng/Kg dw			SW846 8080
	32598-13-3	T			10	ng/Kg dw			SW846 8082
3,3',4,4',5 pentaCB	57465-28-8	T	40	pg/L					EPA 1668
	57465-28-8	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	57465-28-8	T			10	ng/Kg dw			SW846 8080
	57465-28-8	T			10	ng/Kg dw			SW846 8082
3,3',4,4',5,5' hexaCB	32774-16-6	T	60	pg/L					EPA 1668
	32774-16-6	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	32774-16-6	T			10	ng/Kg dw			SW846 8080
	32774-16-6	T			10	ng/Kg dw			SW846 8082
3,3',4,5,5'-Pentachlorobiphenyl	39635-33-1	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
3,3',4,5'-Tetrachlorobiphenyl	41464-48-6	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
3,3',4,5-Tetrachlorobiphenyl	70362-49-1	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
3,3',4-Trichlorobiphenyl	37680-69-6	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
3,3',5,5'-Tetrachlorobiphenyl	33284-52-5	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
3,3',5-Trichlorobiphenyl	38444-87-0	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
3,3'-Dichlorobiphenyl	2050-67-1	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
3,4,4' triCB	38444-90-5	T					10	ng/Kg ww	EPA 1613
	38444-90-5	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	38444-90-5	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	38444-90-5	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
3,4,4',5 tetraCB	70362-50-4	T					10	ng/Kg ww	EPA 1613
	70362-50-4	T			50	ng/Kg dw		µg/Kg ww	EPA 1668A
	70362-50-4	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8080
	70362-50-4	T			10	ng/Kg dw	10	ng/Kg ww	SW846 8082
3,4',5-Trichlorobiphenyl	38444-88-1	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
3,4,5-Trichlorobiphenyl	53555-66-1	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
3,4'-Dichlorobiphenyl	2974-90-5	T			10	ng/Kg dw		µg/Kg ww	EPA 1668A
3,4-Dichlorobiphenyl	2974-92-7	T			10	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
3,5-Dichlorobiphenyl	34883-41-5	T			50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
3-Chlorobiphenyl	2051-61-8	T			1	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
Aroclor	12767-79-2	T					50	µg/Kg ww	SW846 8080
	12767-79-2	T					50	µg/Kg ww	SW846 8082
Aroclor-1016	12674-11-2	T	0.5	µg/L	50	µg/Kg dw			EPA 1668
	12674-11-2	T	0.25	µg/L					EPA 505
	12674-11-2	T	0.5	µg/L					EPA 608
	12674-11-2	T			80	µg/Kg dw	50	µg/Kg ww	SW846 8080
	12674-11-2	T	0.5	µg/L	80	µg/Kg dw	50	µg/Kg ww	SW846 8082

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
PCBs									
Aroclor-1221	11104-28-2	T	0.5	µg/L	50	µg/Kg dw			EPA 1668
	11104-28-2	T	48	µg/L					EPA 505
	11104-28-2	T	0.5	µg/L					EPA 608
	11104-28-2	T			80	µg/Kg dw	50	µg/Kg ww	SW846 8080
	11104-28-2	T	0.5	µg/L	80	µg/Kg dw	50	µg/Kg ww	SW846 8082
Aroclor-1232	11141-16-5	T	0.5	µg/L	50	µg/Kg dw			EPA 1668
	11141-16-5	T	1.5	µg/L					EPA 505
	11141-16-5	T	0.5	µg/L					EPA 608
	11141-16-5	T			80	µg/Kg dw	50	µg/Kg ww	SW846 8080
	11141-16-5	T	0.5	µg/L	80	µg/Kg dw	50	µg/Kg ww	SW846 8082
Aroclor-1242	53469-21-9	T	0.5	µg/L	50	µg/Kg dw			EPA 1668
	53469-21-9	T	1	µg/L					EPA 505
	53469-21-9	T	0.21	µg/L					EPA 608
	53469-21-9	T			80	µg/Kg dw	50	µg/Kg ww	SW846 8080
	53469-21-9	T	0.5	µg/L	80	µg/Kg dw	50	µg/Kg ww	SW846 8082
Aroclor-1248	12672-29-6	T	0.5	µg/L	50	µg/Kg dw			EPA 1668
	12672-29-6	T	0.4	µg/L					EPA 505
	12672-29-6	T	0.5	µg/L					EPA 608
	12672-29-6	T			80	µg/Kg dw	50	µg/Kg ww	SW846 8080
	12672-29-6	T	0.5	µg/L	80	µg/Kg dw	50	µg/Kg ww	SW846 8082
Aroclor-1254	11097-69-1	T	1	µg/L	50	µg/Kg dw			EPA 1668
	11097-69-1	T	0.4	µg/L					EPA 505
	11097-69-1	T	0.5	µg/L					EPA 608
	11097-69-1	T			160	µg/Kg dw	50	µg/Kg ww	SW846 8080
	11097-69-1	T	1	µg/L	160	µg/Kg dw	50	µg/Kg ww	SW846 8082
Aroclor-1260	11096-82-5	T	1	µg/L	50	µg/Kg dw			EPA 1668
	11096-82-5	T	0.6	µg/L					EPA 505
	11096-82-5	T	0.5	µg/L					EPA 608
	11096-82-5	T			160	µg/Kg dw	50	µg/Kg ww	SW846 8080
	11096-82-5	T	1	µg/L	160	µg/Kg dw	50	µg/Kg ww	SW846 8082
Aroclor-1262	37324-23-5	T	0.5	µg/L					EPA 608
	37324-23-5	T			50	µg/Kg dw	50	µg/Kg ww	SW846 8080
	37324-23-5	T			50	µg/Kg dw			SW846 8082
Aroclor-1264	Aroclor-1264	T			50	µg/Kg dw			EPA 1668
	Aroclor-1264	T			50	µg/Kg dw			SW846 8080
	Aroclor-1264	T			50	µg/Kg dw			SW846 8081
Decachlorobiphenyl (surr.)	2051-24-3	T					1	%Recov	EPA 1613
	2051-24-3	T				ng/Kg dw		µg/Kg ww	EPA 1668A
	2051-24-3	T		µg/L					EPA 608
	2051-24-3	T			1	%Recov	1	%Recov	SW846 8080
	2051-24-3	T	1	%Recov	1	%Recov	1	%Recov	SW846 8081
	2051-24-3	T			1	%Recov	1	%Recov	SW846 8082
Dichlorobiphenyl	2050-68-2	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	25512-42-9	T				ng/Kg dw		µg/Kg ww	EPA 1668A
	2050-68-2	T	1	%Recov					EPA 525.2
Heptachlorobiphenyl	28655-71-2	T				ng/Kg dw		µg/Kg ww	EPA 1668A
Hexachlorobiphenyl	26601-64-9	T				ng/Kg dw		µg/Kg ww	EPA 1668A

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Water Units*	*Sediment CRQL*	*Sediment Units*	*Fish Tissues CRQL*	*Fish Tissues Units*	*Acceptable Test CRQL*	*Acceptable Test Units*	*Method(s)[2]*
PCBs											
Monochlorobiphenyl	27323-18-8	T						ng/Kg dw		µg/Kg ww	EPA 1668A
Nonachlorobiphenyl	53742-07-7	T						ng/Kg dw		µg/Kg ww	EPA 1668A
Octachlorobiphenyl	55722-26-4	T						ng/Kg dw		µg/Kg ww	EPA 1668A
PCB 154	60145-22-4	T					50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
	60145-22-4	T	0.1	µg/L							EPA 525.2
PCB 171	52663-71-5	T					100	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	52663-71-5	T	0.1	µg/L							EPA 525.2
PCB 200	40186-71-8	T					100	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
	40186-71-8	T	0.1	µg/L							EPA 525.2
	40186-71-8	T					10	ng/Kg dw			SW846 8080
	40186-71-8	T					10	ng/Kg dw			SW846 8082
PCB 47	2437-79-8	T					50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
	2437-79-8	T	0.1	µg/L							EPA 525.2
PCB 98	60233-25-2	T					50	ng/Kg dw	0.17	µg/Kg ww	EPA 1668A
	60233-25-2	T	0.1	µg/L							EPA 525.2
PCB-(100/93/102/98)	E52450731 [29]	T					75	ng/Kg dw			EPA 1668A
PCB-(107/124)	E52450749 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(108/119/86/97/125/87)	E52450707 [28]	T					100	ng/Kg dw			EPA 1668A
PCB-(110/115)	E52450756 [28]	T					75	ng/Kg dw			EPA 1668A
PCB-(113/90/101)	E52450723 [28]	T					100	ng/Kg dw			EPA 1668A
PCB-(117/116/85)	E52450699 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(128/166)	E52450764 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(13/12)	E52450566 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(134/143)	E52450780 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(138/163/129)	E52450772 [28]	T					100	ng/Kg dw			EPA 1668A
PCB-(139/140)	E52450806 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(147/149)	E52450814 [28]	T					100	ng/Kg dw			EPA 1668A
PCB-(151/135)	E52450798 [28]	T					75	ng/Kg dw			EPA 1668A
PCB-(153/168)	E52450822 [28]	T					100	ng/Kg dw			EPA 1668A
PCB-(156/157)	E52450830 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(171/173)	E52450848 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(180/193)	E52450855 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(183/185)	E52450863 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(197/200)	E52450871 [28]	T					55	ng/Kg dw			EPA 1668A
PCB-(198/199)	E52450889 [28]	T					75	ng/Kg dw			EPA 1668A
PCB-(21/33)	E52450590 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(26/29)	E52450608 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(28/20)	E52450582 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(30/18)	E52450574 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(41/40/71)	E52450616 [28]	T					75	ng/Kg dw			EPA 1668A
PCB-(44/47/65)	E52450624 [28]	T					75	ng/Kg dw			EPA 1668A
PCB-(45/51)	E52450632 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(50/53)	E52450657 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(59/62/75)	E52450665 [28]	T					50	ng/Kg dw			EPA 1668A
PCB-(61/70/74/76)	E52450673 [28]	T					125	ng/Kg dw			EPA 1668A

29 No CAS Number exists for this parameter. CAS Number is the ID from the EPA Substance Registry.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
PCBs									
PCB-(69/49)	E52450640[28]	T			50	ng/Kg dw			EPA 1668A
PCB-(88/91)	E52450715[28]	T			50	ng/Kg dw			EPA 1668A
PCB-101L	104130-39-4	T				ng/Kg dw	0.1	µg/Kg ww	EPA 1668A
PCB-118L	104130-40-7	T				ng/Kg dw	0.05	µg/Kg ww	EPA 1668A
PCB-180L	PCB-180L	T				ng/Kg dw	0.05	µg/Kg ww	EPA 1668A
PCB-202L	105600-26-8	T				ng/Kg dw	0.1	µg/Kg ww	EPA 1668A
PCB-206L	208263-75-6	T				ng/Kg dw	0.1	µg/Kg ww	EPA 1668A
PCB-209L	105600-27-9	T				ng/Kg dw	0.05	µg/Kg ww	EPA 1668A
PCB-28L	208263-76-7	T				ng/Kg dw	0.05	µg/Kg ww	EPA 1668A
PCB-3	2051-62-9	T			20	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
PCB-3L	208263-77-8	T				ng/Kg dw	0.02	µg/Kg ww	EPA 1668A
PCB-8L	PCB-8L	T				ng/Kg dw	0.05	µg/Kg ww	EPA 1668A
PeCB, 2,3,4,4',5-	74472-37-0	T	600	pg/L					EPA 1668
	74472-37-0	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	74472-37-0	T			10	ng/Kg dw			SW846 8080
	74472-37-0	T			10	ng/Kg dw			SW846 8082
Pentachlorobiphenyl	25429-29-2	T				ng/Kg dw		µg/Kg ww	EPA 1668A
Tetrachlorobiphenyl	26914-33-0	T				ng/Kg dw		µg/Kg ww	EPA 1668A
Total PCBs	1336-36-3	T					50	µg/Kg ww	EPA 1668
	1336-36-3	T					50	µg/Kg ww	ISDH[26]
	1336-36-3	T			50	µg/Kg dw	50	µg/Kg ww	SW846 8080
	1336-36-3	T					50	µg/Kg ww	SW846 8082
Trichlorobiphenyl	25323-68-6	T				ng/Kg dw		µg/Kg ww	EPA 1668A
Pesticides[30]									
1,3-Dimethyl-2-Nitrobenzene (Surrogate)	81-20-9	T	1	%Recov					EPA 525.2
2,4,5-T	93-76-5	T	0.5	µg/L					EHL-L131[31]
2,4-D	94-75-7	T	0.5	µg/L					EHL-L131
2,4-DB	94-82-6	T	0.5	µg/L					EHL-L131
2,4'-DDD	53-19-0	T					10	µg/Kg ww	ISDH[32]
	53-19-0	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8080
	53-19-0	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8081
2,4'-DDE	3424-82-6	T					10	µg/Kg ww	ISDH[31]
	3424-82-6	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8080
	3424-82-6	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8081
2,4'-DDT	789-02-6	T	0.1	µg/L					EPA 608
	789-02-6	T					10	µg/Kg ww	ISDH[31]
	789-02-6	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8080
	789-02-6	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8081

30 "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA-600 4-79-020. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986, and any subsequent updates and amendments.

31 Eurofins Eaton Analytical Inc (formerly EHL and Underwriters Labs) Broad Spectrum Test Method for 89 pesticides using LC/PDA.

32 ISDH methods for fish tissue analysis are based on "Trace Metal Methods for Fish," Patricia McMurray, Ed. Indiana State Board of Health, Rev 9/90.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Pesticides									
2-Chlorobiphenyl	2051-60-7	T			50	ng/Kg dw	0.19	µg/Kg ww	EPA 1668A
	2051-60-7	T	0.5	µg/L					EPA 525.2
3,4-Dichlorophenol	95-77-2	T	0.5	µg/L					EHL-L131
3,5-Dichlorobenzoic Acid	51-36-5	T	0.5	µg/L					EHL-L131
3-Hydroxy Carbofuran	16655-82-6	T	0.5	µg/L					EHL-L131
4,4'-DDD	72-54-8	T	0.1	µg/L					EPA 525.2
	72-54-8	T	0.04	µg/L					EPA 608
	72-54-8	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8080
	72-54-8	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8081
4,4'-DDE	72-55-9	T	0.1	µg/L					EPA 525.2
	72-55-9	T	0.02	µg/L					EPA 608
	72-55-9	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8080
	72-55-9	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8081
4,4'-DDT	50-29-3	T	0.1	µg/L					EPA 525.2
	50-29-3	T	0.04	µg/L					EPA 608
	50-29-3	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8080
	50-29-3	T			2	µg/Kg dw	10	µg/Kg ww	SW846 8081
Acetochlor	34256-82-1	T	0.1	µg/L					EPA 525.2
Acifluorfen	50594-66-6	T	0.5	µg/L					EHL-L131
Alachlor	15972-60-8	T	0.71	µg/L					EPA 505
	15972-60-8	T	0.1	µg/L					EPA 525.2
Aldicarb	116-06-3	T	1	µg/L					EHL-L131
Aldrin	309-00-2	T	0.02	µg/L					EPA 505
	309-00-2	T	0.1	µg/L					EPA 525.2
	309-00-2	T	0.01	µg/L					EPA 608
	309-00-2	T			8	µg/Kg dw	8	µg/Kg ww	SW846 8080
	309-00-2	T			8	µg/Kg dw	8	µg/Kg ww	SW846 8081
Alpha-BHC	319-84-6	T	0.1	µg/L					EPA 525.2
	319-84-6	T	0.01	µg/L					EPA 608
	319-84-6	T			5	µg/Kg dw	8	µg/Kg ww	SW846 8080
	319-84-6	T			5	µg/Kg dw	8	µg/Kg ww	SW846 8081
Ametryn	834-12-8	T	0.1	µg/L					EPA 525.2
AMPA	1066-51-9	T	6	µg/L					EPA 547
Aspon	3244-90-4	T	0.1	µg/L					EPA 525.2
Atraton	1610-17-9	T	0.1	µg/L					EPA 525.2
Atrazine (Aatrex)	1912-24-9	T	8	µg/L					EPA 505
	1912-24-9	T	0.1	µg/L					EPA 525.2
Azinphos-ethyl	2642-71-9	T	0.5	µg/L					EPA 525.2
Azinphos-methyl	86-50-0	T	0.1	µg/L					EPA 525.2
	86-50-0	T	100	µg/L	6600	µg/Kg dw			SW846 8270
Baygon	114-26-1	T	0.5	µg/L					EHL-L131
Bendiocarb	22781-23-3	T	0.5	µg/L					EPA 525.2
Benfluralin	1861-40-1	T	0.1	µg/L					EPA 525.2
Bensulide	741-58-2	T	0.5	µg/L					EHL-L131
Bentazon	25057-89-0	T	0.5	µg/L					EHL-L131
Beta-BHC	319-85-7	T	0.1	µg/L					EPA 525.2
	319-85-7	T	0.06	µg/L					EPA 608
	319-85-7	T			5	µg/Kg dw	8	µg/Kg ww	SW846 8080
	319-85-7	T			5	µg/Kg dw	8	µg/Kg ww	SW846 8081

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Pesticides									
Bolstar	35400-43-2	T	0.1	µg/L					EPA 525.2
Bromacil	314-40-9	T	0.5	µg/L					EHL-L131
	314-40-9	T	0.1	µg/L					EPA 525.2
Butachlor	23184-66-9	T	0.1	µg/L					EPA 525.2
Butylate (Sutan Plus)	2008-41-5	T	0.1	µg/L					EPA 525.2
Carbaryl	63-25-2	T	0.5	µg/L					EHL-L131
	63-25-2	T	10	µg/L	660	µg/Kg dw			SW846 8270
Carbophenothion	786-19-6	T	0.5	µg/L					EPA 525.2
	786-19-6	T	10	µg/L	660	µg/Kg dw			SW846 8270
Carboxin	5234-68-4	T	0.1	µg/L					EPA 525.2
Chloramben	133-90-4	T	1	µg/L					EHL-L131
Chlordane, Alpha-	5103-71-9	T	0.02	µg/L					EPA 505
	5103-71-9	T	0.1	µg/L					EPA 525.2
	5103-71-9	T	0.02	µg/L					EPA 608
	5103-71-9	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8080
	5103-71-9	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8081
Chlordane, Gamma-	5103-74-2	T	0.04	µg/L					EPA 505
	5103-74-2	T	0.1	µg/L					EPA 525.2
	5103-74-2	T	0.04	µg/L					EPA 608
	5103-74-2	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8080
	5103-74-2	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8081
Chlordane, Gamma (trans-Chlordane)	5566-34-7	T			0.01	µg/Kg dw	2.5	µg/Kg ww	SW846 8080
	5566-34-7	T			0.01	µg/Kg dw	2.5	µg/Kg ww	SW846 8081
Chlordane, Total	57-74-9	T	0.44	µg/L					EPA 505
	57-74-9	T	0.14	µg/L					EPA 608
	57-74-9	T			20	mg/Kg dw	20	mg/Kg ww	SW846 8080
	57-74-9	T			20	mg/Kg dw			SW846 8081
Chlorfenvinphos	470-90-6	T	5	µg/L					EPA 525.2
	470-90-6	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Chlorobenzilate	510-15-6	T	0.1	µg/L					EPA 525.2
	510-15-6	T	10	µg/L	660	µg/Kg dw			SW846 8270
Chloroneb	2675-77-6	T	0.1	µg/L					EPA 525.2
Chloropropylate	5836-10-2	T	0.1	µg/L					EPA 525.2
Chlorothalonil (Bravo)	1897-45-6	T	0.1	µg/L					EPA 525.2
Chlorotoluron	15545-48-9	T	0.5	µg/L					EHL-L131
Chlorpropham	101-21-3	T	0.1	µg/L					EPA 525.2
Chlorpyrifos	2921-88-2	T	0.1	µg/L					EPA 525.2
Chlorpyrifos Methyl	5598-13-0	T	0.5	µg/L					EPA 525.2
Clomazone	81777-89-1	T	0.1	µg/L					EPA 525.2
Clopyralid	1702-17-6	T	10	µg/L					EPA 525.2
Coumaphos	56-72-4	T	0.1	µg/L					EPA 525.2
	56-72-4	T	40	µg/L	2640	µg/Kg dw			SW846 8270
Crotoxyphos	7700-17-6	T	0.5	µg/L					EPA 525.2
	7700-17-6	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Cyanazine (Bladex)	21725-46-2	T	0.1	µg/L					EPA 525.2
Cycloate	1134-23-2	T	0.1	µg/L					EPA 525.2
DCPA	1861-32-1	T	0.5	µg/L					EHL-L131
	1861-32-1	T	0.1	µg/L					EPA 525.2

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Pesticides									
Delta-BHC	319-86-8	T	0.1	µg/L					EPA 525.2
	319-86-8	T	0.03	µg/L					EPA 608
	319-86-8	T			5	µg/Kg dw	8	µg/Kg ww	SW846 8080
	319-86-8	T			5	µg/Kg dw	8	µg/Kg ww	SW846 8081
Demeton	8065-48-3	T	0.1	µg/L					EPA 525.2
Demeton-O	298-03-3	T	0.5	µg/L					EPA 525.2
	298-03-3	T	10	µg/L	660	µg/Kg dw			SW846 8270
Desethylatrazine	6190-65-4	T	1	µg/L					EPA 525.2
Desisopropylatrazine	1007-28-9	T	1	µg/L					EPA 525.2
Di(2-ethylhexyl) adipate	103-23-1	T	1	µg/L					EPA 525.2
Diazinon	333-41-5	T	0.1	µg/L					EPA 525.2
Dicamba	1918-00-9	T	1	µg/L					EHL-L131
Dichlobenil	1194-65-6	T	0.1	µg/L					EPA 525.2
Dichlofenthion	97-17-6	T	0.1	µg/L					EPA 525.2
Dichlone	117-80-6	T	0.5	µg/L					EHL-L131
Dichloran	99-30-9	T	0.1	µg/L					EPA 525.2
Dichloroprop	120-36-5	T	0.5	µg/L					EHL-L131
Dichlorvos	62-73-7	T	0.1	µg/L					EPA 525.2
	62-73-7	T	10	µg/L	660	µg/Kg dw			SW846 8270
Dieldrin	60-57-1	T	0.04	µg/L					EPA 505
	60-57-1	T	0.1	µg/L					EPA 525.2
	60-57-1	T	0.01	µg/L					EPA 608
	60-57-1	T			1	µg/Kg dw	10	µg/Kg ww	SW846 8080
	60-57-1	T			1	µg/Kg dw	10	µg/Kg ww	SW846 8081
Dinoseb	88-85-7	T	0.5	µg/L					EHL-L131
	88-85-7	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Dioxathion	78-34-2	T	0.5	µg/L					EPA 525.2
Diphenamid	957-51-7	T	0.1	µg/L					EPA 525.2
Disulfoton Sulfone	2497-06-5	T	0.1	µg/L					EPA 525.2
Disulfoton Sulfoxide	2497-07-6	T	10	µg/L					EPA 525.2
Diuron	330-54-1	T	0.5	µg/L					EHL-L131
Dyfonate	944-22-9	T	0.1	µg/L					EPA 525.2
Endosulfan I	959-98-8	T	0.1	µg/L					EPA 525.2
	959-98-8	T	0.14	µg/L					EPA 608
	959-98-8	T			10	µg/Kg dw	20	µg/Kg ww	SW846 8080
	959-98-8	T			10	µg/Kg dw	20	µg/Kg ww	SW846 8081
Endosulfan II	33213-65-9	T	0.1	µg/L					EPA 525.2
	33213-65-9	T	0.01	µg/L					EPA 608
	33213-65-9	T			10	µg/Kg dw	20	µg/Kg ww	SW846 8080
	33213-65-9	T			10	µg/Kg dw	20	µg/Kg ww	SW846 8081
Endosulfan Sulfate	1031-07-8	T	0.1	µg/L					EPA 525.2
	1031-07-8	T	0.21	µg/L					EPA 608
	1031-07-8	T			10	µg/Kg dw	20	µg/Kg ww	SW846 8080
	1031-07-8	T			10	µg/Kg dw	20	µg/Kg ww	SW846 8081
Endrin	72-20-8	T	0.2	µg/L					EPA 505
	72-20-8	T	0.1	µg/L					EPA 525.2
	72-20-8	T	0.02	µg/L					EPA 608
	72-20-8	T			10	µg/Kg dw	10	µg/Kg ww	SW846 8080
	72-20-8	T			10	µg/Kg dw	10	µg/Kg ww	SW846 8081

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Pesticides									
Endrin Aldehyde	7421-93-4	T	0.1	µg/L					EPA 525.2
	7421-93-4	T	0.07	µg/L					EPA 608
	7421-93-4	T			5	µg/Kg dw	10	µg/Kg ww	SW846 8080
	7421-93-4	T			5	µg/Kg dw	10	µg/Kg ww	SW846 8081
Endrin Ketone	53494-70-5	T	0.2	µg/L					EPA 608
	53494-70-5	T			5	µg/Kg dw	10	µg/Kg ww	SW846 8080
	53494-70-5	T			5	µg/Kg dw	10	µg/Kg ww	SW846 8081
EPTC	759-94-4	T	0.1	µg/L					EPA 525.2
Esfenvalerate	66230-04-4	T	0.5	µg/L					EPA 525.2
Ethalfluralin	55283-68-6	T	0.1	µg/L					EPA 525.2
Ethion	563-12-2	T	5	µg/L					EPA 525.2
	563-12-2	T	10	µg/L	660	µg/Kg dw			SW846 8270
Ethofumesate	26225-79-6	T	2	µg/L					EHL-L131
	26225-79-6	T	2	µg/L					EPA 525.2
Ethoprop	13194-48-4	T	0.1	µg/L					EPA 525.2
Etridiazole	2593-15-9	T	0.1	µg/L					EPA 525.2
Fenamiphos	22224-92-6	T	2	µg/L					EHL-L131
	22224-92-6	T	0.1	µg/L					EPA 525.2
Fenarimol	60168-88-9	T	1	µg/L					EPA 525.2
Fenitrothion	122-14-5	T	0.5	µg/L					EPA 525.2
Fenoxaprop-ethyl	66441-23-4	T	1	µg/L					EPA 525.2
Fenthion	55-38-9	T	0.1	µg/L					EPA 525.2
	55-38-9	T	10	µg/L	660	µg/Kg dw			SW846 8270
Fenuron	101-42-8	T	2	µg/L					EHL-L131
Fluazifop-butyl	69806-50-4	T	0.1	µg/L					EPA 525.2
Fluometuron	2164-17-2	T	0.5	µg/L					EHL-L131
	2164-17-2	T	0.1	µg/L					EPA 525.2
Fluridone	59756-60-4	T	1	µg/L					EPA 525.2
Glyphosate	1071-83-6	T	6	µg/L					EPA 547
Heptachlor	76-44-8	T	0.01	µg/L					EPA 505
	76-44-8	T	0.1	µg/L					EPA 525.2
	76-44-8	T	0.01	µg/L					EPA 608
	76-44-8	T			5	µg/Kg dw	8	µg/Kg ww	SW846 8080
	76-44-8	T			5	µg/Kg dw	8	µg/Kg ww	SW846 8081
Heptachlor Epoxide	1024-57-3	T	0.02	µg/L					EPA 505
	1024-57-3	T	0.1	µg/L					EPA 525.2
	1024-57-3	T	0.03	µg/L					EPA 608
	1024-57-3	T			5	µg/Kg dw	8	µg/Kg ww	SW846 8080
	1024-57-3	T			5	µg/Kg dw	8	µg/Kg ww	SW846 8081
Hexazinone	51235-04-2	T	0.1	µg/L					EPA 525.2
Imazaquin*	81335-37-7	T	2	µg/L					EHL-L131
Imazethapyr*	81335-77-5	T	0.5	µg/L					EHL-L131
Imidacloprid	105827-78-9	T	5	µg/L					EHL-L131
Iprodione	36734-19-7	T	0.5	µg/L					EPA 525.2
Isazophos	42509-80-8	T	0.5	µg/L					EHL-L131
Isofenphos	25311-71-1	T	0.5	µg/L					EHL-L131
	25311-71-1	T	0.5	µg/L					EPA 525.2
Isoproturon	34123-59-6	T	0.5	µg/L					EHL-L131
Isoxaben	82558-50-7	T	0.5	µg/L					EHL-L131

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Pesticides									
Leptophos	21609-90-5	T	0.5	µg/L					EPA 525.2
	21609-90-5	T	10	µg/L	660	µg/Kg dw			SW846 8270
Lindane	58-89-9	T	0.01	µg/L					EPA 505
	58-89-9	T	0.1	µg/L					EPA 525.2
	58-89-9	T	0.01	µg/L					EPA 608
	58-89-9	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8080
	58-89-9	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8081
Linuron	330-55-2	T	0.5	µg/L					EHL-L131
Malathion	121-75-5	T	0.1	µg/L					EPA 525.2
	121-75-5	T	50	µg/L	3300	µg/Kg dw			SW846 8270
MCPA	94-74-6	T	0.5	µg/L					EHL-L131
MCPP	7085-19-0	T	0.5	µg/L					EHL-L131
Mecoprop (Anicon B)	93-65-2	T	0.5	µg/L					EHL-L131
Merphos	150-50-5	T	5	µg/L					EHL-L131
	150-50-5	T	0.1	µg/L					EPA 525.2
Metalaxyl	57837-19-1	T	5	µg/L					EHL-L131
	57837-19-1	T	0.5	µg/L					EPA 525.2
Methiocarb	2032-65-7	T	0.5	µg/L					EHL-L131
Methomyl	16752-77-5	T	2	µg/L					EHL-L131
Methoxychlor	72-43-5	T	3	µg/L					EPA 505
	72-43-5	T	0.1	µg/L					EPA 525.2
	72-43-5	T	0	µg/L					EPA 608
	72-43-5	T			10	µg/Kg dw	20	µg/Kg ww	SW846 8080
	72-43-5	T			10	µg/Kg dw	20	µg/Kg ww	SW846 8081
	72-43-5	T	10	µg/L	660	µg/Kg dw			SW846 8270
Methyl Paraoxon	950-35-6	T	0.5	µg/L					EHL-L131
	950-35-6	T	0.1	µg/L					EPA 525.2
	950-35-6	T	10	µg/L	660	µg/Kg dw			SW846 8270
Metolachlor	51218-45-2	T	0.1	µg/L					EPA 525.2
Metribuzin	21087-64-9	T	0.1	µg/L					EPA 525.2
Metsulfuron-methyl	74223-64-6	T	10	µg/L					EPA 525.2
MGK 264, isomers a & b	113-48-4	T	0.1	µg/L					EPA 525.2
MGK 326	136-45-8	T	0.1	µg/L					EPA 525.2
Molinate	2212-67-1	T	0.1	µg/L					EPA 525.2
Monocrotophos	6923-22-4	T	0.5	µg/L					EPA 525.2
	6923-22-4	T	40	µg/L	2640	µg/Kg dw			SW846 8270
Monuron	150-68-5	T	0.5	µg/L					EHL-L131
Naled	300-76-5	T	0.5	µg/L					EPA 525.2
	300-76-5	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Napropamide	15299-99-7	T	0.1	µg/L					EPA 525.2
Naptalam	132-66-1	T	5	µg/L					EHL-L131
Nonachlor, cis-	5103-73-1	T	0.09	µg/L					EPA 505
	5103-73-1	T	0.1	µg/L					EPA 525.2
	5103-73-1	T					8	µg/Kg ww	ISDH[31]
	5103-73-1	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8080
	5103-73-1	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8081
Norflurazon	27314-13-2	T	1	µg/L					EPA 525.2

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Pesticides									
Oryzalin	19044-88-3	T	0.5	µg/L					EHL-L131
	19044-88-3	T	1	µg/L					EPA 525.2
Oxadiazon	19666-30-9	T	0.1	µg/L					EPA 525.2
Oxamyl	23135-22-0	T	2	µg/L					EHL-L131
Oxychlordane	27304-13-8	T	0.1	µg/L					EPA 525.2
	27304-13-8	T					8	µg/Kg ww	ISDH[31]
	27304-13-8	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8080
	27304-13-8	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8081
Oxyfluorfen	42874-03-3	T	0.5	µg/L					EPA 525.2
Parathion	56-38-2	T	0.5	µg/L					EPA 525.2
	56-38-2	T	10	µg/L	660	µg/Kg dw			SW846 8270
Pebulate	1114-71-2	T	0.1	µg/L					EPA 525.2
Pendimethalin	40487-42-1	T	0.1	µg/L					EPA 525.2
Permethrin, cis	61949-76-6	T	0.1	µg/L					EPA 525.2
Permethrin, trans	51877-74-8	T	0.1	µg/L					EPA 525.2
Picloram	1918-02-1	T	1	µg/L					EHL-L131
Profluralin	26399-36-0	T	0.1	µg/L					EPA 525.2
Prometon	1610-18-0	T	0.1	µg/L					EPA 525.2
Prometryn	7287-19-6	T	0.1	µg/L					EPA 525.2
Propachlor	1918-16-7	T	0.1	µg/L					EPA 525.2
	1918-16-7	T	0.04	µg/L					EPA 608
Propanil	709-98-8	T	0.1	µg/L					EPA 525.2
Propazine	139-40-2	T	0.1	µg/L					EPA 525.2
Propham	122-42-9	T	0.5	µg/L					EHL-L131
Propiconazole isomer a	60207-90-1a	T	5	µg/L					EPA 525.2
Propiconazole isomer b	60207-90-1b	T	5	µg/L					EPA 525.2
Prothiofos	34643-46-4	T	0.5	µg/L					EPA 525.2
Ronnel	299-84-3	T	0.5	µg/L					EHL-L131
Siduron	1982-49-6	T	2	µg/L					EHL-L131
Simazine	122-34-9	T	21.6	µg/L					EPA 505
	122-34-9	T	0.1	µg/L					EPA 525.2
Simetryn	1014-70-6	T	0.1	µg/L					EPA 525.2
Stirofos	22248-79-9	T	0.1	µg/L					EPA 525.2
Sulfometuron Methyl	74222-97-2	T	2	µg/L					EHL-L131
Sulfotep	3689-24-5	T	0.5	µg/L					EPA 525.2
Tebuthiuron	34014-18-1	T	0.5	µg/L					EHL-L131
	34014-18-1	T	10	µg/L					EPA 525.2
Terbacil	5902-51-2	T	0.1	µg/L					EPA 525.2
Terbufos	13071-79-9	T	0.1	µg/L					EPA 525.2
	13071-79-9	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Terbuthylazine	30125-63-4	T	0.5	µg/L					EHL-L131
Terbutryn	886-50-0	T	0.1	µg/L					EPA 525.2
Tetradifon	116-29-0	T	5	µg/L					EHL-L131
Thiabendazole	148-79-8	T	10	µg/L					EPA 525.2
Thifensulfuron Methyl	79277-27-3	T	2	µg/L					EHL-L131
Thiobencarb	28249-77-6	T	0.1	µg/L					EPA 525.2

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Water Units*	*Sediment CRQL*	*Sediment Units*	*Fish Tissues CRQL*	*Fish Tissues Units*	*Acceptable Test Method(s)[2]*
Pesticides									
Thionazin	297-97-2	T	0.5	µg/L					EPA 525.2
	297-97-2	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Thiophanate Methyl	23564-05-8	T	2	µg/L					EHL-L131
Thiram	137-26-8	T	2	µg/L					EHL-L131
Toxaphene	8001-35-2	T	3.18	µg/L					EPA 505
	8001-35-2	T	10	µg/L					EPA 525.2
	8001-35-2	T	0.76	µg/L					EPA 608
	8001-35-2	T			50	µg/Kg dw	10	µg/Kg ww	SW846 8080
	8001-35-2	T			50	µg/Kg dw	10	µg/Kg ww	SW846 8081
trans-Nonachlor	39765-80-5	T	0.03	µg/L					EPA 505
	39765-80-5	T	0.1	µg/L					EPA 525.2
	39765-80-5	T					8	µg/Kg ww	ISDH[31]
	39765-80-5	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8080
	39765-80-5	T			1	µg/Kg dw	8	µg/Kg ww	SW846 8081
Triadimefon	43121-43-3	T	0.1	µg/L					EPA 525.2
Triallate	2303-17-5	T	2	µg/L					EHL-L131
Tribufos	78-48-8	T	0.1	µg/L					EPA 525.2
Trichlopyr	55335-06-3	T	5	µg/L					EHL-L131
Trichlorfon	52-68-6	T	10	µg/L					EPA 525.2
Trichloronate	327-98-0	T	0.5	µg/L					EPA 525.2
Tricyclazole	41814-78-2	T	1	µg/L					EPA 525.2
Triphenyl Phosphate	115-86-6	T	1	%Recov					EPA 525.2
Vernolate	1929-77-7	T	0.1	µg/L					EPA 525.2
Vinclozolin	50471-44-8	T	0.5	µg/L					EPA 525.2
Physical									
Flow		T	0.1	cf/sec					ASTM D5089-95/ D3858-95[33]
		T	0.1	cf/sec					ASTM D5389-95/ D3858-95
		T	0.1	cf/sec					ASTM D3858-95
		T	0.1	cf/sec					USGS Gage (P)[34]
Polynuclear Aromatic Hydrocarbons[35]									
1,2-Dehydro-3-methylcholanthrene	3343-10-0	T				µg/Kg dw			SW846 8270
11H-Benzo[b]fluorene	243-17-4	T				µg/Kg dw			SW846 8270
1H-Indene	95-13-6	T				µg/Kg dw			SW846 8270
1H-Indene, 1-phenyl-	1961-96-2	T				µg/Kg dw			SW846 8270
1-Methylnaphthalene	90-12-0	T	0.1	µg/L					EPA 525.2
	90-12-0	T					100	µg/Kg ww	ISDH[31]
	90-12-0	T		µg/L	200	µg/Kg dw	0.27	µg/Kg ww	SW846 8270
	90-12-0	T			16	µg/Kg dw	100	µg/Kg ww	SW846 8310

33 ASTM Standards. Vol 11.01, American Standard Test Methods International, updates and amendments.

34 Measurement from USGS Gaging Station, https://pubs.usgs.gov/tm/tm3-a7/

35 "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA-600 4-79-020. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986, and any subsequent updates and amendments.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Polynuclear Aromatic Hydrocarbons									
2,3-Dimethylphenanthrene	3674-65-5	T				µg/Kg dw			SW846 8270
2,5-Dimethyl phenanthrene	3674-66-6	T				µg/Kg dw			SW846 8270
2-Chloronaphthalene	91-58-7	T	6	µg/L					EPA 625
	91-58-7	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
2-Fluorobiphenyl (Surrogate)	321-60-8	T		µg/L					EPA 625
	321-60-8	T	1	%Recov	1	%Recov	0.1	%	SW846 8270
	321-60-8	T				%Recov			SW846 8310
2-Methylnaphthalene	91-57-6	T	0.1	µg/L					EPA 525.2
	91-57-6	T	10	µg/L					EPA 625
	91-57-6	T	10	µg/L	660	µg/Kg dw	1.7	µg/Kg ww	SW846 8270
	91-57-6	T			16	µg/Kg dw	100	µg/Kg ww	SW846 8310
4H-	203-64-5	T				µg/Kg dw			SW846 8270
5-Nitroacenaphthene	602-87-9	T	10	µg/L	660	µg/Kg dw			SW846 8270
7,12-Dimethylbenz(a)-	57-97-6	T	10	µg/L	660	µg/Kg dw			SW846 8270
9,10-Dimethylanthracene	781-43-1	T				µg/Kg dw			SW846 8270
9,10-Diphenylanthracene	1499-10-1	T					700	µg/Kg ww	SW846 8270
	1499-10-1	T			16	µg/Kg dw	700	µg/Kg ww	SW846 8310
9-n-Dodecyl[tetradecahydroanthracene]	55401-75-7	T				µg/Kg dw			SW846 8270
Acenaphthene	83-32-9	T	0.1	µg/L					EPA 525.2
	83-32-9	T	10	µg/L					EPA 625
	83-32-9	T	10	µg/L	660	µg/Kg dw	0.37	µg/Kg ww	SW846 8270
	83-32-9	T	18	µg/L	33	µg/Kg dw	50	µg/Kg ww	SW846 8310
Acenaphthene-d10 (IS)	15067-26-2	T	1	%Recov					EPA 525.2
	15067-26-2	T	1	%Recov	1	%Recov	1	%Recov	SW846 8270
Acenaphthylene	208-96-8	T	0.1	µg/L					EPA 525.2
	208-96-8	T	10	µg/L					EPA 625
	208-96-8	T		µg/L	660	µg/Kg dw	0.25	µg/Kg ww	SW846 8270
	208-96-8	T	23	µg/L	67	µg/Kg dw	125	µg/Kg ww	SW846 8310
Anthracene	120-12-7	T	0.1	µg/L					EPA 525.2
	120-12-7	T	10	µg/L					EPA 625
	120-12-7	T	10	µg/L	660	µg/Kg dw	0.27	µg/Kg ww	SW846 8270
	120-12-7	T	6.6	µg/L	3.3	µg/Kg dw	7.5	µg/Kg ww	SW846 8310
Anthracene, 1-methyl-	610-48-0	T				µg/Kg dw			SW846 8270
Anthracene, 2-methyl-	613-12-7	T				µg/Kg dw			SW846 8270
Anthracene, 9,10-dimethyl-	827-54-3	T				µg/Kg dw			SW846 8270
Benzo[a]anthracene	56-55-3	T	0.1	µg/L					EPA 525.2
	56-55-3	T	10	µg/L					EPA 625
	56-55-3	T	10	µg/L	660	µg/Kg dw	0.26	µg/Kg ww	SW846 8270
	56-55-3	T	0.13	µg/L	3.3	µg/Kg dw	5	µg/Kg ww	SW846 8310
Benzo[a]pyrene	50-32-8	T	0.1	µg/L					EPA 525.2
	50-32-8	T	10	µg/L					EPA 625
	50-32-8	T	10	µg/L	660	µg/Kg dw	0.17	µg/Kg ww	SW846 8270
	50-32-8	T	0.23	µg/L	3.3	µg/Kg dw	10	µg/Kg ww	SW846 8310
benzo[a]pyrene-d12	63466-71-7	T					660	µg/Kg dw	SW846 8270
Benzo[b]fluoranthene	205-99-2	T	0.1	µg/L					EPA 525.2
	205-99-2	T	10	µg/L					EPA 625
	205-99-2	T	10	µg/L	660	µg/Kg dw	0.28	µg/Kg ww	SW846 8270
	205-99-2	T	0.18	µg/L	6.7	µg/Kg dw	5	µg/Kg ww	SW846 8310
Benzo[b]naphtho[2,1-	239-35-0	T				µg/Kg dw			SW846 8270
Benzo[b]triphenylene	215-58-7	T				µg/Kg dw			SW846 8270

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Polynuclear Aromatic Hydrocarbons									
Benzo[c]fluorene	205-12-9	T				µg/Kg dw			SW846 8270
Benzo[c]phenanthrene	195-19-7	T				µg/Kg dw			SW846 8270
Benzo[e]pyrene	192-97-2	T				µg/Kg dw			SW846 8270
Benzo[g,h,i]perylene	191-24-2	T	0.1	µg/L					EPA 525.2
	191-24-2	T	10	µg/L					EPA 625
	191-24-2	T	10	µg/L	660	µg/Kg dw	0.3	µg/Kg ww	SW846 8270
	191-24-2	T	0.23	µg/L	6.7	µg/Kg dw	12.5	µg/Kg ww	SW846 8310
Benzo[k]fluoranthene	207-08-9	T	0.1	µg/L					EPA 525.2
	207-08-9	T	10	µg/L					EPA 625
	207-08-9	T	10	µg/L	660	µg/Kg dw	0.23	µg/Kg ww	SW846 8270
	207-08-9	T	0.17	µg/L	3.3	µg/Kg dw	5	µg/Kg ww	SW846 8310
Chrysene	218-01-9	T	0.1	µg/L					EPA 525.2
	218-01-9	T	10	µg/L					EPA 625
	218-01-9	T	10	µg/L	660	µg/Kg dw	0.27	µg/Kg ww	SW846 8270
	218-01-9	T	1.5	µg/L	3.3	µg/Kg dw	5	µg/Kg ww	SW846 8310
Chrysene, 5-methyl-	3697-24-3	T				µg/Kg dw			SW846 8270
Dibenzo[a,e]pyrene	192-65-4	T	10	µg/L	660	µg/Kg dw			SW846 8270
Dibenzo[a,h]anthracene	53-70-3	T	0.1	µg/L					EPA 525.2
	53-70-3	T	10	µg/L					EPA 625
	53-70-3	T	10	µg/L	660	µg/Kg dw	0.43	µg/Kg ww	SW846 8270
	53-70-3	T	0.3	µg/L	6.7	µg/Kg dw	15	µg/Kg ww	SW846 8310
Dibenzo[def,mno]chrysene	191-26-4	T				µg/Kg dw			SW846 8270
Fluoranthene	206-44-0	T	0.1	µg/L					EPA 525.2
	206-44-0	T	10	µg/L					EPA 625
	206-44-0	T	10	µg/L	660	µg/Kg dw	1.7	µg/Kg ww	SW846 8270
	206-44-0	T	2.1	µg/L	5	µg/Kg dw	7.5	µg/Kg ww	SW846 8310
Fluorene	86-73-7	T	0.1	µg/L					EPA 525.2
	86-73-7	T	10	µg/L					EPA 625
	86-73-7	T	10	µg/L	660	µg/Kg dw	1.7	µg/Kg ww	SW846 8270
	86-73-7	T	2.1	µg/L	6.7	µg/Kg dw	10	µg/Kg ww	SW846 8310
Indeno[1,2,3-cd]pyrene	193-39-5	T	0.1	µg/L					EPA 525.2
	193-39-5	T	10	µg/L					EPA 625
	193-39-5	T	10	µg/L	660	µg/Kg dw	0.32	µg/Kg ww	SW846 8270
	193-39-5	T	0.43	µg/L	6.7	µg/Kg dw	7.5	µg/Kg ww	SW846 8310
Methylnaphthalene	1321-94-4	T			50	µg/Kg dw	1.7	µg/Kg ww	SW846 8270
	1321-94-4	T			50	µg/Kg dw	1.7	µg/Kg ww	SW846 8310
Naphthalene	91-20-3	T	0.15	µg/L					EPA 524.2
	91-20-3	T	0.1	µg/L					EPA 525.2
	91-20-3	T	0.5	µg/L					EPA 624
	91-20-3	T	10	µg/L					EPA 625
	91-20-3	T		µg/L	5	µg/Kg dw			SW846 8260
	91-20-3	T	10	µg/L	660	µg/Kg dw	1.7	µg/Kg ww	SW846 8270
	91-20-3	T	18	µg/L	33	µg/Kg dw	100	µg/Kg ww	SW846 8310
Naphthalene, 1,6,7-trimethyl-	2245-38-7	T				µg/Kg dw			SW846 8270
Naphthalene, 1-ethyl-	1127-76-0	T				µg/Kg dw			SW846 8270
Naphthalene, 2-(1-methylethyl)-	2027-17-0	T				µg/Kg dw			SW846 8270
Naphthalene, 2,3-dimethyl-	581-40-8	T				µg/Kg dw			SW846 8270
Naphthalene, 2,6-dimethyl-	581-42-0	T				µg/Kg dw			SW846 8270
Naphthalene, 2-phenyl-	612-94-2	T				µg/Kg dw			SW846 8270

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Water Units*	*Sediment CRQL*	*Sediment Units*	*Fish Tissues CRQL*	*Fish Tissues Units*	*Acceptable Test CRQL*	*Acceptable Test Units*	*Method(s)[2]*
Polynuclear Aromatic Hydrocarbons											
Naphthalene,1,2,3-trimethyl-4-(1E)-1-propen-1-yl-	26137-53-1	T						µg/Kg dw			SW846 8270
Naphthalene,2-methyl-1-propyl-	54774-89-9	T						µg/Kg dw			SW846 8270
Naphtho[1,2-b]furan, 2,3-dihydro-2-(1-methylethenyl)-	77630-44-5	T						µg/Kg dw			SW846 8270
Nitrobenzene-d5 (Surrogate)	4165-60-0	T		µg/L							EPA 625
	4165-60-0	T	1	%Recov			1	%Recov	0.1	%	SW846 8270
Phenanthrene	85-01-8	T	0.1	µg/L							EPA 525.2
	85-01-8	T	10	µg/L							EPA 625
	85-01-8	T	10	µg/L			660	µg/Kg dw	1.7	µg/Kg ww	SW846 8270
	85-01-8	T	6.4	µg/L			3.3	µg/Kg dw	5	µg/Kg ww	SW846 8310
Phenanthrene, 1-methyl-	832-69-9	T						µg/Kg dw			SW846 8270
Phenanthrene, 2,3,5-trimethyl-	3674-73-5	T						µg/Kg dw			SW846 8270
Phenanthrene, 2,7-dimethyl-	1576-69-8	T						µg/Kg dw			SW846 8270
Phenanthrene, 2-methyl-	2531-84-2	T						µg/Kg dw			SW846 8270
Phenanthrene, 3,6-dimethyl-	1576-67-6	T						µg/Kg dw			SW846 8270
Phenanthrene, 4,5-dimethyl-	3674-69-9	T						µg/Kg dw			SW846 8270
Phenanthrene, 4-methyl-	832-64-4	T						µg/Kg dw			SW846 8270
Phenanthrene, 9-methyl-	883-20-5	T						µg/Kg dw			SW846 8270
Phenanthrene-d10 (IS)	1517-22-2	T	1	%Recov							EPA 525.2
	1517-22-2	T	1	%Recov			1	%Recov			SW846 8270
Phenol-d6 (Surrogate)	13127-88-3	T	1	%Recov			1	%Recov	0.1	%	SW846 8270
Phenylnaphthalene	35465-71-5	T						µg/Kg dw			SW846 8270
p-Terphenyl-d14 (Surrogate)	1718-51-0	T	1	%Recov							EPA 525.2
	1718-51-0	T	1	%Recov			1	%Recov	0.1	%	SW846 8270
Pyrene	129-00-0	T	0.1	µg/L							EPA 525.2
	129-00-0	T	10	µg/L							EPA 625
	129-00-0	T	10	µg/L			660	µg/Kg dw	0.22	µg/Kg ww	SW846 8270
	129-00-0	T	2.7	µg/L			3.3	µg/Kg dw	7.5	µg/Kg ww	SW846 8310
Pyrene, 1-methyl-	2381-21-7	T						µg/Kg dw			SW846 8270
Pyrene, 2-methyl-	3442-78-2	T						µg/Kg dw			SW846 8270
Pyrene-d10	1718-52-1	T	1	%Recov							EPA 525.2
Triphenylene	217-59-4	T						µg/Kg dw			SW846 8270
Radionuclides [29]											
Alpha Activity	12587-46-1	T	1	pCi/L							EPA 900.0
Beta Activity	12587-47-2	T	1	pCi/L							EPA 900.0
Semi-Volatile Organics[36]											
(Z)-octadec-9-enoic acid	112-80-1	T		µg/L							EPA 625
	112-80-1	T						mg/Kg dw			SW846 8270
1,1,3,3-Tetramethyl-1,3,5-trisilacyclohexane	27559-34-8	T						µg/Kg dw			SW846 8270
1,1'-Biphenyl, 2-methyl-	643-58-3	T						µg/Kg dw			SW846 8270
1,2-Dinitrobenzene	528-29-0	T	40	µg/L			2640	µg/Kg dw			SW846 8270

36 "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA-600 4-79-020. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986, and any subsequent updates and amendments.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test*	*Method(s)[2]*
Semi-Volatile Organics										
1,2-Octanediol	1117-86-8	T		µg/L		µg/Kg dw				SW846 8270
1,3,5-Trinitrobenzene	99-35-4	T	10	µg/L	660	µg/Kg dw				SW846 8270
1,3-Dichlorobenzene	541-73-1	T	0.15	µg/L						EPA 524.2
	541-73-1	T	1.6	µg/L						EPA 601
	541-73-1	T	10	µg/L						EPA 624
	541-73-1	T	10	µg/L						EPA 625
	541-73-1	T		µg/L	5	µg/Kg dw				SW846 8260
	541-73-1	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
1,3-Dinitrobenzene	99-65-0	T	20	µg/L	1320	µg/Kg dw				SW846 8270
1,4-Dichlorobenzene-d4 (IS)	3855-82-1	T	1	%Recov	1	%Recov				SW846 8270
1,4-Dinitrobenzene	100-25-4	T	40	µg/L	2640	µg/Kg dw				SW846 8270
1,4-Naphthoquinone	130-15-4	T	10	µg/L	660	µg/Kg dw				SW846 8270
1,4-Phenylenediamine	106-50-3	T	10	µg/L	660	µg/Kg dw				SW846 8270
1-Acetyl-2-thiourea	591-08-2	T	1000	µg/L	66000	µg/Kg dw				SW846 8270
1-Cyclopentyl-4-n-	5638-09-5	T				µg/Kg dw				SW846 8270
1-Hexadecene	629-73-2	T		µg/L						EPA 625
	629-73-2	T				µg/Kg dw				SW846 8270
1-methyl-4-prop-1-en-2-yl-cyclohexene	138-86-3	T		µg/L						EPA 625
1-Naphthylamine	134-32-7	T	10	µg/L	660	µg/Kg dw				SW846 8270
1-Nonadecene	18435-45-5	T				µg/Kg dw				SW846 8270
1-Octadecanamine, N,N-	124-28-7	T				µg/Kg dw				SW846 8270
1-Octanamine, N,N-dimethyl-	7378-99-6	T				µg/Kg dw				SW846 8270
1-tetradecene	1120-36-1	T		µg/L						EPA 625
2-(2-butoxyethoxy)ethanol	112-34-5	T		µg/L						EPA 625
2-(2-Butoxyethoxy)ethyl Acetate	124-17-4	T	1	µg/L						EPA 525.2
	124-17-4	T		µg/L						EPA 625
2,3,4,6-Tetrachlorophenol	58-90-2	T	10	µg/L	660	µg/Kg dw				SW846 8270
2,4,4-trimethyl-2-Pentene	107-40-4	T		µg/L		µg/Kg dw				SW846 8270
2,4,5-Trichlorophenol	95-95-4	T	10	µg/L						EPA 625
	95-95-4	T	10	µg/L	660	µg/Kg dw	3200	µg/Kg ww		SW846 8270
2,4,5-Trimethylaniline	137-17-7	T	10	µg/L	660	µg/Kg dw				SW846 8270
2,4,6-Tribromophenol	118-79-6	T	10	µg/L						EPA 625
	118-79-6	T	1	%Recov	1	%Recov	1	%Recov		SW846 8270
2,4-Diaminotoluene	95-80-7	T	20	µg/L	1320	µg/Kg dw				SW846 8270
2,4-Dichlorophenol	120-83-2	T	0.5	µg/L						EHL-L131
	120-83-2	T	8.6	µg/L						EPA 625
	120-83-2	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
2,4-Dimethylphenol	105-67-9	T	0.5	µg/L						EHL-L131
	105-67-9	T	8.6	µg/L						EPA 625
	105-67-9	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
2,4-Dinitrophenol	51-28-5	T	0.5	µg/L						EHL-L131
	51-28-5	T	135	µg/L						EPA 625
	51-28-5	T	50	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
2,4-Dinitrotoluene	121-14-2	T	0.5	µg/L						EPA 525.2
	121-14-2	T	18	µg/L						EPA 625
	121-14-2	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
2,5-Dimethylheptane	2216-30-0	T				µg/Kg dw				SW846 8270
2,5-dione-3-Hexene	4436-75-3	T				µg/Kg dw				SW846 8270

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Semi-Volatile Organics									
2,6-Dichlorophenol	87-65-0	T	10	µg/L	660	µg/Kg dw			SW846 8270
2,6-Dinitrotoluene	606-20-2	T	0.1	µg/L					EPA 525.2
	606-20-2	T	106	µg/L					EPA 625
	606-20-2	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
2,7,8-trimethyl-2-(4,8,12-trimethyltridecyl)chroman-6-ol	7616-22-0	T				mg/Kg dw			SW846 8270
2,8-Dimethyldibenzothiophene	1207-15-4	T				µg/Kg dw			SW846 8270
2-Acetylaminofluorene	53-96-3	T	20	µg/L	1320	µg/Kg dw			SW846 8270
2-Aminoanthraquinone	117-79-3	T	20	µg/L	1320	µg/Kg dw			SW846 8270
2-Butoxy ethanol	111-76-2	T		µg/L					EPA 625
2-Chlorophenol	95-57-8	T	0.5	µg/L					EHL-L131
	95-57-8	T	10	µg/L					EPA 625
	95-57-8	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
2-Cyclohexyl-4,6-dinitro-phenol	131-89-5	T	100	µg/L	6600	µg/Kg dw			SW846 8270
2-Fluorophenol (Surrogate)	367-12-4	T		µg/L					EPA 625
	367-12-4	T	1	%Recov	1	%Recov	1	%Recov	SW846 8270
2-Methyl-4,6-Dinitrophenol	534-52-1	T	0.5	µg/L					EHL-L131
	534-52-1	T	24	µg/L					EPA 625
	534-52-1	T	50	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
2-Methyleicosane	1560-84-5	T				µg/Kg dw			SW846 8270
2-Methylphenol	95-48-7	T	10	µg/L					EPA 625
	95-48-7	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
2-Methyltetradecane	1560-95-8	T				µg/Kg dw			SW846 8270
2-Naphthylamine	91-59-8	T	10	µg/L	660	µg/Kg dw			SW846 8270
2-Nitroaniline	88-74-4	T	50	µg/L					EPA 625
	88-74-4	T	50	µg/L	660	µg/Kg dw	3200	µg/Kg ww	SW846 8270
2-Nitrophenol	88-75-5	T	0.5	µg/L					EHL-L131
	88-75-5	T	11	µg/L					EPA 625
	88-75-5	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
2-picoline	109-06-8	T			330	µg/Kg dw			SW846 8270
3,3'-Dichlorobenzidine	91-94-1	T	52	µg/L					EPA 625
	91-94-1	T	20	µg/L	660	µg/Kg dw	1400	µg/Kg ww	SW846 8270
3,3'-Dimethoxybenzidine	119-90-4	T	100	µg/L	6600	µg/Kg dw			SW846 8270
3,3'-Dimethylbenzidine	119-93-7	T	10	µg/L	660	µg/Kg dw			SW846 8270
3,7,11,15-Tetramethyl-2-hexadecen-1-ol	150-86-7	T				µg/Kg dw			SW846 8270
3-Methylcholanthrene	56-49-5	T	10	µg/L	660	µg/Kg dw			SW846 8270
3-Methyldibenzothiophene	16587-52-3	T				µg/Kg dw			SW846 8270
3-Methylphenol	108-39-4	T	10	µg/L	660	µg/Kg dw			SW846 8270
3-Nitroaniline	99-09-2	T	50	µg/L					EPA 625
	99-09-2	T	50	µg/L	660	µg/Kg dw	3200	µg/Kg ww	SW846 8270
3-Picolyl chloride hydrochloride	6959-48-4	T	100	µg/L	6600	µg/Kg dw			SW846 8270
4,4'-Oxydianiline	101-80-4	T	20	µg/L	1320	µg/Kg dw			SW846 8270

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Semi-Volatile Organics									
4,7,7-trimethylbicyclo[3.1.1]hept-3-ene	80-56-8	T				µg/Kg dw			SW846 8270
4,9-Dimethylnaphtho[2,3-b]thiophene	16587-34-1	T				µg/Kg dw			SW846 8270
4-Aminobiphenyl	92-67-1	T	20	µg/L	1320	µg/Kg dw			SW846 8270
4-Bromophenyl Phenyl Ether	101-55-3	T					0.02	µg/Kg ww	EPA 1614
	101-55-3	T	6	µg/L					EPA 625
	101-55-3	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
4-Chloro-3-methylphenol	59-50-7	T	0.5	µg/L					EHL-L131
	59-50-7	T	9.5	µg/L					EPA 625
	59-50-7	T	20	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
4-Chloroaniline	106-47-8	T	10	µg/L					EPA 625
	106-47-8	T	20	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
4-Chlorophenyl Phenyl Ether	7005-72-3	T	13	µg/L					EPA 625
	7005-72-3	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
4-Hydroxy-4-methyl-2-	123-42-2	T		µg/L		µg/Kg dw			SW846 8270
4-Methylphenol	106-44-5	T	10	µg/L					EPA 625
	106-44-5	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
4-Nitroaniline	100-01-6	T	50	µg/L					EPA 625
	100-01-6	T	20	µg/L	660	µg/Kg dw	3200	µg/Kg ww	SW846 8270
4-Nitrobiphenyl	92-93-3	T	10	µg/L	660	µg/Kg dw			SW846 8270
4-Nitrophenol	100-02-7	T	0.5	µg/L					EHL-L131
	100-02-7	T	7.6	µg/L					EPA 625
	100-02-7	T	50	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
5,5-Diphenylhydantoin	57-41-0	T	20	µg/L	1320	µg/Kg dw			SW846 8270
5-Chloro-2-methylaniline	95-79-4	T	10	µg/L	660	µg/Kg dw			SW846 8270
5-Hexen-2-one	109-49-9	T				µg/Kg dw			SW846 8270
5-methyl-3-Hexen-2-one	5166-53-0	T				µg/Kg dw			SW846 8270
5-methyl-5-Hexen-2-one	3240-09-3	T				µg/Kg dw			SW846 8270
5-Nitro-o-anisidine	99-59-2	T	10	µg/L	660	µg/Kg dw			SW846 8270
5-Nitro-o-toluidine	99-55-8	T	10	µg/L	660	µg/Kg dw			SW846 8270
6-Methyltridecane	13287-21-3	T				µg/Kg dw			SW846 8270
9-Hexadecenoic acid	2091-29-4	T				µg/Kg dw			SW846 8270
Acetophenone	98-86-2	T	10	µg/L	660	µg/Kg dw			SW846 8270
Aminoazobenzene	60-09-3	T	10	µg/L	660	µg/Kg dw			SW846 8270
Anilazine	101-05-3	T	0.5	µg/L					EHL-L131
	101-05-3	T	0.5	µg/L					EPA 525.2
	101-05-3	T	100	µg/L	6600	µg/Kg dw			SW846 8270
Aniline	62-53-3	T	10	µg/L					EPA 625
	62-53-3	T		µg/L	660	µg/Kg dw			SW846 8270
Anthracene-9,10-dione	84-65-1	T				µg/Kg dw			SW846 8270
Aramite	140-57-8	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Barban	101-27-9	T	200	µg/L	13200	µg/Kg dw			SW846 8270
Benzenamine,4-[(1E)-2-phenylethenyl]-	4309-66-4	T				µg/Kg dw			SW846 8270
Benzene, 1-ethyl-2-methyl-	611-14-3	T				µg/Kg dw			SW846 8270
Benzidine	92-87-5	T	140	µg/L					EPA 625
	92-87-5	T		µg/L	660	µg/Kg dw			SW846 8270
Benzoic Acid	65-85-0	T	50	µg/L					EPA 625
	65-85-0	T	50	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Semi-Volatile Organics									
Benzyl Alcohol	100-51-6	T	20	µg/L					EPA 625
	100-51-6	T			330	µg/Kg dw	700	µg/Kg ww	ISDH[31]
	100-51-6	T	20	µg/L	330	µg/Kg dw	700	µg/Kg ww	SW846 8270
Benzyl Butyl Phthalate	85-68-7	T	1	µg/L					EPA 525.2
	85-68-7	T	1.5	µg/L					EPA 606
	85-68-7	T	8	µg/L					EPA 625
	85-68-7	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Bis(2-chloroethoxy)Methane	111-91-1	T	17	µg/L					EPA 625
	111-91-1	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Bis(2-chloroethyl)Ether	111-44-4	T	18	µg/L					EPA 625
	111-44-4	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Bis(2-chloroisopropyl) Ether	108-60-1	T	18	µg/L					EPA 625
	108-60-1	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Bis(2-chloromethyl) Ether	542-88-1	T	10	µg/L					EPA 625
	542-88-1	T			660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Bromoxynil	1689-84-5	T	10	µg/L	660	µg/Kg dw			SW846 8270
Butyl Octadecanoate	123-95-5	T				µg/Kg dw			SW846 8270
Caffeine	58-08-2	T		µg/L					EPA 625
Camphene	79-92-5	T				µg/Kg dw			SW846 8270
Captan	133-06-2	T	50	µg/L	3300	µg/Kg dw			SW846 8270
Carbazole	86-74-8	T	10	µg/L					EPA 625
	86-74-8	T					700	µg/Kg ww	ISDH[31]
	86-74-8	T		µg/L	50	µg/Kg dw	100	µg/Kg ww	SW846 8270
Carbofuran	1563-66-2	T	1	µg/L					EHL-L131
	1563-66-2	T	10	µg/L	660	µg/Kg dw			SW846 8270
Chlorophenol, 3-	108-43-0	T					700	µg/Kg ww	ISDH[31]
Cholestane, (5A)-	481-21-0	T				µg/Kg dw			SW846 8270
Cholesterol	57-88-5	T		µg/L					EPA 625
Chrysene-d12 (IS)	1719-03-5	T	1	%Recov					EPA 525.2
	1719-03-5	T	1	%Recov	1	%Recov			SW846 8270
Coprostan-3-one	601-53-6	T				µg/Kg dw			SW846 8270
Cresol (m-,p-,mixture)	84989-04-8	T					1330	µg/Kg ww	SW846 8270
Cyclohexadecanolide	109-29-5	T				µg/Kg dw			SW846 8270
Cyclohexane, 1-methyl-2-propyl-	4291-79-6	T		µg/L		µg/Kg dw			SW846 8270
Cyclohexane, diethyl-	1331-43-7	T		µg/L		µg/Kg dw			SW846 8270
Cyclohexanol	89-78-1	T		µg/L					EPA 625
Decamethylcyclopentasiloxane	541-02-6	T		µg/L					EPA 625
DEHP	117-81-7	T	1	µg/L					EPA 525.2
	117-81-7	T	6	µg/L					EPA 606
	117-81-7	T	10	µg/L					EPA 625
	117-81-7	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Demeton-S	126-75-0	T	0.5	µg/L					EPA 525.2
	126-75-0	T	10	µg/L	660	µg/Kg dw			SW846 8270
Diallate (cis or trans)	2303-16-4	T	0.5	µg/L					EHL-L131
	2303-16-4	T	10	µg/L	660	µg/Kg dw			SW846 8270
Dibenz(a,j)acridine	224-42-0	T	10	µg/L	660	µg/Kg dw			SW846 8270
Dibenzofuran	132-64-9	T	10	µg/L					EPA 625
	132-64-9	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test*	*Method(s)[2]*
Semi-Volatile Organics										
Dibenzofuran, 4-methyl	7320-53-8	T				µg/Kg dw				SW846 8270
Dibenzothiophene, 4-methyl-	7372-88-5	T				µg/Kg dw				SW846 8270
Dicrotophos	141-66-2	T	0.5	µg/L						EPA 525.2
	141-66-2	T	10	µg/L	660	µg/Kg dw				SW846 8270
Diethyl Sulfate	64-67-5	T	100	µg/L	6600	µg/Kg dw				SW846 8270
Diethylphthalate	84-66-2	T	1	µg/L						EPA 525.2
	84-66-2	T	1.5	µg/L						EPA 606
	84-66-2	T	6	µg/L						EPA 625
	84-66-2	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
Diethylstilbestrol	56-53-1	T	20	µg/L	1320	µg/Kg dw				SW846 8270
Dihydrocholesterol	80-97-7	T		µg/L						EPA 625
	80-97-7	T				mg/Kg dw				SW846 8270
Dihydromyrcenol	18479-58-8	T		µg/L						EPA 624
	18479-58-8	T		µg/L						EPA 625
Dimethoate	60-51-5	T	0.1	µg/L						EPA 525.2
	60-51-5	T	20	µg/L	1320	µg/Kg dw				SW846 8270
Dimethyl Phthalate	131-11-3	T	1	µg/L						EPA 525.2
	131-11-3	T	1	µg/L						EPA 606
	131-11-3	T	5.1	µg/L						EPA 625
	131-11-3	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
Dimethylaminoazobenzene	60-11-7	T	10	µg/L	660	µg/Kg dw				SW846 8270
Di-n-butyl phthalate	84-74-2	T	1	µg/L						EPA 525.2
	84-74-2	T	1.5	µg/L						EPA 606
	84-74-2	T	8	µg/L						EPA 625
	84-74-2	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
Dinitrobenzene (All Isomers)	25154-54-5	T				µg/Kg dw				SW846 8270
Dinocap	39300-45-3	T	100	µg/L	6600	µg/Kg dw				SW846 8270
Di-n-octyl Phthalate	117-84-0	T	1	µg/L						EPA 525.2
	117-84-0	T	10	µg/L						EPA 606
	117-84-0	T	8	µg/L						EPA 625
	117-84-0	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
Diphenylhydrazine, 1,2-	122-66-7	T	10	µg/L						EPA 625
	122-66-7	T		µg/L	660	µg/Kg dw				SW846 8270
Disulfoton	298-04-4	T	0.1	µg/L						EPA 525.2
	298-04-4	T	10	µg/L	660	µg/Kg dw				SW846 8270
Docosane	629-97-0	T				µg/Kg dw				SW846 8270
Dodecane, 2,6,11-trimethyl-	31295-56-4	T				µg/Kg dw				SW846 8270
Eicosane	112-95-8	T				µg/Kg dw				SW846 8270
EPN	2104-64-5	T	0.5	µg/L						EPA 525.2
	2104-64-5	T	10	µg/L	660	µg/Kg dw				SW846 8270
Ethyl carbamate	51-79-6	T	50	µg/L	3300	µg/Kg dw				SW846 8270
Ethyl methanesulfonate	62-50-0	T	20	µg/L	1320	µg/Kg dw				SW846 8270
Famphur	52-85-7	T	0.1	µg/L						EPA 525.2
	52-85-7	T	20	µg/L	1320	µg/Kg dw				SW846 8270
Fensulfothion	115-90-2	T	2	µg/L						EHL-L131
	115-90-2	T	0.5	µg/L						EPA 525.2
	115-90-2	T	40	µg/L	2640	µg/Kg dw				SW846 8270
Fluchloralin	33245-39-5	T	0.1	µg/L						EPA 525.2
	33245-39-5	T	20	µg/L	1320	µg/Kg dw				SW846 8270

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Semi-Volatile Organics									
Fluoranthene-d10 (Surrogate)	93951-69-0	T					1	%Recov	SW846 8270
Fluorene,2,4A-Dihydro-	59247-36-8	T			µg/Kg dw				SW846 8270
Heneicosane	629-94-7	T			µg/Kg dw				SW846 8270
Hexachlorobenzene	118-74-1	T	0.01	µg/L					EPA 505
	118-74-1	T	0.1	µg/L					EPA 525.2
	118-74-1	T	0.1	µg/L					EPA 608
	118-74-1	T	6	µg/L					EPA 625
	118-74-1	T					10	µg/Kg ww	ISDH[31]
	118-74-1	T			5	µg/Kg dw	10	µg/Kg ww	SW846 8080
	118-74-1	T			5	µg/Kg dw	10	µg/Kg ww	SW846 8081
	118-74-1	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Hexachlorocyclopentadiene	77-47-4	T	0.41	µg/L					EPA 505
	77-47-4	T	0.1	µg/L					EPA 525.2
	77-47-4	T	4	µg/L					EPA 608
	77-47-4	T	10	µg/L					EPA 625
	77-47-4	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Hexachloroethane	67-72-1	T	0.2	µg/L					EPA 524.2
	67-72-1	T	5.1	µg/L					EPA 625
	67-72-1	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Hexachlorophene	70-30-4	T	50	µg/L	3300	µg/Kg dw			SW846 8270
Hexachloropropene	1888-71-7	T	10	µg/L	660	µg/Kg dw			SW846 8270
hexacosane	630-01-3	T		µg/L					EPA 625
Hexadecane	544-76-3	T			µg/Kg dw				SW846 8270
Hexadecane, 2,6,10,14-tetramethyl-	638-36-8	T			µg/Kg dw				SW846 8270
Hexadecane, 2,6,11,15-tetramethyl-	504-44-9	T			µg/Kg dw				SW846 8270
Hexamethylphosphoramide	680-31-9	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Isodrin	465-73-6	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Isophorone	78-59-1	T	0.1	µg/L					EPA 525.2
	78-59-1	T	7	µg/L					EPA 625
	78-59-1	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Isosafrole	120-58-1	T	10	µg/L	660	µg/Kg dw			SW846 8270
Kepone	143-50-0	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Mesityl oxide	141-79-7	T			µg/Kg dw				SW846 8270
Mestranol	72-33-3	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Methapyrilene	91-80-5	T	100	µg/L	6600	µg/Kg dw			SW846 8270
Methyl Methanesulfonate	66-27-3	T	10	µg/L	660	µg/Kg dw			SW846 8270
Mevinphos	7786-34-7	T	0.1	µg/L					EPA 525.2
	7786-34-7	T	10	µg/L	660	µg/Kg dw			SW846 8270
Mexacarbate	315-18-4	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Mirex	2385-85-5	T	0.5	µg/L					EPA 525.2
	2385-85-5	T					700	µg/Kg ww	SW846 8080
	2385-85-5	T					700	µg/Kg ww	SW846 8081
	2385-85-5	T	10	µg/L	660	µg/Kg dw			SW846 8270
Naphthalene-d8 (IS)	1146-65-2	T	1	%Recov	1	%Recov			SW846 8270
N-heptacosane	593-49-7	T			µg/Kg dw				SW846 8270

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test*	*Method(s)[2]*
Semi-Volatile Organics										
n-Heptadecane	629-78-7	T		µg/L						EPA 625
	629-78-7	T				µg/Kg dw				SW846 8270
N-hexatriacontane	630-06-8	T				µg/Kg dw				SW846 8270
Nicotine	54-11-5	T	20	µg/L	1320	µg/Kg dw				SW846 8270
Nitrobenzene	98-95-3	T	4	µg/L						EPA 524.2
	98-95-3	T	6	µg/L						EPA 625
	98-95-3	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
Nitrofen	1836-75-5	T	20	µg/L	1320	µg/Kg dw				SW846 8270
Nitroquinoline-1-oxide	56-57-5	T	40	µg/L	2640	µg/Kg dw				SW846 8270
N-Nitrosodiethylamine	55-18-5	T	5	µg/L						EPA 625
	55-18-5	T	20	µg/L	660	µg/Kg dw				SW846 8270
N-Nitrosodimethylamine	62-75-9	T	5	µg/L						EPA 625
	62-75-9	T		µg/L	660	µg/Kg dw				SW846 8270
N-Nitrosodi-n-butylamine	924-16-3	T	10	µg/L						EPA 625
	924-16-3	T	10	µg/L	660	µg/Kg dw				SW846 8270
N-Nitrosodi-n-propylamine	621-64-7	T	5	µg/L						EPA 625
	621-64-7	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
N-Nitrosodiphenylamine	86-30-6	T	6	µg/L						EPA 625
	86-30-6	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww		SW846 8270
N-Nitrosopiperidine	100-75-4	T	20	µg/L	1320	µg/Kg dw				SW846 8270
N-Nitrosopyrrolidine	930-55-2	T	5	µg/L						EPA 625
	930-55-2	T	40	µg/L	660	µg/Kg dw				SW846 8270
n-Tetracosane	646-31-1	T		µg/L						EPA 625
	646-31-1	T				µg/Kg dw				SW846 8270
n-Tetradecane	629-59-4	T				mg/Kg dw				SW846 8270
n-Tetradecanoic Acid	544-63-8	T		µg/L						EPA 625
	544-63-8	T				µg/Kg dw				SW846 8270
n-Tricosane	638-67-5	T		µg/L						EPA 625
	638-67-5	T				µg/Kg dw				SW846 8270
n-Tridecane	629-50-5	T		µg/L						EPA 625
o-Anisidine	90-04-0	T	10	µg/L	660	µg/Kg dw				SW846 8270
octadecan-1-ol	112-92-5	T		µg/L						EPA 625
Octadecane	593-45-3	T				µg/Kg dw				SW846 8270
Octamethyl Pyrophosphoramide	152-16-9	T	200	µg/L	13200	µg/Kg dw				SW846 8270
octathiocane	10544-50-0	T		µg/L						EPA 625
o-Toluidine	95-53-4	T	10	µg/L	660	µg/Kg dw				SW846 8270
Palmitic acid	57-10-3	T		µg/L						EPA 625
	57-10-3	T				µg/Kg dw				SW846 8270
p-Benzoquinone	106-51-4	T	10	µg/L	660	µg/Kg dw				SW846 8270
PCP methyl ether	1825-21-4	T	50	µg/L						EPA 625
	1825-21-4	T					8	µg/Kg ww		ISDH[31]
	1825-21-4	T			20	µg/Kg dw	8	µg/Kg ww		SW846 8080
	1825-21-4	T			20	µg/Kg dw	8	µg/Kg ww		SW846 8081
	1825-21-4	T			660	µg/Kg dw				SW846 8270
p-Cresidine	120-71-8	T	10	µg/L	660	µg/Kg dw				SW846 8270
Pentachlorobenzene	608-93-5	T	0.5	µg/L						EPA 525.2
	608-93-5	T	50	µg/L						EPA 625
	608-93-5	T	10	µg/L	660	µg/Kg dw				SW846 8270

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Semi-Volatile Organics									
Pentachloronitrobenzene	82-68-8	T	1	µg/L					EPA 525.2
	82-68-8	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Pentachlorophenol	87-86-5	T	0.5	µg/L					EHL-L131
	87-86-5	T	0.1	µg/L					EPA 525.2
	87-86-5	T	11	µg/L					EPA 625
	87-86-5	T	50	µg/L	660	µg/Kg dw	3200	µg/Kg ww	SW846 8270
Pentadecane	629-62-9	T				µg/Kg dw			SW846 8270
Pentadecane, 2,6,10,14-tetramethyl-	1921-70-6	T				µg/Kg dw			SW846 8270
Pentadecanoic acid	1002-84-2	T				µg/Kg dw			SW846 8270
Pentanal, 2-methyl-	123-15-9	T		µg/L		µg/Kg dw			SW846 8270
Perylene	198-55-0	T				µg/Kg dw			SW846 8270
Perylene-d12 (IS)	1520-96-3	T	1	%Recov					EPA 525.2
	1520-96-3	T	1	%Recov	1	%Recov			SW846 8270
Phenacetin	62-44-2	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Phenobarbital	50-06-6	T	10	µg/L	660	µg/Kg dw			SW846 8270
Phenol	108-95-2	T	5	µg/L					EHL-L131
	108-95-2	T	10	µg/L					EPA 1625
	108-95-2	T	4.8	µg/L					EPA 625
	108-95-2	T	10	µg/L					SM5530D
	108-95-2	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Phenol, nonyl-	25154-52-3	T				µg/Kg dw			SW846 8270
Phenol-d5 (Surrogate)	4165-62-2	T		µg/L					EPA 625
	4165-62-2	T		%Recov	1	%Recov	1	%Recov	SW846 8270
Phenols [4AAP]	E-10253	T	2	µg/L					EPA 420.1
	E-10253	T	2	µg/L					EPA 420.2
	E-10253	T	2	µg/L					EPA 420.4
	E-10253	T	2	µg/L					SM5530C
	E-10253	T	2	µg/L	3.3	mg/Kg dw			SW846 9066
Phorate	298-02-2	T	0.1	µg/L					EPA 525.2
	298-02-2	T	10	µg/L	660	µg/Kg dw			SW846 8270
Phosalone	2310-17-0	T	100	µg/L	6600	µg/Kg dw			SW846 8270
Phosmet	732-11-6	T	0.5	µg/L					EHL-L131
	732-11-6	T	0.5	µg/L					EPA 525.2
	732-11-6	T	40	µg/L	2640	µg/Kg dw			SW846 8270
Phosphamidon	13171-21-6	T	0.5	µg/L					EPA 525.2
	13171-21-6	T	100	µg/L	6600	µg/Kg dw			SW846 8270
Phthalic Anhydride	85-44-9	T	100	µg/L	6600	µg/Kg dw			SW846 8270
Piperonyl Sulfoxide	120-62-7	T	100	µg/L	6600	µg/Kg dw			SW846 8270
Poly(oxy-1,2-ethanediyl), .alpha.-(2-ethylhexyl)-.omega.-hydroxy-, phosphate, potassium	238-84-6	T				µg/Kg dw			SW846 8270
Pronamide	23950-58-5	T	0.1	µg/L					EPA 525.2
	23950-58-5	T	10	µg/L	660	µg/Kg dw			SW846 8270
Propylthiouracil	51-52-5	T	100	µg/L	6600	µg/Kg dw			SW846 8270
psi,psi-Carotene, 7,7,8,8,11,11,12,12,15,15-decahydro-	502-62-5	T				µg/Kg dw			SW846 8270

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Semi-Volatile Organics									
Pyridine	110-86-1	T		µg/L	330	µg/Kg dw			SW846 8270
Resorcinol	108-46-3	T	100	µg/L	6600	µg/Kg dw			SW846 8270
Safrole	94-59-7	T	10	µg/L	660	µg/Kg dw			SW846 8270
sodium dodecanoate	143-07-7	T		µg/L					EPA 625
Stearic acid	57-11-4	T		µg/L					EPA 625
	57-11-4	T				mg/Kg dw			SW846 8270
Strychnine	57-24-9	T	40	µg/L	2640	µg/Kg dw			SW846 8270
Sulfallate	95-06-7	T	10	µg/L	660	µg/Kg dw			SW846 8270
TDBPP	126-72-7	T	200	µg/L	13200	µg/Kg dw			SW846 8270
TEPP	107-49-3	T	10	µg/L					EPA 525.2
	107-49-3	T	40	µg/L	2640	µg/Kg dw			SW846 8270
Terphenyl-d14	98904-43-9	T		µg/L					EPA 625
	98904-43-9	T		%Recov		%			SW846 8270
Tetrachlorobenzene, 1,2,4,5-	95-94-3	T	0.5	µg/L					EPA 525.2
	95-94-3	T	10	µg/L					EPA 625
	95-94-3	T	10	µg/L	660	µg/Kg dw			SW846 8270
Tetrachloro-m-xylene (Surrogate)	877-09-8	T	1	%Recov					EPA 525.2
	877-09-8	T			1	%Recov	1	%Recov	SW846 8080
	877-09-8	T	1	%Recov	1	%Recov	1	%Recov	SW846 8081
	877-09-8	T			1	%Recov	1	%Recov	SW846 8082
Tetrachlorophenol	25167-83-3	T				µg/Kg dw			SW846 8270
Tetrachlorvinphos	961-11-5	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Thiophenol (Benzenethiol)	108-98-5	T	20	µg/L	1320	µg/Kg dw			SW846 8270
Tricesium 4,4'-carbonyldiphthalate	226-88-0	T				µg/Kg dw			SW846 8270
Trichlorophenol, 2,4,6-	88-06-2	T	0.5	µg/L					EHL-L131
	88-06-2	T	10	µg/L					EPA 625
	88-06-2	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Tricosanol	3133-01-5	T				µg/Kg dw			SW846 8270
Triethylene Glycol	112-27-6	T	1	µg/L					EPA 525.2
Triethyleneglycol Monobutyl Ether	143-22-6	T				µg/Kg dw			SW846 8270
Trifluralin	1582-09-8	T	0.1	µg/L					EPA 525.2
	1582-09-8	T	0.1	µg/L					EPA 608
	1582-09-8	T	10	µg/L	660	µg/Kg dw			SW846 8270
Trimethyl Phosphate	512-56-1	T	10	µg/L	660	µg/Kg dw			SW846 8270
Tri-p-tolyl Phosphate	78-32-0	T	10	µg/L	660	µg/Kg dw			SW846 8270
Undecane, 2,5-dimethyl-	17301-22-3	T				µg/Kg dw			SW846 8270
Unknown [37]	63-07-9	T				µg/Kg dw			SW846 8270
Unknown Compound [36]	E-Unknown	T				µg/Kg dw			SW846 8270
Vitamin E	59-02-9	T				µg/Kg dw			SW846 8270

37 These are compounds detected but not identified. CASRN is arbitrarily assigned by IDEM

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Volatile Organics [38]									
1,1,1,2-Tetrachloroethane	630-20-6	T	0.15	µg/L					EPA 524.2
	630-20-6	T	0.5	µg/L					EPA 624
	630-20-6	T		µg/L	5	µg/Kg dw			SW846 8260
1,1,1-Trichloroethane	71-55-6	T	0.15	µg/L					EPA 524.2
	71-55-6	T	0.15	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	71-55-6	T	12	µg/L					EPA 624
	71-55-6	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
1,1,2-Trichloroethane	79-00-5	T	0.1	µg/L					EPA 524.2
	79-00-5	T	0.1	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	79-00-5	T	16	µg/L					EPA 624
	79-00-5	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
1,1-Dichloroethane	75-34-3	T	0.1	µg/L					EPA 524.2
	75-34-3	T	0.35	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	75-34-3	T	15	µg/L					EPA 624
	75-34-3	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
1,1-Dichloroethene	75-35-4	T	0.15	µg/L					EPA 524.2
	75-35-4	T	0.6	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	75-35-4	T	9	µg/L					EPA 624
	75-35-4	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
1,1-Dichloropropanone	513-88-2	T	3.2	µg/L					EPA 524.2
1,1-Dichloropropene	563-58-6	T	0.08	µg/L					EPA 524.2
	563-58-6	T	0.5	µg/L					EPA 624
	563-58-6	T		µg/L	5	µg/Kg dw			SW846 8260
1,2,3,4-Tetramethylbenzene	488-23-3	T		µg/L					EPA 624
1,2,3-Trichlorobenzene	87-61-6	T	0.1	µg/L					EPA 524.2
	87-61-6	T	0.5	µg/L					EPA 624
	87-61-6	T		µg/L	5	µg/Kg dw			SW846 8260
1,2,3-Trichloropropane	96-18-4	T	0.1	µg/L					EPA 524.2
	96-18-4	T	0.5	µg/L					EPA 624
	96-18-4	T		µg/L	5	µg/Kg dw			SW846 8260
1,2,4-Trichlorobenzene	120-82-1	T	0.15	µg/L					EPA 524.2
	120-82-1	T	0.5	µg/L					EPA 624
	120-82-1	T	6	µg/L					EPA 625
	120-82-1	T		µg/L	5	µg/Kg dw			SW846 8260
	120-82-1	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
1,2,4-Trimethylbenzene	95-63-6	T	0.15	µg/L					EPA 524.2
	95-63-6	T	0.41	µg/L					EPA 624
	95-63-6	T		µg/L	5	µg/Kg dw			SW846 8260
1,2-Dibromoethane (EDB)	106-93-4	T	0.08	µg/L					EPA 524.2
	106-93-4	T	0.5	µg/L					EPA 624
	106-93-4	T		µg/L	5	µg/Kg dw			SW846 8260
1,2-Dichlorobenzene	95-50-1	T	0.1	µg/L					EPA 524.2
	95-50-1	T	0.75	µg/L					EPA 601
	95-50-1	T	10	µg/L					EPA 624
	95-50-1	T	10	µg/L					EPA 625
	95-50-1	T		µg/L	5	µg/Kg dw			SW846 8260
	95-50-1	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270

38 Analytical methods from 40 CFR Part 136, revised as of July 1, 1994 and "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986, updates and amendments.

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Volatile Organics									
1,2-Dichlorobenzene-d4	2199-69-1	T	10	µg/L					EPA 624
1,2-Dichloroethane	107-06-2	T	0.08	µg/L					EPA 524.2
	107-06-2	T	0.15	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	107-06-2	T	9	µg/L					EPA 624
	107-06-2	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
1,2-Dichloroethane-d4	17060-07-0	T		µg/L					EPA 624
	17060-07-0	T	1	%					SW846 8260
1,2-Dichloropropane	78-87-5	T	0.08	µg/L					EPA 524.2
	78-87-5	T	0.2	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	78-87-5	T	19	µg/L					EPA 624
	78-87-5	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
1,3,5-Trimethylbenzene	108-67-8	T	0.08	µg/L					EPA 524.2
	108-67-8	T	0.16	µg/L					EPA 624
	108-67-8	T		µg/L	5	µg/Kg dw			SW846 8260
1,3-Dichloropropane	142-28-9	T	0.15	µg/L					EPA 524.2
	142-28-9	T	0.5	µg/L					EPA 624
	142-28-9	T		µg/L	5	µg/Kg dw			SW846 8260
1,4-Cineole	470-67-7	T		µg/L					EPA 624
1,4-dichloro-2-Butene	764-41-0	T			5	µg/Kg dw			SW846 8260
1,4-Dichlorobenzene	106-46-7	T	0.1	µg/L					EPA 524.2
	106-46-7	T	1.2	µg/L					EPA 601
	106-46-7	T	10	µg/L					EPA 624
	106-46-7	T	10	µg/L					EPA 625
	106-46-7	T		µg/L	5	µg/Kg dw	5	µg/Kg ww	SW846 8260
	106-46-7	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
1-Chlorobutane	109-69-3	T	0.6	µg/L					EPA 524.2
1-Ethyl-2,3-dimethyl-benzene	933-98-2	T		µg/L					EPA 624
2,2-Dichloropropane	594-20-7	T	0.15	µg/L					EPA 524.2
	594-20-7	T	0.5	µg/L					EPA 624
	594-20-7	T		µg/L	5	µg/Kg dw			SW846 8260
2-Butanone (MEK)	78-93-3	T	1.5	µg/L					EPA 524.2
	78-93-3	T	10	µg/L					EPA 624
	78-93-3	T	5	µg/L	10	µg/Kg dw	10	µg/Kg ww	SW846 8260
2-Chloroethylvinylether	110-75-8	T	0.65	µg/L	10	µg/Kg dw	10	µg/Kg ww	EPA 601
	110-75-8	T	10	µg/L					EPA 624
	110-75-8	T	5	µg/L	12	µg/Kg dw	10	µg/Kg ww	SW846 8260
2-Chlorotoluene	95-49-8	T	0.15	µg/L					EPA 524.2
	95-49-8	T	0.5	µg/L					EPA 624
	95-49-8	T		µg/L	5	µg/Kg dw			SW846 8260
2-ethyl-1,3-dimethyl-benzene	2870-04-4	T		µg/L					EPA 624
2-Hexanone	591-78-6	T	1.3	µg/L					EPA 524.2
	591-78-6	T	5	µg/L	10	mg/Kg dw	10	µg/Kg ww	SW846 8260
2-Methyldecane	6975-98-0	T		µg/L					EPA 624
2-Nitropropane	79-46-9	T	0.5	µg/L					EPA 524.2
3-Methyl decane	13151-34-3	T		µg/L					EPA 624
4-Bromofluorobenzene (surr.)	460-00-4	T		µg/L					EPA 624
	460-00-4	T	1	%Recov	1	%Recov			SW846 8260
4-Chlorotoluene	106-43-4	T	0.15	µg/L					EPA 524.2
	106-43-4	T	0.5	µg/L					EPA 624
	106-43-4	T		µg/L	5	µg/Kg dw			SW846 8260

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Volatile Organics									
4-Isopropyltoluene	99-87-6	T	0.4	µg/L					EPA 524.2
	99-87-6	T	0.5	µg/L					EPA 624
	99-87-6	T		µg/L	5	µg/Kg dw			SW846 8260
4-Methyl-2-pentanone	108-10-1	T	0.55	µg/L					EPA 524.2
	108-10-1	T	5	µg/L					EPA 624
	108-10-1	T	5	µg/L	12	µg/Kg dw	10	µg/Kg ww	SW846 8260
Acetone	67-64-1	T	1	µg/L					EPA 524.2
	67-64-1	T	100	µg/L					EPA 624
	67-64-1	T	100	µg/L	10	µg/Kg dw	10	µg/Kg ww	SW846 8260
	67-64-1	T				µg/Kg dw			SW846 8270
Acrolein	107-02-8	T	3	µg/L					EPA 603
	107-02-8	T	95	µg/L					EPA 624
	107-02-8	T		µg/L	5	µg/Kg dw			SW846 8260
Acrylonitrile	107-13-1	T	0.7	µg/L					EPA 524.2
	107-13-1	T	1.6	µg/L					EPA 603
	107-13-1	T	43	µg/L					EPA 624
	107-13-1	T		µg/L	5	µg/Kg dw			SW846 8260
Allyl Chloride	107-05-1	T	0.4	µg/L					EPA 524.2
Benzene	71-43-2	T	0.1	µg/L					EPA 524.2
	71-43-2	T	1	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 602
	71-43-2	T	14	µg/L					EPA 624
	71-43-2	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Bromobenzene	108-86-1	T	0.1	µg/L					EPA 524.2
	108-86-1	T	0.5	µg/L					EPA 624
	108-86-1	T		µg/L	5	µg/Kg dw			SW846 8260
Bromochloromethane	74-97-5	T	0.15	µg/L					EPA 524.2
	74-97-5	T	0.5	µg/L					EPA 624
	74-97-5	T		µg/L	5	µg/Kg dw			SW846 8260
Bromodichloromethane (surr.)	75-27-4	T	0.1	µg/L					EPA 524.2
	75-27-4	T	0.5	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	75-27-4	T	0.5	µg/L					EPA 624
	75-27-4	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Bromoform	75-25-2	T	0.4	µg/L					EPA 524.2
	75-25-2	T	0.1	µg/L	5	µg/Kg dw			EPA 601
	75-25-2	T	15	µg/L					EPA 624
	75-25-2	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Bromomethane	74-83-9	T	0.2	µg/L					EPA 524.2
	74-83-9	T	5.9	µg/L	10	µg/Kg dw			EPA 601
	74-83-9	T	10	µg/L					EPA 624
	74-83-9	T	2	µg/L	12	µg/Kg dw	10	µg/Kg ww	SW846 8260
Carbon Disulfide	75-15-0	T	0.3	µg/L					EPA 524.2
	75-15-0	T	8	µg/L					EPA 624
	75-15-0	T	8	µg/L	5	µg/Kg dw	5	µg/Kg ww	SW846 8260
Carbon Tetrachloride	56-23-5	T	0.25	µg/L					EPA 524.2
	56-23-5	T	0.6	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	56-23-5	T	9	µg/L					EPA 624
	56-23-5	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Chloroacetonitrile	107-14-2	T	0.4	µg/L					EPA 524.2

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Volatile Organics									
Chlorobenzene	108-90-7	T	0.1	µg/L					EPA 524.2
	108-90-7	T	1	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 602
	108-90-7	T	19	µg/L					EPA 624
	108-90-7	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Chlorodibromomethane	124-48-1	T	0.15	µg/L					EPA 524.2
	124-48-1	T	0.45	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	124-48-1	T	10	µg/L					EPA 624
	124-48-1	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Chloroethane	75-00-3	T	0.08	µg/L					EPA 524.2
	75-00-3	T	2.6	µg/L	10	µg/Kg dw	10	µg/Kg ww	EPA 601
	75-00-3	T	10	µg/L					EPA 624
	75-00-3	T	2	µg/L	12	µg/Kg dw	10	µg/Kg ww	SW846 8260
Chloroform	67-66-3	T	0.08	µg/L					EPA 524.2
	67-66-3	T	0.25	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	67-66-3	T	5	µg/L					EPA 624
	67-66-3	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Chloromethane	74-87-3	T	0.15	µg/L					EPA 524.2
	74-87-3	T	0.4	µg/L	10	µg/Kg dw	10	µg/Kg ww	EPA 601
	74-87-3	T	10	µg/L					EPA 624
	74-87-3	T	2	µg/L	12	µg/Kg dw	10	µg/Kg ww	SW846 8260
Dibromo-3-Chloropropane, 1,2	96-12-8	T	0.15	µg/L					EPA 524.2
	96-12-8	T	0.5	µg/L					EPA 624
	96-12-8	T		µg/L	5	µg/Kg dw			SW846 8260
Dibromofluoromethane (surr.)	1868-53-7	T	1	%Recov	1	%Recov			SW846 8260
Dibromomethane	74-95-3	T	0.1	µg/L					EPA 524.2
	74-95-3	T	0.5	µg/L					EPA 624
	74-95-3	T		µg/L	5	µg/Kg dw			SW846 8260
Dichlorodifluoromethane	75-71-8	T	0.3	µg/L					EPA 524.2
	75-71-8	T	5.9	µg/L					EPA 601
	75-71-8	T	0.5	µg/L					EPA 624
	75-71-8	T		µg/L	5	µg/Kg dw			SW846 8260
Dichloroethene, 1,2- (Total)	540-59-0	T	2	µg/L	5	µg/Kg dw	5	µg/Kg ww	SW846 8260
Dichloroethene, cis-1,2-	156-59-2	T	0.2	µg/L					EPA 524.2
	156-59-2	T	0.5	µg/L					EPA 624
	156-59-2	T		µg/L	5	µg/Kg dw			SW846 8260
Dichloroethene, trans-1,2-	156-60-5	T	0.1	µg/L					EPA 524.2
	156-60-5	T	0.5	µg/L					EPA 601
	156-60-5	T	5.1	µg/L					EPA 624
	156-60-5	T		µg/L	5	µg/Kg dw	5	µg/Kg ww	SW846 8260
Dichloropropene, cis-1.3-	10061-01-5	T	0.2	µg/L					EPA 524.2
	10061-01-5	T	1.7	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	10061-01-5	T	5	µg/L					EPA 624
	10061-01-5	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Dichloropropene, trans-1,3-	10061-02-6	T	0.1	µg/L					EPA 524.2
	10061-02-6	T	1	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	10061-02-6	T	10	µg/L					EPA 624
	10061-02-6	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Diethyl Ether	60-29-7	T	1	µg/L					EPA 524.2
Diisopropyl ether (DIPE)	108-20-3	T	1	µg/L					EPA 624
D-limonene	5989-27-5	T		µg/L					EPA 624

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Volatile Organics									
Dodecane	112-40-3	T		µg/L					EPA 624
	112-40-3	T				µg/Kg dw			SW846 8270
Ethyl methacrylate	97-63-2	T	0.1	µg/L					EPA 524.2
	97-63-2	T		µg/L	5	µg/Kg dw			SW846 8260
Ethylbenzene	100-41-4	T	0.1	µg/L					EPA 524.2
	100-41-4	T	1	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 602
	100-41-4	T	23	µg/L					EPA 624
	100-41-4	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Fuel Oil	68476-34-6	T			100	mg/Kg dw			SW846 8260
Gasoline	8006-61-9	T			10	mg/Kg dw			SW846 8260
Hexachlorobutadiene	87-68-3	T	0.15	µg/L					EPA 524.2
	87-68-3	T	0.5	µg/L					EPA 624
	87-68-3	T	2.9	µg/L					EPA 625
	87-68-3	T		µg/L	5	µg/Kg dw			SW846 8260
	87-68-3	T	10	µg/L	660	µg/Kg dw	700	µg/Kg ww	SW846 8270
Isopropylbenzene	98-82-8	T	0.3	µg/L					EPA 524.2
	98-82-8	T	0.5	µg/L					EPA 624
	98-82-8	T		µg/L	5	µg/Kg dw			SW846 8260
	98-82-8	T				µg/Kg dw			SW846 8270
m-cymene	535-77-3	T		µg/L					EPA 624
Methacrylonitrile	126-98-7	T	0.4	µg/L					EPA 524.2
Methyl Iodide	74-88-4	T	0.08	µg/L					EPA 524.2
	74-88-4	T		µg/L	5	µg/Kg dw			SW846 8260
Methylacrylate	96-33-3	T	1.4	µg/L					EPA 524.2
Methylene Chloride	75-09-2	T	0.1	µg/L					EPA 524.2
	75-09-2	T	0.25	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	75-09-2	T	8.9	µg/L					EPA 624
	75-09-2	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Methylmethacrylate	80-62-6	T	1.4	µg/L					EPA 524.2
MTBE	1634-04-4	T	0.3	µg/L					EPA 524.2
	1634-04-4	T	0.29	µg/L					EPA 624
	1634-04-4	T		µg/L	5	µg/Kg dw			SW846 8260
m-Xylene	108-38-3	T	0.1	µg/L					EPA 524.2
n-Butylbenzene	104-51-8	T	0.1	µg/L					EPA 524.2
	104-51-8	T	0.5	µg/L					EPA 624
	104-51-8	T		µg/L	5	µg/Kg dw			SW846 8260
n-Propylbenzene	103-65-1	T	0.15	µg/L					EPA 524.2
	103-65-1	T	0.5	µg/L					EPA 624
	103-65-1	T		µg/L	5	µg/Kg dw			SW846 8260
Pentachloroethane	76-01-7	T	0.45	µg/L					EPA 524.2
Propionitrile	107-12-0	T	0.45	µg/L					EPA 524.2
Propyl Mercaptan	107-03-9	T		µg/L					EPA 624
p-Xylene	106-42-3	T	0.2	µg/L					EPA 524.2
sec-Butylbenzene	135-98-8	T	0.4	µg/L					EPA 524.2
	135-98-8	T	0.5	µg/L					EPA 624
	135-98-8	T		µg/L	5	µg/Kg dw			SW846 8260
Styrene	100-42-5	T	0.15	µg/L					EPA 524.2
	100-42-5	T	0.5	µg/L					EPA 624
	100-42-5	T	1	µg/L	5	µg/Kg dw	5	µg/Kg ww	SW846 8260

Table B4-1
Contract Required Quantification Limits and Test Methods
Target Compounds and Parameters for Water Quality Monitoring Projects

Parameter	*CAS Number/ OWQ Identifier*	*Total / Dissolved / SEM / Free*	*Water CRQL[1]*	*Units*	*Sediment CRQL*	*Units*	*Fish Tissues CRQL*	*Units*	*Acceptable Test Method(s)[2]*
Volatile Organics									
Sulfur Dioxide	7446-09-5	T		µg/L					EPA 624
tert-Butylbenzene	98-06-6	T	0.45	µg/L					EPA 524.2
	98-06-6	T	0.5	µg/L					EPA 624
	98-06-6	T		µg/L	5	µg/Kg dw			SW846 8260
Tetrachlorobenzene	12408-10-5	T				µg/Kg dw			SW846 8270
Tetrachloroethane, 1,1,2,2-	79-34-5	T	0.15	µg/L					EPA 524.2
	79-34-5	T	0.15	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	79-34-5	T	22	µg/L					EPA 624
	79-34-5	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Tetrachloroethene	127-18-4	T	0.15	µg/L					EPA 524.2
	127-18-4	T	0.15	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	127-18-4	T	13	µg/L					EPA 624
	127-18-4	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Tetrahydrofuran	109-99-9	T	5	µg/L					EPA 524.2
Toluene	108-88-3	T	0.25	µg/L					EPA 524.2
	108-88-3	T	1	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 602
	108-88-3	T	19	µg/L					EPA 624
	108-88-3	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
	108-88-3	T		µg/L					SW846 8270
Toluene-d8 (surr.)	2037-26-5	T		µg/L					EPA 624
	2037-26-5	T	1	%Recov	1	%Recov			SW846 8260
trans-1,4-Dichloro-2-butene	110-57-6	T	1.2	µg/L					EPA 524.2
	110-57-6	T	1	mg/L					SW846 8260
Trichloroethene	79-01-6	T	0.08	µg/L					EPA 524.2
	79-01-6	T	0.6	µg/L	5	µg/Kg dw	5	µg/Kg ww	EPA 601
	79-01-6	T	6	µg/L					EPA 624
	79-01-6	T	1	µg/L	6	µg/Kg dw	5	µg/Kg ww	SW846 8260
Trichlorofluoromethane	75-69-4	T	0.25	µg/L					EPA 524.2
	75-69-4	T	10	µg/L					EPA 624
	75-69-4	T		µg/L	5	µg/Kg dw			SW846 8260
Trimethylbenzene, 1,2,3-	526-73-8	T	0.5	µg/L					EPA 624
Undecane	1120-21-4	T		µg/L					EPA 624
	1120-21-4	T				µg/Kg dw			SW846 8270
Vinyl Acetate	108-05-4	T	1	µg/L	10	µg/Kg dw	10	µg/Kg ww	SW846 8260
Vinyl Chloride	75-01-4	T	0.15	µg/L					EPA 524.2
	75-01-4	T	0.9	µg/L					EPA 601
	75-01-4	T	10	µg/L					EPA 624
	75-01-4	T	2	µg/L	12	µg/Kg dw	10	µg/Kg ww	SW846 8260
Xylene, (m- + p-)	0-00-62 [39]	T	0.2	ug/L					EPA 524.2
	0-00-62	T	0.5	µg/L					EPA 624
	0-00-62	T			1	µg/Kg dw			SW846 8260
Xylene, o-	95-47-6	T	0.2	µg/L					EPA 524.2
	95-47-6	T	0.5	µg/L					EPA 624
	95-47-6	T			1	µg/Kg dw			SW846 8260
Xylenes, Total	1330-20-7	T	1	µg/L					EPA 624
	1330-20-7	T	3	µg/L	5	µg/Kg dw	5	µg/Kg ww	SW846 8260

39 No CAS Number exists for this parameter. CAS Number has been arbitrarily assigned by the ISDH Organics Laboratory.

SECTION B5

B5 QUALITY CONTROL REQUIREMENTS

B5.1 Internal Quality Control Checks

This section describes specific quality control checks to be performed for both field and laboratory analysis in order to verify compliance with the project investigation requirements. Field quality control checks are measures used to assess the quality of the field data. Laboratory quality control checks are measures used to assess the quality of the data resulting from the analytical procedures performed in the lab. WAPB staff utilizes the Preventative Maintenance Program (PMP) to track equipment inventory and related calibration and maintenance schedules to ensure accurate measurements and proper maintenance. A list of major equipment used for field measurement can be found in Table B6.1-1.

B5.2 Field Quality Control Checks

Table B5 – 1
FIELD QUALITY CONTROL CHECK FREQUENCIES

Parameters and Test Procedure	Measurement	Duplicate Sample	Reference Standards	Calibration Verification Standard	Equipment/ Field Blank	Trip Blank
Sample Collection	1/sample	Maximum of 1 per sampling event or 1/20	n/a	n/a	1/Set	1/Set, VOC and Bacteria
Stream Flow and Physical Measurements	1/sample	n/a	Calibrate measurement equipment each yr. Inspect before each sampling trip.	n/a	n/a	n/a
Temperature	1/sample	n/a	Calibrate thermometers each yr.	n/a	n/a	n/a
pH	1/sample	1/10	pH buffer stds. 1/10 locations	1/10 End of batch	n/a	n/a
Dissolved Oxygen	1/sample	1/sampling event	Calibrate before each sampling event.	Winkler DO 1/sampling trip	n/a	n/a
Sediment Oxygen Demand	1/sample	0	Winkler DO at each location	n/a	n/a	n/a
Tot. Residual Chlorine	1/sample	0	0	0	Blank each location	n/a
Datasonde Tests Conductivity Turbidity	1/sample	0	Calibrate before each sampling trip	1/10 End of batch	0	n/a

SECTION B5

B5.3 Laboratory Quality Control Checks

Each Contract Laboratory providing analytical services to the OWQ/WAPB is expected to meet the statement of work and technical specifications of the IDEM RFQ, or IDEM RFP in compliance with contract requirements. Laboratory quality control checks for water, sediments, and fish tissues samples may be found in the Technical Specifications of the IDEM RFQ, or IDEM RFP. See **Appendix I** of IDEM RFP 16-74 (**Appendix B)**, IDEM RFP 16-88 Attachment D of **Appendix C,** and IDEM RFP 5-60 Attachment C of **Appendix D**. **Table B5-2** summarizes the laboratory quality control checks for test method procedures. Refer to individual test methods for specific requirements (**Table B4-1**).

Table B5-2
LABORATORY QUALITY CONTROL CHECK FREQUENCIES

Parameters and Test Procedures	Calibration[1] and/or Verification	Sample Lab Duplicate	MS/ MSD[2]	LCS	Method Blank	External QC Standard	Surrogate	Serial Dilution	Interference Check
Metals	1/10	1/20	1/20	1/20	1/run	1/20	n/a	1/run w/ dilutions	2/run
Inorganic Chemicals, & Nutrients	1/run	1/20	1/20	1/run	1/run	1/run	n/a	n/a	n/a
Physical Properties	n/a	1/20	n/a	1/run	1/run	n/a	n/a	n/a	n/a
Volatile Organic Compounds (GC)	every day	1/20	1/10	1/10	1/day	4/day	every sample	n/a	n/a
Volatile Organic Compounds (GC/MS)	every day	1/20	1/20	1/20	1/day	4/day	every sample	n/a	n/a
Semi- Volatile Organic Compounds (GC/MS)	every day	1/20	1/20	1/20	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Organotin Compounds (GC/FPD)	every day	1/20	1/20	1/20	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Pesticides (GC/ECD) [all projects except Fixed Stations - Pesticides]	every day	1/20	1/10	1/10	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Polychlorinated Biphenyl (PCBs)	every day	1/20	1/10	1/10	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Bacteriology	n/a	1/run	n/a	n/a	1/run	1+ & 1- / run	n/a	when required	n/a
Fixed Stations – Pesticides & SVOCs									
Pesticide Compounds GC/MS EHL-S125 or EPA Method 525.2	every day (LFB)	1/20 minimum	1/20	1/20 for SDWA pest. 1/45 for others	1/20 or 1/extract batch	1/quarter	every sample	every sample	n/a

1 Continuing calibration verification standards (CCVs) shall be run according to the test method or at the beginning and end of a run batch and at a rate of 5%., whichever is greater.

2 Laboratories shall analyze MS/MSDs at a rate of 1 per batch or 5%, whichever is greater.

SECTION B5

Table B5-2
LABORATORY QUALITY CONTROL CHECK FREQUENCIES

Parameters and Test Procedures	Calibration[1] and/or Verification	Sample Lab Duplicate	MS/ MSD[2]	LCS	Method Blank	External QC Standard	Surrogate	Serial Dilution	Interference Check
Glyphosate HPLC/PCD EPA Method 547	every day(LFB)	1/20 minimum	1/20	1/20 for SDWA pest. 1/45 for others	1/20 or 1/extract batch	1/quarter	every sample	every sample	n/a
Herbicides/ Pesticides HPLC/PDA (EHL-L131)	1/batch(LFB)	1/20 minimum	1/20	1/20	1/20	N/A	N/A	N/A	n/a

SECTION B6

B6 PREVENTIVE MAINTENANCE

Preventive maintenance is the planned upkeep program for measurement instruments which enhances the instrument performance, ensures accurate and precise readings, and prolongs useful life. Records are kept within the Preventive Maintenance Plan (PMP), an electronic equipment management system used to track equipment inventory and related calibration and maintenance schedules, for each measurement instrument. It includes the preventive maintenance schedule, their frequency, location of maintenance, parts kept in supply, location of part (if not with instrument).

B6.1 Field Instrument Preventive Maintenance

Field equipment maintenance frequency and responsibilities are described in OWQ WAPB SOPs:

1042 General Equipment Maintenance Duties. See "*Surveillance Group SOP Manual"*, (**Appendix F)**.

2011 Operational Equipment Manuals and Procedures. See "*Biological Studies Section SOP Manual"*, **(Appendix G)**.

The following table summarizes major field equipment and the maintenance frequency.

Table B6.1-1
Field Equipment Maintenance

Equipment Item	Maintenance Item	Frequency
Boat	Maintenance/Repair	As needed
Boat Trailer	Inspection, repack wheel bearings, check lights, check bunks, check tires	Annually
Boat Motor	Maintenance of engine oil, lower gear lube, propellers, state of turn of engine	Annually
Data Sondes - YSI 6600, YSI 6920, YSI EXO1, Hydrolab MS 5, Hydrolab Quanta	Calibration, when being used regularly	Weekly
Electro Shock Boxes	Factory Calibration	Every two years
Electro Shock Backpacks	Factory Calibration	Every two years
Fire Extinguishers	Inspection	Annually
Generators	Maintenance	Annually

SECTION B7

Equipment Item	Maintenance Item	Frequency
GPS Units - Trimble Juno ™	Update software	As new software comes available
pH Meters - Oakton Acorn Series 4 and 5	Calibration, when being used regularly	Weekly
Turbidimeters - Hach 2100P, Hach 2100Q	Calibration, when being used regularly	Monthly
Weighing Scales	Calibration	Annually

Each section maintains hardcopy logs of equipment calibration and equipment status. The PMP is anticipated to replace the hardcopy logs and management.

B6.2 Laboratory Instrument Preventive Maintenance

Preventive maintenance procedures at set frequencies for all analytical instruments and measurement equipment used in the performance of analytical services for the OWQ are required of each analytical laboratory in accordance with IDEM RFQ, or IDEM RFP. Written SOPs which demonstrate that the contract laboratory is capable of providing the services requested in the IDEM RFQ, or IDEM RFP, (Technical Specifications), are required of each contract laboratory. Preventive maintenance is an element of laboratory system audits.

SECTION B7

B7 CALIBRATION PROCEDURES AND FREQUENCY

Measurement equipment requires periodic calibration or standardization in order to reliably produce accurate results. Instrument calibration procedures and frequency are described within the standard operating procedure for each field and laboratory instrument. Calibration and standardization information collected and stored within the PMP and the laboratory instruments (if applicable).

B7.1 Field Instrument Calibration

Procedures for field instrument calibration are contained in the "*Biological Studies Section Standard Operating Procedures Manual*", (**Appendix F**), WQSSB/SOP 2004, and in the *Surveys Section Field Procedure Manual. Revised June 2002*, **(Appendix G),** Section 2. Each of these procedure manuals or SOPs have been previously submitted to U.S. EPA Region 5 from the Water Quality Surveillance and Standards Branch, WQSSB, (now the WAPB). An index of the two sets of SOPs is provided with this QAPP (See **Appendix H**).

B7.2 Laboratory Instrument Calibration

Contract laboratories providing analytical services to the WAPB water quality monitoring programs are required to document calibration procedures and frequency in compliance with the IDEM RFP. (See IDEM RFP 16-74, **Appendix B,** RFP 16-88, **Appendix C,** and IDEM RFP 5-60, **Appendix D**).

B8 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

Supplies and consumables are inspected to requisition requirements and accepted by the project managers per IDEM DOA regulations and the IDEM OWQ Quality Management Plan Section 4.0 (IDEM 2012b).

SECTION C1

C ASSESSMENT/OVERSIGHT

C1 ASSESSMENTS AND RESPONSE ACTIONS

Two kinds of audits are conducted in order to verify that quality control procedures are being followed and that the quality assurance system is functioning effectively. The performance audit is an independent evaluation, through review of internal quality control checks and procedures, of the quality of data being generated. The system audit is an on-site review and evaluation of facilities, instrumentation, quality control practices, data validation, and documentation practices.

C1.1 Field Performance and System Audits

Data quality is evaluated by the OWQ WAPB staff after each sampling event in order to assess data usability. Field performance measurements include:

- Precision: RPD between field duplicate measurements.
- Accuracy: %R of field references or of matrix spikes in samples analyzed in the lab.
- Completeness: % planned samples that are actually collected, analyzed, reported, and useable for each project.

QA staff perform a system audit once a year before or at the beginning of the field season. Specific system audits are performed throughout the field season on data collection and sampling procedures to ensure continuity of data acquisition and determine person to person variability. System audits include, but may not be limited to:

- Sampling Work Plan reviews including data quality objectives and target parameters.
- Equipment calibration, maintenance, and frequency.
- Field data collection procedures.
- Sample collection and chain-of-custody procedures.

Field audits are conducted to ensure that sampling activities adhere to approved SOPs. Audits are systematically conducted by WAPB Quality Assurance staff to include all WAPB personnel that engage in field sampling activities. WAPB field staff involved with sample collection and preparation are evaluated by QA staff trained in the associated sampling SOPs, and in the processes related to conducting an audit. QA staff produce an evaluation report documenting each audit for review by those field staff audited, as well as

SECTION C1

WAPB management. Corrective actions are communicated to, and implemented by, field staff as a result of the audit process.

C1.2 Laboratory Performance and System Audits

Analytical laboratory results are audited for performance using quality control checks. QA staff audit reported results and included data deliverables at 100% frequency. Each sample set is reviewed and the data usability is determined. Laboratory performance measurements include:

- Precision: RPD of (LCS/LCSD) or (MS/MSD) pairs.
- Accuracy: % R of matrix spikes.
- Completeness: % of samples delivered to the laboratory that are analyzed, reported, and useable for each project.

Laboratory system audits are performed by the QAO or designee at the beginning of a laboratory contract and at least once a year during the contract. The system audit includes any or all of the operational quality control elements of the laboratory's quality assurance system. All applicable elements of this quality assurance project plan and the laboratory contract requirements are addressed including, but not limited, to those listed in **Table C1-1** below.

Table C1-1
Laboratory System Audit Elements

• Sample handling:	• Receiving, custody procedures, log in, storage, retention.
• Sample analysis:	• Written standard operating procedures, SOPs consistent with Acceptable U.S. EPA test methods and/or IDEM RFQ, or IDEM RFP specifications, availability to analysts, inclusion of QC samples specified in RFQ, or RFP.
• Record keeping:	• Written SOPs for all procedures associated with sample handling, analysis, and reporting.
• Preventive maintenance:	• Written SOPs and records for equipment maintenance.
• Proficiency testing:	• Analysts individually perform U.S. EPA reference sample analyses (WP or WS).
• Personnel requirements:	• Laboratory personnel meet contract required experience requirements.
• Training:	• Technical staff training and experience is documented that is appropriate for tasks assigned.

SECTION C1

• Workload:	• Holding times are met; sufficient manpower is available to handle the workload.
• Other:	• Any operational laboratory procedure influencing sample results, reporting, or procedural documentation.

SECTION C2

C2 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Quality assurance reports are submitted by the QAO upon completion of the data validation of a dataset, to the Program Manager or WAPB Branch Chief. This is done to ensure that problems arising during the sampling and analysis phases of the project are investigated and corrected. Each report addresses:

- Data assessment and qualification results since the last report.
- Field and laboratory audits performed since the last report.
- Significant quality assurance system and quality control task problems, recommended solutions, and status of corrective actions.
- Status of the extent to which project data quality objectives have been satisfied.

The QA Manager, relevant Section Chief, Project Manager, any technical staff working on corrective actions, and quality assurance staff receive copies of the progress reports when new developments arise. The corrective actions progress reports are stored in VFC along with the project coorespondence and are available for any interested parties.

C2.1 Corrective Actions

A nonconformity may be identified by any technical staff. Once identified, the individual Section Chief, Project Officer, or QA Officer is responsible for corrective action for the one or more programs within his/her responsibility. The Section Chief, Project Officer, or QA Officer is responsible for documenting the nonconformity, working with relevant staff members to develop corrective actions, and notifying the QA Manager of corrective action progress. Depending on the nonconformity and associated corrective actions either the Section Chief or the QA Officer approves the final corrective action.

SECTION D1

D DATA VALIDATION AND USABILITY

D1 DATA REDUCTION, VALIDATION, AND REPORTING

Data reduction, validation, and reporting, for both field and laboratory activities, are explained in this section. These activities are performed by field staff for data acquired in the field and by the contract laboratory in compliance with IDEM RFQ, and RFP requirements for the samples analyzed.

Data reduction is the process of converting raw analytical data into final results in proper reporting units. In most instances an equation is used to calculate both field and laboratory results.

Data validation is the process of qualifying analytical/ measurement data on the performance of the field and laboratory quality control measures incorporated into the sampling and analysis procedures. Field staff are responsible for validating data acquired in the field. Analytical laboratories are responsible for validating data from samples analyzed in the laboratory. WAPB QA staff review and perform data validation for 100% of the data received from a contract laboratory.

Data reporting is the detailed description of the data deliverables used to completely document the calibration, analysis, quality control measures, and calculations. Data acquired in the field are reported after reduction and validation by the responsible technical staff. Data from laboratory analyses are reported after laboratory reports the data are reviewed, assessed for quality assurance, and the data usability is determined by assigning 1 of 4 Data Quality Assessments (DQAs) Levels to the data.

SECTION D3

D3 RECONCILIATION WITH DATA QUALITY OBJECTIVES

D3.1 Data Quality Assessment

Data Quality Assessment (DQA) is the process of determining the scientific and statistical quality of data collected to satisfy the project data quality objectives. Field data and laboratory results are assessed for usability with regard to each specific project data quality objectives. **Section D1** on Data Reduction, Validation, and Reporting; and **Section C1.2** on Performance and System Audits describe the procedures used to produce data and to evaluate the data production system effectiveness.

Chain of Custody: The following items are reviewed to ensure they are complete and acceptable:

- Sampler Signature
- Custodian Signature
- Containers
- Collection Date(s)
- Receiving Time(s)
- Receiving Date(s)
- Preservatives
- Samples received and stored at proper temperatures

Quality Control (QC) Checks and Compliance:

- Summary Data Package
- Approved Analytical Methods
- Approved Detection and Reporting Limits
- Prep Dates
- Analysis Dates
- Holding Times
- Positive Control (> 0) – *E. coli and Total Coliforms Media Test*
- Negative Control – *E. coli and Total Coliforms Media Test*
- Beginning and Ending Sterility Controls (0) – *E. coli and Total Coliforms Media Test*
- Initial, Continuing, Method, Field, and Trip Blanks (< CRQL, MRL, or Control Limit)
- Field and Method Duplicate RPDs
- Matrix Spikes/Duplicate RPDs
- Laboratory Control Standards or Laboratory Fortified Blanks (± 20%)

SECTION D3

- Surrogates (< CRQL or Control Limit)
- Internal Standards (70% to 100%)
- Instrument Calibrations (Correlation Coefficient > 0.995)
- Initial and Continuing Calibration Verification Standards (± 10%)
- ICP Interference Check Standards (< CRQL or ≤ Control Limit; ± 20%)
- ICP Serial Dilutions (± 10%)
- System Performance

The level of Quality Assurance and the Data Quality Assessment (DQA) Level to which the analytical data qualify will be as follows:

D3.2 Data Quality Assessment (DQA) Levels

DQA Level 1 **Screening Data:** The results are usually generated onsite and have no QC checks. Analytical results, which include no QC checks, precision or accuracy information, or detection limit calculations are included in this category. Primarily, onsite data are used for presurveys and for preliminary rapid assessment.

DQA Level 2 **Field Analysis Data:** Data is recorded in the field or laboratory on calibrated or standardized equipment. Field duplicates are measured on a regular periodic basis. Calculations may be done in the field or later at the office. Analytical results with limited QC checks are included in this category. Detection limits and ranges have been set for each analysis. The QC checks information for field or laboratory results is useable for estimating precision, accuracy, and completeness for the project. Data from this category are used independently for rapid assessment and preliminary decisions.

DQA Level 3 **Laboratory Analytical Data:** Analytical results include QC check samples for each batch of samples from which precision, accuracy, and completeness can be determined. Method detection limits (MDLs) have been determined using 40 CFR Part 136 **Appendix B**. Additionally, all reporting information required in the laboratory contract, and in the *IDEM Surface Water Quality Monitoring and TMDL QAPP,* especially **Table A9-1,** are included in the analytical data reports. Raw data, chromatograms, spectrograms, and bench sheets are not included as part of the analytical report, but are maintained by the contract laboratory for easy retrieval and review upon request from WAPB. Data can be elevated from DQA Level 3 to DQA Level 4 by the inclusion of this information in the data report and the QC data are reported using CLP

forms or CLP format. Data falling under this category are considered as complete, legally defensible, and used for regulatory decisions.

DQA Level 4 **Enforcement Data:** *Analytical results mostly meet the U.S. EPA required Contract Laboratory Program (CLP) data analysis, Contract Required Quantification Limits (CRQL), and validation procedures.* QC data are reported on CLP forms or CLP format. Raw data, chromatograms, spectrograms, and bench sheets are included as part of the analytical report. Additionally, all reporting information required in the laboratory contract, and in the *IDEM Surface Water Quality Monitoring and TMDL QAPP,* especially **Table A9-1,** are included in the analytical data reports. Data falling under this category are considered as complete, legally quantitative in value, and used for regulatory decisions.

D3.2.2 Discussion on Data Quality Assessments (DQAs).

Data Quality Assessment **(DQA) Level 1**, for Screening Data, is used in surface water quality monitoring programs for presurveys and preliminary rapid assessment when precision and accuracy are not of concern. Most data received through grant projects and water column data received prior to 1996 are assigned to **DQA Level 1**. Stream and Lake Water quality assessment field measurements require **DQA Level 2** in order to assess compliance with water quality standards. **DQA Level 3** is required for most laboratory results and uses QA/QC protocols required by U.S. EPA which mostly comply with contract laboratory program (CLP). The Fixed Station Monitoring, Probabilistic Monitoring, Source Identification, TMDLs, most Special Projects, and Trace Metals programs require **DQA Level 3** for water quality assessments. Laboratory results from samples collected under the Fish Tissues and Sediment Contaminants Monitoring Program and used for Fish Consumption Advisories or projects that may be followed up with enforcement action require **DQA Level 4**.

The IDEM, RFQs, and RFPs require all laboratories performing analyses for OWQ to mostly meet CLP Protocol, Contract Required Quantification Limits (CRQLs), and data validation procedures. The full CLP protocol is not needed for IDEM regulatory decisions. Laboratory data can be elevated from **DQA Level 3** to **DQA Level 4** by the inclusion of raw data, bench sheets, and chromatograms in the analytical data reports. In addition, **DQA Level 4** QC data must be reported using CLP forms or CLP format. This gives OWQ the flexibility to review data, which were originally gathered for water quality assessment purposes, and to use the data in compliance actions.

SECTION D3

D3.2.3 Data Qualification and Categories

Environmental data are qualified and classified into four categories:

1. **Enforcement capable** results are DQA Level 3 or 4 data which meet all QC checks.
2. **Acceptable data** are DQA Level 2, 3 or 4 data suitable for decision making. Although a few data may be estimated or even unusable, the sample set as a whole has scientific and statistical integrity. Scientific and statistical decisions may be made with respect to the data quality objectives.
3. **Estimated data** may be suitable for enforcement or decision making on a case by case basis. Estimated data are suitable for determining future sampling needs, locating target parameters, and identifying possible contaminant levels.
4. **Rejected data** are not suitable for enforcement or for decision making.

D3.2.4 Data Qualifiers and Flags

Laboratory data is reviewed and qualified by QA staff using U.S. EPA CLP guidance for data validation. Data flags have two parts, a cause (U, Q, D, B, or H) and an action (R or J). For WAPB projects, data qualifiers and flags are assigned and entered into an IDEM electronic database (AIMS) record. The flags are used for both the individual test result and QA/QC Review Reports. **Table D3-1** lists data qualifiers and flags that are used for analytical results.

Table D3-1: Data Qualifiers and Flags

Flags	Description
R	**Rejected**. Result is not acceptable for use in decision making processes.
J	**Estimated**. The **use** of the result in decision making processes will be determined on **a case by case basis**.
U	**Between MDL and RL** -- The result of the parameter is **above** the Method Detection Limit (**MDL**) but **below** the Lab Reporting Limit (**RL**) and will be estimated.
Q	**QC Checks or Criteria** -- One or more of the QC checks or criteria are out of control

SECTION D3

Table D3-1: Data Qualifiers and Flags(Continued)

Flags	Description
D	**RPD for Duplicates** -- The Relative Percent Difference (RPD) for a parameter is outside the acceptable control limits. The parameter will be considered estimated or rejected on the basis listed below: If either the sample or duplicate value is less than the RL, and the other value exceeds 5 times the MDL, then the sample will be **estimated**. If the RPD is **outside** the established control limits (max. RPD) but **below** two times the established control limits (max. RPD), then the sample will be **estimated**. If the RPD is **twice** the established control limits (max. RPD) or greater, then the sample will be **rejected**.
B	**Blank Contamination** -- This parameter is found in a field or a lab blank. Whether the result is accepted, estimated, or rejected will be based upon the level of contamination listed below: If the result of the sample **is greater than the reporting limit** but **less than five times** the blank contamination, the result will be **rejected**. If the result of the sample is **between five and ten times** the blank contamination, the result will be **estimated**. If the result of the sample is **less than the reporting limit** or **greater than ten times** the blank contamination, the result will be **accepted**.
H	**Holding Time** -- The analysis for this parameter was performed out of the holding time. The results will be estimated or rejected on the basis listed below: If the analysis was performed between the holding time limit and 1.5 times the holding time limit, the result will be **estimated.** If the analysis was performed outside the 1.5 times the holding time limit, the result will be **rejected**.

D3.2.5 Data Assessment Guidelines

The following references are used by QA staff as guidelines in assessing data quality and usability and in assigning data qualifiers and flags:

"U.S. EPA Region 10: Quality Assurance Data Review Documents."

"Superfund Analytical Services and Contract Laboratory Program (CLP)."

"U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review", U.S. EPA Contract Laboratory Program, EPA-540-R-2016-001, September 2016, Washington DC.

"U.S. EPA Contract Laboratory Program National Functional Guidelines for High Resolution Superfund Methods Data Review", U.S. EPA Contract Laboratory Program, EPA-542-B-16-001, April 2016, Washington DC.

SECTION D3

"National Functional Guidelines for Superfund Organic Methods Data Review", U.S. EPA Contract Laboratory Program, "EPA-540-R-2016-002, September 2016, Washington DC.
"

"USEPA Contract Laboratory Program National Functional Guidelines for Chlorinated Dioxin/Furan Data Review", EPA-540-R-11-016, September 2011, Washington DC.

"Region 5 Standard Operating Procedure for Validation of CLP Inorganic Data," U.S. EPA Region 5, Central Regional Laboratory, 9/93, EPA 905/R-93/010, Washington DC.

"Region 5 Standard Operating Procedure for Validation of CLP Organic Data," U.S. EPA Region 5, Central Regional Laboratory, 1997.

"Using Qualified Data to Document an Observed Release and Background," U.S. EPA, Office of Solid Waste and Emergency Response," draft 10/93.

D3.3 Assessments And Response Actions

Corrective action is the process of modifying procedures and/or actions in order to remedy out of control deviations from the Quality Assurance Project Plan (QAPP) and bring them back into control. Corrective action is approved by the responsible Section Chief/ Project Officer and the QAO or designee. Each project section maintains a corrective action file to document corrective actions .

D3.3.1 Field Corrective Action

The Field Crew Chief assigned to the sampling event is responsible for all field decisions including corrective action. Any unusual or unexpected occurrence during data or sample collection is brought to the attention of the crew chief who decides: what actions should be taken immediately; what actions, if any, are necessary as a follow up. Field corrective actions are at the discretion of the field crew chief and are documented by the crew chief on return to the office. The Section Chief/ Project Officer will assign a staff member to follow up and document any further needed action.

D3.3.2 Laboratory Corrective Action

Each analytical or contract laboratory is required to maintain a corrective action program as indicated in the Technical Specifications of IDEM RFQ, or RFP. (See IDEM RFP 16-74**, Appendix B,** RFP 16-88, **Appendix C,** and IDEM RFP 5-60, **Appendix D**). The laboratory is required to document any corrective actions taken as a result of problems

during the handling, preparation, analysis, or reporting of analytical data to the IDEM/OWQ/WAPB. Corrective actions are documented in the case narrative section of the report for each sample set. Problems that indicate that the laboratory quality assurance system may be out of control will trigger a system audit by the QAO or a designee.

D3.3.3 Data Assessment and Qualification Corrective Action

Problems arising during data assessment and qualification which are due to laboratory or QA actions are brought to the attention of the QAO who determines if immediate corrective action is required. The Laboratory/Quality Assurance Coordinator then assigns a QA staff member to develop, and after approval, implement in-house the corrective action. Laboratory corrective actions are implemented according to IDEM (RFQ, or RFP) and contract requirements.

BIBLIOGRAPHY

Beckman T, Editor. 2002. *Surveys Section Field Procedure Manual. Revised June 2002*. Indiana Department of Environmental Management, OWQ, Assessment Branch, Surveys Section, Indianapolis, Indiana. IDEM 032/02/055/2002.

CWA 1997. The Clean Water Act of 1977. Public Law 92-500, as Amended, 33 U.S.C. 1251.

Diaz-Ramos, S., D. L. Stevens, Jr, and A. R. Olsen. 1996. EMAP Statistical Methods Manual. EPA/620/R-96/002, U.S. Environmental Protection Agency, Office of Research and Development, NHEERL-Western Ecology Division, Corvallis, Oregon.

Eaton, A. D. et. al., 1995. **Standard Methods** for the Examination of Water and Wastewater, 19th Edition. American Public Health Association, Washington, DC.

Eaton, A. D. et. al., 1998. **Standard Methods** for the Examination of Water and Wastewater, 20th Edition. American Public Health Association, Washington, DC.

Eaton, A. D. et. al., 2005. **Standard Methods** for the Examination of Water and Wastewater, 21th Edition. American Public Health Association, Washington, DC.

Eaton, A. D. et. al., 2012. **Standard Methods** for the Examination of Water and Wastewater, 22nd Edition. American Public Health Association, Washington, DC.

FR 1986. 40 CFR Part 136, Appendix B, Revised June 30, 1986.

FR 2000. 40 CFR Part 136, Appendix A, Revised Dec. 22, 2000.

FR 2012. 40 CFR Part 136, Revised May 18, 2012.

FR 2013. 40 CFR Part 141, Subpart C , Revised June 21, 2013.

Hill, K.H. Jr. 1989. "Manual of Laboratory Quality Assurance, III. Chlorinated Organics in Tissue", Indiana State Department of Health, January 1984, Rev. 12/89.

IDEM 1992. "Surveillance Group Current Operating Procedures Manual" (SG-SOP), Dec. 1992, Indianapolis, IN.

IDEM 1994. "Biological Studies Section Standard Operating Procedures Manual" (BSS-SOP), Dec. 1992, updated May 1994, Indianapolis, IN.

IDEM 1994. "Indiana Department of Environmental Management, OWQ, 1995 Program Plan", 11/1/94, Indianapolis, IN.

IDEM 2005. "State of Indiana Request for Proposals 5-60, Solicitation for: Environmental Services", Indiana Department of Administration, Indianapolis, IN, April 5, 2005.

IDEM 2010. "303(d) Appendix B: IDEM's Consolidated Assessment and Listing Methodology (CALM): 2010", Indiana Department of Environmental Management, OWQ, Indianapolis, IN. (http://www.in.gov/idem/nps/files/watersheds_methodology_calm.pdf)

IDEM 2011. "Indiana Water Quality Monitoring Strategy (WQMS) 2011-2019", Indiana Department of Environmental Management, OWQ, Indianapolis, IN. (http://in.gov/idem/cleanwater/files/swq_strategy_qapp.pdf)

IDEM 2012a. "Indiana Integrated Water Monitoring and Assessment Report: 2012", Indiana Department of Environmental Management, OWQ, Indianapolis, IN. (http://www.in.gov/idem/nps/files/305b_ir_report_2012_report.pdf)

IDEM 2012b. "OWQ Quality Management Plan", Indiana Department of Environmental Management, OWQ, Indianapolis, IN. (https://extranet.idem.in.gov/standards/docs/quality_improvement/qmps/owq_qmp_2012.pdf)

IDEM 2014a. "Indiana Integrated Water Monitoring and Assessment Report: 2014", Indiana Department of Environmental Management, OWQ, Indianapolis, IN. (http://www.in.gov/idem/nps/2647.htm)

IDEM 2014b. "Appendix I: Addendum to the Indiana Department of Environmental Management OWQ 2014 Integrated Water Monitoring and Assessment Report", Indiana Department of Environmental Management, OWQ, Indianapolis, IN. (http://www.in.gov/idem/nps/2647.htm)

IDEM. 2014. Guidance for Conducting a Demonstration as a Requirement of a 316(a) Alternative Thermal Effluent Limitation Request. Office of Water Quality, Indiana Department of Environmental Management, Indianapolis, Indiana.

IDEM 2015. IDEM's Total Maximum Daily Load Program Priority Framework. Indianapolis, IN: Indiana Department of Environmental Management. (http://www.in.gov/idem/nps/files/ir_2016_report_apndx_l_attch_3.pdf)

IDEM 2016. "State of Indiana Request for Proposals 16-74, Solicitation for: Laboratory Analytical Services", Indiana Department of Administration, Indianapolis, IN, February 26, 2016.

IDEM 2016a. "Addendum to the Indiana Department of Environmental Management OWQ 2016 Integrated Water Monitoring and Assessment Report", Indiana Department of Environmental Management, OWQ, Indianapolis, IN. (http://www.in.gov/idem/nps/2647.htm)

IDEM 2016b. "State of Indiana Request for Proposals 16-88, Solicitation for: Analytical Laboratory Services to Perform Analyses of Biological Tissues (fish) and Sediment Samples for Chemical Contaminants", Indiana Department of Administration, Indianapolis, IN, April 13, 2016.

IDEM 2016c. "Analysis of Cyanobacteria Toxins in Water Samples", Indiana Department of Environmental Management, S-001-OWQ-WAPTGM-16-T-R2, Technical Standard Operating Procedure Dated September 2016.

IDEM 2017 "EDI Format Description", Indiana Department of Environmental Management, Indianapolis, IN, Rev. 2017. (http://in.gov/idem/cleanwater/files/edf_edi_format_specification.pdf)

McMurray, P. "Trace Metal Methods for Fish", Indiana State Department of Health, Rev. 9/90.

Ohio EPA 1991. "Quality Assurance Project Plans Integrated Work Program", Ohio EPA, December 1991.

Stevens, D.L., Jr. 1997. Variable density grid-based sampling designs for continuous spatial populations. Environmetrics, 8:167-95.

Stevens, D. L., Jr., and A. R. Olsen. 2004. Spatially-balanced sampling of natural resources in the presence of frame imperfections. Journal of American Statistical Association:99:262-278.

Uhler, A.D., M. Clower, and G. Miller. 1988. "Analysis for Tributyltin, and Monobutyltin in Fish and Shellfish via n-pentyl Derivatization and GC/FPD", U.S.FDA. Laboratory Information Bulletin No. 3256.

Uhler, A.D., and G.S. Durell. 1989. "Measurement of Butyltin Species in Sediments by n-pentyl Derivation with Gas Chromatography/Flame Photometric Detection (GC/FPD)", Batelle Ocean Sciences Project No. N-0519-6100, Duxbury, MA.

U.S. EPA 1979. "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA 600/4-79/019, March 1979. Washington, DC.

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

U.S. EPA 1984. "Policy and Program Requirements to Implement the Mandatory Quality Assurance Program", EPA Order 5360.1, April 1984, Reissued May 5, 2000.

U.S. EPA 1986. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, November 1986, Washington, DC. (https://www.epa.gov/hw-sw846)

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

U.S. EPA 1989. "Guidelines for the Preparation of Standard Operating Procedures (SOPs) for Field and Laboratory Measurements", U.S. EPA Region 5, QA Section, 3/16/89.

U.S. EPA 1991a. "Draft Analytical Methods for Determination of Acid Volatile Sulfide (AVS) in Sediment", EPA 821/R-91-100, Washington, DC.

U.S. EPA 1991b. Quality Assurance Management Staff, 1991. "Planning for Data Collection, The Data Quality Objectives Process for Environmental Decisions", Draft, Oct. 16, 1991.

U.S. EPA 1991. "Region 5 Model RCRA Quality Assurance Project Plan (QAPjpP)", Office of RCRA, May 1991.

U.S. EPA 1993. "Region 5 Standard Operating Procedure for Validation of CLP Organic Data", U.S. EPA Region 5, Central Regional Laboratory, 4/91, revised 9/93.

U.S. EPA 1993. "Region 5 Standard Operating Procedure for Validation of CLP Inorganic Data." U.S. EPA Region 5, Central Regional Laboratory, EPA 905R93010, 9/93.

U.S. EPA 1993. "Using Qualified Data to Document an Observed Release and Background", U.S. EPA, Office of Solid Waste and Emergency Response", , EPA/540/F-94/028, July 1994.

U.S. EPA 1994a. "Content Requirements for Quality Assurance Project Plans for Water division Programs", U.S. EPA Region 5, QA Section, Revision 0, August 1994.

U.S. EPA 1996. "Method 1613B: Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS", U.S. Environmental Protection Agency. Washington, DC., October 1994, Revision B 1996.

U.S. EPA 1996. "Method 9014: Titrimetric and Manual Spectrophotometric Determinative Methods for Cyanide", U.S. Environmental Protection Agency. Washington, DC., December 1996.

U.S. EPA 2000a. "Guidance for Data Quality Assessment, Practical Methods for Data Analysis - EPA QA/G-9", EPA 600/R-96/084, July 2000, Washington, DC.

U.S. EPA 2000b. "Guidance for the Data Quality Objectives Process – EPA QA/G4", U.S. EPA Region 5, EPA/600/R-96/055, August 2000, Washington, DC

U.S. EPA 2001a. "EPA Requirements for Quality Assurance Project Plans – EPA QA/R-5", EPA/240/B-01/003, March 2001, Washington, DC.

U.S. EPA 2001b. "Method 1630 (DRAFT): Methyl Mercury in Water by Distillation, Aqueous Purge and Trap, and CVAFS.", U.S. Environmental Protection Agency. Washington, DC., EPA-821-R-01-020, January 2001.

U.S. EPA 2002a. "Guidance for Quality Assurance Project Plans – EPA QA/G-5", EPA/240/R-02/009, July 2002, Washington, DC.

U.S. EPA 2002b. "Method 1631, Revision E: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry", U.S. Environmental Protection Agency. Washington, DC., EPA-821-R-02-019, August 2002.

U.S. EPA 2003. "Method 8323: Determination of Organotins by Micro-Liquid Chromatography-Electrospray Ion Trap Mass Spectrometry. U.S. Environmental Protection Agency. Washington, DC.

U.S. EPA 2004a. Method 9012B Revision 2: Total and Amenable Cyanide (Automated Colorimetric With Off-Line Distillation). U.S. Environmental Protection Agency. Washington, DC.

U.S. EPA 2004b. Method OIA-1677: Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry. Office of Water, Engineering and Analysis Division (4303). EPA-821-R-04-001, January 2004.

U.S. EPA 2005. S. Environmental Protection Agency. 2005. Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act, July 29, 2005. Washington, D.C.: U.S. Environmental Protection Agency.

U.S. EPA 2006a. "Guidance on Systematic Planning Using the Data Quality Objective Process - EPA QA/G-4", EPA/240/B-06/001, February 2006, Washington, DC.

U.S. EPA 2006b. Method 8260 Revision C: Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS). U.S. Environmental Protection Agency. Washington, DC.

U.S. EPA 2007a. Method 6020A: Inductively Coupled Plasma-Mass Spectrometry. U.S. Environmental Protection Agency. February 2007, Washington, DC.

U.S. EPA 2007b. Method 8081B Revision 2: Organochlorine Pesticides by Gas Chromatography. U.S. Environmental Protection Agency. Washington, DC.

U.S. EPA 2007c. Method 8082A Revision 1: Polychlorinated Biphenyls (PCBs) by Gas Chromatography. U.S. Environmental Protection Agency. Washington, DC.

U.S. EPA 2007d. Method 8270D, Revision 4: Semivolatile Organic Compounds by Gas Chromatography Mass Spectrometry (GC/MS). U.S. Environmental Protection Agency. Washington, DC.

U.S. EPA 2008a. Method 1668, Revision B: Chlorinated Biphenyls Congeners in Water, Soil, Sediment, and Tissue by HRGC/HRMS. U.S. Environmental Protection Agency. Washington, DC. EPA/821/R/08/020.

U.S. EPA 2010b. Method 1614 DRAFT: Brominated Diphenyl Ethers in Water, Soil, Sediment, and Tissue by HRGC/HRMS. U.S. Environmental Protection Agency. Washington, DC., EPA-821-R-10-005, May 2010.

U.S. EPA 2011a. "USEPA Contract Laboratory Program National Functional Guidelines for Chlorinated Dioxin/Furan Data Review", EPA-540-R-11-016, September 2011, Washington DC.

U.S. EPA 2016a. "U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review", U.S. EPA Contract Laboratory Program, EPA-540-R-2016-001, September 2016, Washington DC.

U.S. EPA 2016b. "National Functional Guidelines for Superfund Organic Methods Data Review", U.S. EPA Contract Laboratory Program, "EPA-540-R-2016-002, September 2016, Washington DC.

U.S. EPA 2016c. "U.S. EPA Contract Laboratory Program National Functional Guidelines for High Resolution Superfund Methods Data Review", U.S. EPA Contract Laboratory Program, EPA-542-B-16-001, April 2016, Washington DC.

Test Method References

1. American Public Health Association. 2005. Standard Methods for the Examination of Water and Wastewater, 21st Edition. Washington, DC. American Public Health Association, American Water Works Association, Water Environment Federation, http://www.standardmethods.org.

2. American Society for Testing and Materials, 2007, Standard Test Method for Particle-Size Analysis of Soils, D422-63(2007), Philadelphia, Pennsylvania, www.astm.org.

3. American Society for Testing and Materials, 2010, Standard, Standard Test Methods for Specific Gravity of Soil Solids by Water Pycnometer, D854-10, Philadelphia, Pennsylvania, www.astm.org.

4. American Society for Testing and Materials, 2011, Standard Specification for Reagent Water, D1193-06(2011), Philadelphia, Pennsylvania, www.astm.org.

5. American Society of Agronomy, Methods of Soil Analysis, 1982 Second Edition, Method 29-3.5.2.1 Walkley-Black Procedure.

6. IDEM 2015, Volunteer Stream Monitoring Training Manual, 9th Edition, http://www.in.gov/idem/riverwatch/files/volunteer_monitoring_manual.pdf

7. National Guidance For The Permitting, Monitoring, and Enforcement of Water Quality-Based Effluent Limitations Set Below Analytical Detection/Quantitation Levels. U.S. Environmental Protection Agency. Apr. 25, 2005.

8. Office of the Federal Register. 1994 (or most recent revision). Code of Federal Regulations Title 40, Part 136. Washington, DC. Office of the Federal Register National Archives and Records Administration.

9. Schmacher, Brian, Plumb, Russell H., Jr., and Fox, Richard. 1994. Great Lakes Dredged Material Testing and Evaluation Manual, Appendix F: Methods for Chemical and Physical Analyses. Las Vegas, NV: Environmental Monitoring Systems Laboratory. U.S. Environmental Protection Agency: Great Lakes National Program Office and U.S. Army Corps of Engineers, North Central Division.

10. U.S. Environmental Protection Agency, 1997, Method 446.0: In Vitro Determination of Chlorophylls a, b, c1 + c2 and Pheopigments in Marine and Freshwater Algae by Visible Spectrometry. Office of Research and Development.

11. U.S. Environmental Protection Agency. 1983. Methods for the Chemical Analysis of Water and Wastes. Washington, DC: U.S. Environmental Protection Agency. *EPA/600/*4-79-020.

12. U.S. Environmental Protection Agency. 1990. Methods for the Determination of Organic Compounds in Drinking Water, Supplement I. Washington, DC: U.S. Environmental Protection Agency. *EPA/600/4-90/020*.

13. U.S. Environmental Protection Agency. 1991. Draft Analytical Methods for Determination of Acid Volatile Sulfide (AVS) in Sediment. Washington, DC: U.S. Environmental Protection Agency Office of Water Office of Science and Technology, Health and Ecological Criteria Division, Washington, D.C. *EPA/821/R-91/100*.

14. U.S. Environmental Protection Agency. 1991. Methods for the Determination of Metals in Environmental Samples. Washington, DC: U.S. Environmental Protection Agency. *EPA/600/4-91/01*0.

15. U.S. Environmental Protection Agency. 1992. Methods for the Determination of Organic Compounds in Drinking Water, Supplement II. Washington, DC: U.S. Environmental Protection Agency. *EPA/600/R-92/129*.

16. U.S. Environmental Protection Agency. 1993. Methods for the Determination of Inorganic Substances in Environmental Samples. Washington, DC: U.S. Environmental Protection Agency. *EPA/600/R-93/100*.

17. U.S. Environmental Protection Agency. 1994. Methods for the Determination of Metals in Environmental Samples, Supplement I. Washington, DC: U.S. Environmental Protection Agency. *EPA/600/R-94/111*.

18. U.S. Environmental Protection Agency. 1995. Methods for the Determination of Organic Compounds in Drinking Water, Supplement III. Washington, DC: U.S. Environmental Protection Agency. *EPA/600/R-95/131*.

19. U.S. Environmental Protection Agency. 1980. Prescribed Procedures for Measurement of Radioactivity in Drinking Water. Washington, DC: U.S. Environmental Protection Agency, EMSL. EPA-600 4-80-032.

20. U.S. Environmental Protection Agency. 1994. Test Methods for Evaluating Solid Waste Physical/Chemical Methods, (SW-846) Revision II, Third Edition. Washington, DC: U.S. Environmental Protection Agency.

21. U.S. Environmental Protection Agency. 1994. Method 1613: Tetra- Through Octa- Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS, Revision B. Washington, DC: U.S. Environmental Protection Agency, Office of Water. EPA 821-B-94-005. (Requests for copies: Water Resource Center 202/260-7786 or 202/260-2814).

22. U.S. Environmental Protection Agency. 1994. Technical Notes on Drinking Water Methods. Washington, DC: U.S. Environmental Protection Agency, Office of Research and Development. *EPA/600/R-94/173*.

23. U.S. Environmental Protection Agency. 1996. ICR Microbial Laboratory Manual. Washington, DC, Office of Research and Development. *EPA/600/R-95/178.*

24. U.S. Environmental Protection Agency. 1996. Method 1636: Determination of Hexavalent Chromium by Ion Chromatography. Washington, DC, Office of Water Engineering and Analysis Division (4303). EPA 821-R-95-029.

25. U.S. Environmental Protection Agency. 1996. Method 1637: Determination of Trace Elements in Ambient Waters by Chelation Preconcentration with Graphite Furnace Atomic Absorption. Office of Water (4303). EPA 821-R-95-030.

26. U.S. Environmental Protection Agency. 1996. Method 1638: Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma-Mass Spectrometry. Office of Water (4303). EPA 821-R-95-031.

27. U.S. Environmental Protection Agency. 1996. Method 1639: Determination of Trace Elements in Ambient Waters by Stabilized Temperature Graphite Furnace Atomic Absorption. Office of Water (4303). EPA 821-R-95-032.

28. U.S. Environmental Protection Agency. 1996. Method 515.3, "Stand Alone Version", Determination of Chlorinated Acid in Drinking Water by Liquid-Liquid Extraction, Derivatization and Gas Chromatography with Electron Capture Detection, Revision 1.0.

29. U.S. Environmental Protection Agency. 1997. Method 1640: Determination of Trace Elements in Ambient Waters by On-Line Chelation Preconcentration and Inductively Coupled Plasma-Mass Spectrometry. Office of Water (4303). EPA 821-R-95-033.

30. U.S. Environmental Protection Agency. 1997. Method 549.2, Determination of Diquat and Paraquat In Drinking water by Liquid-Solid Extraction and High Performance Liquid Chromatography with Ultraviolet Detection, Revision 1.0.

31. U.S. Environmental Protection Agency. 1998. Method 1630, Methyl Mercury in Water by Distillation, Aqueous Ethylation. Office of Water. Engineering and Analysis Division (4303).

32. U.S. Environmental Protection Agency. 1998. Method 1632 Revision A: Determination of Inorganic Arsenic in Water by Hydride Generation Flame Atomic Absorption. Washington, DC, Office of Water Engineering and Analysis Division (4303).

33. U.S. Environmental Protection Agency. 1999. Method 1678: Total Cyanide Determination. Office of Water, Engineering and Analysis Division (4303).

34. U.S. Environmental Protection Agency. 2002. Method 1631. Revision E: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry. Office of Water (4303). EPA-821-R-02-019.

35. U.S. Environmental Protection Agency. 2004. Method OIA-1677: Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry. Office of Water, Engineering and Analysis Division(4303). EPA-821-R-04-001.

36. U.S. Environmental Protection Agency. 2005, Method 535, Measurement of Chloroacetanilide and Other Acetamide Herbicide Degradates in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS), Revision 1.1, U.S. Environmental Protection Agency Office of Water Office of Science and Technology, Health and Ecological Criteria Division, Washington, D.C., EPA/600/R-05/053

37. U.S. Environmental Protection Agency. 2008. . Method 1668B, DRAFT: Toxic PCBs by Isotope Dilution HRGC/HRMS. Washington, DC: U.S. Environmental Protection Agency. Washington, DC: U.S. Environmental Protection Agency, Office of Water. EPA-821-R-08-020.

38. U.S. Environmental Protection Agency. 2010. Method 1664, Revision B: N-Hexane Extractable Material (HEM; Oil and Grease) and Silica Get Treated N_Hexane Extractable Material (SGT-HEM; Non-polar Material) by Extraction and Gravimetry. Office of Water, Engineering and Analysis Division (4303). EPA-821-R-10-001.

39. U.S. Geological Survey, 1977, National Handbook of Recommended Methods for Water Data Acquisition, Chapter 3, Sediment. (June 1978 Revision)

SOP References

1. IDEM 2008. "Creating a Load Duration Curve for a TMDL", (S-002-OWQ-W-WE-08-S-R0), Jul. 2008, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-002-OWQ-W-WE-08-S-R0.pdf)

2. IDEM 2008. "Creating a Water Quality Duration Curve for a TMDL", (S-005-OWQ-W-WE-08-S-R0), Jul. 2008, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-005-OWQ-W-WE-08-S-R0.pdf)

3. IDEM 2008. "Data and Information Gathering for TMDL Development", (S-001-OWQ-W-WE-08-S-R0), Jul. 2008, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-001-OWQ-W-WE-08-S-R0.pdf)

4. IDEM 2008. "Outreach Activities for a Draft TMDL", (S-003-OWQ-W-WE-08-S-R0), Jul. 2008, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-003-OWQ-W-WE-08-S-R0.pdf)

5. IDEM 2008. "Outreach Activities for a TMDL Kickoff", (S-004-OWQ-W-WE-08-S-R0), Jul. 2008, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-004-OWQ-W-WE-08-S-R0.pdf)

6. IDEM 2010. "Lake_Macrophyte_Assemblage_Collection_SOP ", (S-001-OWQ-W-BS-10-T-R0), Oct. 2010, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-001-OWQ-W-BS-10-S-R0.pdf)

7. IDEM 2010. "Multi-habitat (MHAB) Macroinvertebrate Collection Procedure", (S-001-OWQ-W-BS-10-T-R0), Oct. 2010, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-001-OWQ-W-BS-10-S-R0.pdf)

8. IDEM 2014. "Nonpoint Source (NPS) Data Management SOP", (S-002-OWQ-WAP-TL-14-S-R0), Dec. 2014, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-002-OWQ-WAP-TL-14-S-R0.pdf)

9. IDEM 2014. "Reviewing Nonpoint Source (NPS) Grantee Quality Assurance Project Plans (QAPPS)", (S-001-OWQ-W-TL-13-S-R0), Jan. 2014, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-001-OWQ-W-TL-13-S-R0.pdf)

10. IDEM 2015. "Cyanobacteria Identification and Enumeration", (B-002-WAP-XX-15-T-R0), Dec. 2015, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/B-002-WAP-XX-15-T-R0.pdf)

11. IDEM 2015. "Global Positioning System (GPS) Data Creation", (B-001-OWQ-WAP-XXX-15-T-R0), Feb. 2015, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/B-001-OWQ-WAP-XXX-15-T-R0.pdf)

12. IDEM 2015. "Processing and Indentification of Diatom Samples", (B-002-OWQ-WAP-TGM-15-T-R0), Sep. 2015, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/B-002-OWQ-WAP-TGM-15-T-R0.pdf)

13. IDEM 2016. "Analysis of Cyanobacteria Toxins in Water Samples", (S-001-OWQ-WAPTGM-16-T-R2), Sep. 2016, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-001-OWQ-WAP-TGM-16-T-R2.pdf)

14. IDEM 2016. "Procedures for Completing the Qualitative Habitat Evaluation Index", (B-003-OWQ-WAP-XX-16-T-R0), Dec. 2016, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/B-003-OWQ-WAP-XX-16-T-R0.pdf)

15. IDEM 2017. "Collecting Surface Water Samples for Cyanobacteria and Cyanotoxin Analysis", (S-003-OWQ-WAP-TGM-17-T-R0), Jan. 2017, Indianapolis, IN, (https://extranet.idem.in.gov/standards/docs/sops/owq/S-003-OWQ-WAP-TGM-17-T-R0.pdf)

APPENDIX A

Definitions

DEFINITIONS

The following are definitions IDEM/OWQ utilizes in interpretation of terminology referenced in IDEM QAPPs, Sampling and Analysis Workplans, and Request for Proposals. Contractors must use the IDEM Definition column when referring to the item listed.
Cross Ref represents typical industry acronyms or terms.

Definitions

IDEM Definition	Cross Ref	Type	Description
% Solids			Total percent solids as determined in a 103-105 degree Centigrade oven.
Ambient Water			Waters in the natural environment (e.g., rivers, lakes, streams, and other receiving waters), as opposed to effluent discharges.
Accuracy			Accuracy is the degree to which an observed value and an accepted reference value agree. Percent recovery (%R) of reference standards is calculated as indicated below: $\%R = \frac{(A - B) \times 100}{C}$ where: A = Analyte concentration determined experimentally with known quantity of reference material added. B = Background determined by separate (unspiked) analysis of sample, or in the field, a blank. C = True value of reference standard added.
Analytical Shift			All of the 12-hour period during which analyses are performed. The period begins with the analysis of the LFB and ends exactly 12 hours later. All analyses both started and completed within this 12-hour period are valid.
ASTM Type 1		Reagent Water	Water demonstrated to be free from the analyte(s) of interest and potentially interfering substances at the MDL for an analyte in the referenced method. Type I reagent water has a minimum resistivity of 10 megohms-cm, @ 25°C (in-line).

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
Batch			A group of samples extracted, digested, diluted, or treated and analyzed at the same time and in the same manner. Refer to the relevant method for defining the size of a batch. When no batch size is specified, a batch is comprised of 10 or less samples. Reagents, reagent water and solid phase disks or cartridges (SP's), used for sample prep, internal standards, spike solutions, surrogates, etc., must be prepared or drawn from the same source or lot. A new batch must be started with any change in lot or solution. If a solution of reagents, e.g. fortification solution or CCC solution, is changed, a new batch must be created, even if the individual lot numbers of reagents, in the new solution, are the same as used in the old solution. If reagent water is exhausted before reaching the limit of a batch, a new batch must be created. If a new lot of SP's are used, a new batch must be created.
BOD			Biochemical Oxygen Demand.
BTU			British Thermal Unit.
Bubbler Blank			The process of analyzing water in the bubbler, including purging Hg from the water, trapping the Hg purged on a sample trap, desorbing the Hg onto an analytical trap, desorbing the Hg from the analytical trap, and determining the amount of Hg present. The blank is somewhat different between days, and the average of a minimum of the results from three bubbler blanks must be subtracted from all standards and samples before reporting the results for these standards and samples.
CAL		Calibration Standard	A solution prepared from the dilution of stock standard solutions. The CAL solutions are used to calibrate the instrument response with respect to analyte concentration.
Case			A case consists of a finite number of samples collected over a given time period from a particular site. This is also referred to as a sample set.
CB		Calibration Blank	A volume of ASTM type I water or reagent water fortified with the same matrix as the calibrations standards, but without the analytes, internal standards, or surrogate analytes. The calibration blank is a zero standard and is used to define the baseline of the instrument.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
CCC		Continuing Calibration Check	Used to demonstrate acceptable initial calibration and confirm continued acceptable analytical performance. The CCC is ran immediately after initial calibration, recalibration and periodically throughout an analysis. With methods that utilize procedural standards (see PSC), analysis of the LFB may be used as a CCC, unless prohibited by the method.
CCC	CCV	Continuing Calibration Verification	See Continuing Calibration Check (CCC).
CF			Calibration Factor.
COD			Chemical Oxygen Demand.
Completeness			Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained for that measurement. The percent completeness for the project is stated for both field and laboratory analyses as follows: % Completeness = (number of valid measurements) x 100 / (number of measurements planned) where: "valid measurements" refers to numbers of investigational samples obtained or to be obtained for a specific purpose, or in order to satisfy a particular project objective.
CRQL			Contract Required Quantitation Limits. CRQLs listed are the higher values of laboratory reported MDL= s or method MDL= s times a factor of 3.18 as recommended in USEPA wastewater compliance guidance. Typically the resulting values are rounded to number nearest to (1, 2, or 5) x 10^n, where n is an integer. CRQLs are equivalent to PQLs, MLs, RLs, or Method Reporting Limits (MRLs) in various methods and EPA guidance documentation.
D001			Ignitability - as defined in 40 CFR 261.21 and SW-846.
D002			Corrosivity - as defined in 40 CFR 261.22 and SW-846.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
D003			Reactivity - as defined in 40 CFR 261.23 and SW-846.
Data reduction			The process of converting raw analytical data into final results in proper reporting units. In most instances an equation is used to calculate both field and laboratory results.
Dissolved			The concentration of analyte that will pass through a 0.45 µm membrane filter assembly, prior to sample acidification.
DQA		Data Quality Assessment	Quality Assurance/Control assessment level specified in Section 2. Dictates QA/QC and reporting requirements.
Duplicate			One sample split into two laboratory samples and analyzed separately with identical procedures.
Elutriate			To purify, separate, or remove lighter or finer particles by washing, decanting, and settling.
EDD			Electronic Data Deliverable – Electronic file(s) created by a contractor for transmitting and reporting analytical data. Transmission specifications vary by OWQ group.
EDI			Electronic Data Import – Format Specification developed by IDEM WAPB for import of lab data and lab QC to the AIMS database.
EPTOX15			Extraction Procedure Toxicity with Organics - as defined in 40 CFR 261.24 and SW-846, including nickel.
Equipment Blank			An aliquot of reagent water that is subjected in the lab or field to all aspects sample collection and analysis, including contact with all sampling devices and apparatus for sample collection have been adequately cleaned before shipment to the field site. An acceptable equipment blank must be achieved before the sampling devices and apparatus are used for sample collection. In addition, equipment blanks should be run on random, representative sets of gloves, storage bags, and plastic wrap for each lot to determine if these materials are free from contamination before use.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
Extractor			The extractor used for the Extraction Procedure Toxicity test must be equivalent to those shown in Figures 103, Method 1310 of SW-846.
FD1 and FD2		Field Duplicates	Two separate samples collected at the same time and place under identical circumstances and treated exactly the same throughout field and laboratory procedures. Analyses of FD1 and FD2 give a measure of the precision associated with sample collection, preservation, and storage, as well as with laboratory procedure.
FIA			Flow Injection Analyzer.
Field Blank			Quality control blanks prepared on-site during sampling by pouring analyte-free water into appropriate sample containers for each analyte group of interest. Field blanks are chemically preserved, stored, transported and analyzed with the collected field samples.
FRB		Field Reagent Blank	An aliquot of reagent water or other blank matrix that is placed in a sample container in the laboratory and treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FRB is to determine if method analytes or other interferences are present in the field environment.
FRB	TB	Trip Blank	See Field Reagent Blank (FRB).
GC			Gas Chromatography
GC/MS			Gas Chromatography/Mass Spectroscopy
Geometric site			Sampling site chosen according to its drainage area within a watershed.
Holding Time			The holding time for a sample starts at the time a grab sample is collected or when the last grab sample component of a composite sample is collected during a collection event. Holding time ends when either the sample is prepared for an analysis (if applicable) or is analyzed for a parameter. In addition, the maximum time between a sample preparation step (such as a distillation or extraction) and the analysis step may be specified in the test method(s).

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
HPLC			High Pressure Liquid Chromatography
IC		Initial Calibration	Instrument Calibration performed using a series of calibration standards in accordance with method specifications. Instrument should be operational in accordance with manufacturer=s specifications and any additional tuning or performance checks must be completed and verified. Calibration curves used for subsequent analyses are generated.
IC			Ion Chromatography
ICP			Inductively Coupled Plasma
ICP-MS			Inductively Coupled Plasma Mass Spectroscopy
IDL		Instrumental Detection Limit	The concentration equivalent to the analyte signal which is equal to three times the standard deviation of a series of ten replicate measurements of a reagent blank signal at the same wavelength.
Intercomparison Study			An exercise in which samples are prepared and split by a reference laboratory, then analyzed by one or more testing laboratories and the reference laboratory. The intercomparison, with a reputable laboratory as the reference laboratory, serves as the best test of the precision and accuracy of the analyses at natural environmental levels.
IPR		Initial Precision & Recovery	Four aliquots of the ongoing precision and recovery standard analyzed to establish the ability to generate acceptable precision and accuracy. IPRs are performed before a method is used for the first time and any time the method or instrumentation is modified.
IR			Infrared Spectroscopy
IS		Internal Standard	A pure analyte(s) added to a sample, extract, or standard solution in known amount(s) and used to measure the relative responses of other method analytes and surrogates that are components of the same sample or solution. The internal standard must be an analyte that is not a sample component.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
LCS		Laboratory Control Standard	A standard usually certified by an outside agency that is used to measure the bias in a procedure. For certain constituents and matrices, use National Institute of Standards and Technology (NIST) or other national or international traceable sources (Standard Reference Materials), when available.
LD1 and LD2		Laboratory Duplicates	Two aliquots of the same sample taken in the laboratory from the same sample bottle and analyzed separately using the referenced method. Analyses of LD1 and LD2 indicate precision associated with laboratory procedures, but not with sample collection, preservation, transportation, or storage procedures.
LDR	LCR	Linear Calibration Range	See Linear Dynamic Range
LDR		Linear Dynamic Range	The concentration range over which the analytical curve remains linear.
Leachate			EP Toxicity, except with no addition of acetic acid. Specifications listed in 329 IAC 2, February 1, 1989.
LFB	OPR	Ongoing Precision & Recovery Standard	See Laboratory Fortified Blank (LFB).
LFB	LCS	Laboratory Control Sample	See Laboratory Fortified Blank (LFB).
LFB		Laboratory Fortified Blank	An aliquot of reagent water or other blank matrix to which known quantities of the method analytes are added in the laboratory. The LFB is analyzed exactly like a sample. Its purpose is to determine whether the methodology is in control and to assure that the results produced by the laboratory remain within the limits specified in the referenced methods for precision and accuracy.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
LFM	MS and MSD	Laboratory Fortified Sample Matrix	An aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for the concentrations found.
LLD	LOD	Lower Level of detection	[also called detection level and level of detection (LOD)]—the constituent concentration in reagent water that produces a signal 2(1.645)s above the mean of blank analyses (where s is the estimate of standard deviation). This establishes both Type I and Type II errors at 5%.
LPC		Laboratory Performance Check Solution	A solution of one or more compounds (analytes, surrogates, internal standard, or other test compounds) used to evaluate the performance of the instrument system with respect to a defined set of method criteria.
LPC	IPC	Instrument Performance Check Solution	See Laboratory Performance Check Solution (LPC).
LRB	MB	Method Blank	See Laboratory Reagent Blank (LRB).
LRB		Laboratory Reagent Blank	An aliquot of reagent water that is treated exactly as a sample including exposure to all glassware, equipment, reagents, and acids that are used with other samples. The LRB is used to determine if method analytes or other interferences are present in the laboratory environment, the reagents or apparatus.
LRB	PB	Preparation Blank	See Laboratory Reagent Blank (LRB).
Maximum Holding Time			The maximum time a sample may be stored before analysis.
May Not			This action, activity, or procedural step is prohibited.
May			This action, activity, or procedural step is optional.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
MDL		Method Detection Limit	The minimum concentration of an analyte that can be identified, measured and reported with 99% confidence that the analyte concentration is greater than zero. For seven replicates of the sample, the mean must be 3.14*s* above the blank result (where *s* is the standard deviation of the seven replicates). Compute MDL from replicate measurements of samples spiked with analyte at concentrations more than one to five times the estimated MDL. The MDL will be larger than the LLD because typically 7 or less replicates are used. Additionally, the MDL will vary with matrix. MDL's must be determined in accordance with 40 CFR, Part 136, Appendix B.
ML		Minimum Level	The lowest level at which the entire analytical system gives a recognizable signal and acceptable calibration point.
MRL	CRQL	Method Reporting Limit	MRLs listed are the higher values of laboratory reported MDL= s or method MDL= s times a factor of 3.18 as recommended in USEPA wastewater compliance guidance. Typically the resulting values are rounded to number nearest to (1, 2, or 5) x 10^n, where n is an integer. Method Reporting Limits (MRLs) are equivalent to PQLs, MLs, RLs, or in various methods and EPA guidance documentation. This defined concentration is no lower than the concentration of the lowest calibration standard for that analyte and can only be used if acceptable QC criteria for this standard are met.
MS and MSD	LFM	Matrix Spike & Matrix Spike Duplicate	Aliquots of an environmental sample to which known quantities of the analytes are added in the laboratory. The MS and MSD are analyzed exactly like a sample. Their purpose is to quantify the bias and precision caused by the sample matrix. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the MS and MSD corrected for background concentrations.
MS			Matrix Spike.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
MSA		Method of Standard Addition	The standard addition technique involves the use of the unknown and the unknown plus a known amount of standard. Method of Standard Additions as described in EPA 600/4-79-020
Must			This action, activity, or procedural step is required.
Neutral			The leaching method extraction as specified for
One (1) minute kick sample			A stationary method of sampling that is accomplished using a box-shaped net comprised of canvas bottom and/or sides and 504µm nylon mesh back. The designated area is sampled for one minute.
Out-of-Control			A condition which exists when a single analytical or instrumental evaluation measure fails to meet the criteria specified an analytical method, IDEM/OWQ contract, or instrument manufacturer's specification.
OWQ			Office of Water Quality.
OWQ Analysis Set			See Case
PCB			Polychlorinated Biphenyls.
PDS		Primary Dilution Standard Solution	A solution of several analytes prepared in the laboratory from stock standard solutions and diluted as needed to prepare calibration solutions and other needed analyte solutions.
Petroleum			Identification of petroleum fuel contamination Analysis - (gasoline, kerosene, diesel) using Gas Chromatography with a flame Ionization Detector, or using Gas Chromatography with a Photoionization Detector as per IDEM requests. Also, analysis of heavy oils using an Infrared Spectrophotometer.
Plasma Solution			A solution that is used to determine the optimum height above the work coil for viewing the plasma.
Pour Point			The outlet of a subwatershed or the common point where all the water flows out of any given subwatershed.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
PQL	CRQL	Practical Quantitation Limit	See Contract Required Quantitation Limit (CRQL)
ppb			Parts per Billion
ppm			Parts per Million
PSC		Procedural Standard Calibration	A calibration method where calibration standards are prepared and processed (e.g. purged, extracted, and/or derivatized) in exactly the same manner as a sample. All steps in the process from addition of sampling preservatives through instrumental analyses are included in the calibration. Using procedural standard calibration compensates for any inefficiencies in the processing procedures.
QA			Quality Assurance -- A definitive plan for laboratory operations that specifies the measures used to produce data with known precision and bias.
QAO			Quality Assurance Officer. The person responsible for all QA/QC and technical aspects of the contract. He/she manages all aspects of the laboratory program, including sampling.
QC			Quality Control -- A set of measures used during an analytical method to ensure that the process is within specified control parameters.
QCS		Quality Control Sample	A solution of method analytes of known concentrations which is used to fortify an aliquot of LRB matrix. The QCS is obtained from a source external to the laboratory and different from the source of calibration standards. It is used to check laboratory performance with test materials prepared external to the normal preparation process.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
RPD		Relative Percent Difference	The RPD is a measure of precision and the degree to which two or more measurements are in agreement. Relative percent difference (RPD) is calculated for each pair of duplicates as indicated below: $RPD = \frac{|(S - D)| \times 100}{(S + D) / 2}$ where: S = First sample value (original or matrix spike value) D = Second sample value (duplicate or matrix spike duplicate value)
Replicate			A repeated operation during an analytical procedure. Two or more analyses for the same constituent in an extract of one sample constitute replicate extract analyses.
RF			Response Factor.
RL			Reporting level — the lowest quantified level within an analytical method's operational range deemed reliable enough, and therefore appropriate, for reporting by the laboratory. RLs may be established by regulatory mandate or client specifications, or arbitrarily chosen based on a preferred level of acceptable reliability. Examples of RLs typically used (besides the MDL) include: Level Of Quantitation (LOQ) Minimum Quantifiable Level (MQL) Minimum Reporting Level (MRL)
RRF			Relative Response Factor
S.C.			Specific Conductance.
SA	SS	Surrogate Analyte	A pure analyte(s), which is extremely unlikely to be found in any sample, and which is added to a sample aliquot in known amount(s) before extraction or other processing and is measured with the same procedures used to measure other sample components. The purpose of the SA is to monitor method performance with each sample.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
Sample Set			See Case
SAS			Special Analytical Services - Non-routine analyses listed under Task SAS
Should			This action, activity, or procedural step is suggested but not required.
SIC		Special Interference Check Solution	A solution of selected method analytes of higher level concentrations which is used to evaluate the procedural routine for correcting known interelement spectral interferences with respect to a defined set of method criteria.
SPCC			System Performance Check Compound
Specificity			The qualitative measure of degree of separation of an analyte from other analytes and the sensitivity of the response of an analyte to an analytical procedure. A procedure with a high degree of specificity for an analyte would be able to resolve the analyte in a complex mixture and provide a sufficient detector response to quantify the analyte.
SSS		Stock Standard Solution	A solution containing an analyte that is prepared using a reference material traceable to EPA, the National Institute of Science and Technology (NIST), or a source that will attest to the purity and authenticity of the reference material.
SVOA			Semi-volatile Organics Analysis (Tasks 6). Compounds amenable to analysis by extraction with solvent. Used synonymously with Base/Neutral/Acid (BNA) compounds.
SW-846			"Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, Third Edition Nov. 1986, and any subsequent updates or amendments.
Targeted site			A sampling site intentionally selected based on specific monitoring objectives or decisions to be made.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
TCLP			Toxicity Characteristic Leachate Procedure - as defined in the Federal Register, Vol 55, No. 61, Thursday, March 29, 1990.
TKN			Total Kjeldahl Nitrogen.
TOC			Total Organic Carbon.
Total Coliforms			Total coliforms is a term used to measure the amount of coliform bacteria in drinking water and other substances consumed by humans. Coliforms are a large class of micro-organisms that are found in human and animal fecal matter and are used to determine whether the drinking water or other substance may have other disease-causing organisms in it. Water with a high total coliform level has a high probability of contamination by protozoa, viruses and bacteria that may be pathogenic.
Total Metals			Metals determined on an acid extracted sample as (OWQ per "Methods for Chemical Analysis of Water and Methods) -Wastes", EPA-600 4-79-020.
TOX			Total Organic Halide.
TPL			Target Parameter List.
Trip Blank			Trip blanks are only used for VOC samples. Blanks of VOC-free water are prepared by the organization providing sample containers for VOC collection. These blanks are transported to the site with the empty VOC sample containers and shipped to the analyzing laboratory in the same transport containers as the VOC samples. They remain unopened for the entire trip and are analyzed at the laboratory with the environmental VOC samples.
TRM		Total Recoverable Metals	The concentration of an analyte determined in an unfiltered sample following treatment by refluxing with hot, dilute mineral acid.
Tuning Solution			A solution which is used to determine acceptable instrument performance prior to calibration and sample analyses
Type I error	alpha error		The probability of determining that a constituent is present when it actually is absent.

DEFINITIONS

Definitions

IDEM Definition	Cross Ref	Type	Description
Type II error	beta error		The probability of not detecting a constituent that actually is present.
Ultraclean Handling			A series of established procedures designed to ensure that samples are not contaminated during sample collection, storage, or analysis.
VOA			Volatile Organics Analysis
VOC			Volatile Organic Compounds

APPENDIX B

State of Indiana Request for Proposals 16-74

Original on File

"State of Indiana Request for Proposals 16-74, Solicitation for: Laboratory Analytical Services", Indiana Department of Administration, Indianapolis, IN, February 26, 2016.
(http://www.in.gov/idoa/proc/bids/rfp-16-074/)

APPENDIX C

State of Indiana Request for Proposals 16-88

Original on File

"State of Indiana Request for Proposals 16-88, Solicitation for: Analytical Laboratory Services to Perform Analyses of Biological Tissues (Fish) and Sediment Samples for Chemical Contaminants", Indiana Department of Administration, Indianapolis, IN, April 13, 2016. (http://www.in.gov/idoa/proc/bids/16-088/)

APPENDIX D

State of Indiana Request for Proposals 5-60

Original on File

APPENDIX E

Surface Water Quality Monitoring Strategy 2011 - 2019

Original on File

"Indiana Water Quality Monitoring Strategy (WQMS) 2011-2019", Indiana Department of Environmental Management, OWQ, Indianapolis, IN. (http://in.gov/idem/cleanwater/files/swq_strategy_qapp.pdf)

APPENDIX F

Surveys Section Field Procedure Manual. Revised June 2002

Original on File

Surveys Section Field Procedure Manual. Revised June 2002. Indiana Department of Environmental Management, OWQ, Assessment Branch, Surveys Section, Indianapolis, Indiana. IDEM 032/02/055/2002. (http://monitoringprotocols.pbworks.com/f/IDEM+SurveysSOP2002.pdf)

APPENDIX G

BIOLOGICAL STUDIES SECTION SOP MANUAL

Original on File

APPENDIX H

INDEX FOR PROCEDURE MANUALS (SOPs)

1. SURVEILLANCE GROUP STANDARD OPERATING PROCEDURES MANUAL

2. BIOLOGICAL STUDIES SECTION STANDARD OPERATING PROCEDURES MANUAL

Original on File

APPENDIX I

OWQ/AB AIMS Database EDI Format Description

"EDI Format Description", Indiana Department of Environmental Management, Indianapolis, IN, Rev. 2017. (http://in.gov/idem/cleanwater/files/edf_edi_format_specification.pdf)

EDI FORMAT DESCRIPTION

This document identifies the Laboratory Results electronic reporting format required by the Indiana Department of Environmental Management - Office of Water Quality, Assessments Branch. Should there be any questions concerning the format please feel free to call Mike Sutton at (317) 308-3203, or Tim Bowren at (317) 308-3181.

The general layout is "pipe-delimited". There are several different record types, which are defined in separate sections in this document. Record type is specified in the first field of every record (Record ID). Details are as listed below:

Naming Conventions:

n = place holder for a Decimal Number (0-9)
X = place holder for text/other
M = place holder for a "Month" or "Minute" number
D = place holder for a "Date" number
Y = place holder for a "Year" number
H = place holder for an "Hour" number
S = place holder for a "Second" number

The file MUST BE SAVED in MS-DOS Text format.

Field names in **Bold Red** are Required fields.

Use the following Table for selection of Units:

UnitValue	Comments
CFU/100mL	Colony Forming Units / 100 mL
MPN/100mL	Most Probable Number / 100mL
g/cm3	Density
mg/Kg dw	Dry Weight
mg/L	milligrams/Liter (Water)
NTU	Turbidity units
SU	pH units
ug/Kg dw	Dry Weight
ug/L	micrograms/Liter (Water)
umho/cm	Conductivity
%	Percent
umoles/g	Molar Ratio for SEM
pg/L	picograms/Liter (Water)
%Recov	% Recovery
°C	Degrees Celsius
AMU	Atomic Mass Units
ug/Kg ww	Wet Weight
mg/Kg ww	Wet Weight
ng/L	nanograms/Liter (Water)
Ratio	to be used for Ratios without Units

DO NOT USE ANY OTHER UNITS WITHOUT PRIOR APPROVAL FROM IDEM/OWQ.

Use dry weight (dw) units for ALL sediment parameters unless specifically told otherwise by IDEM/OWQ.

Use wet weight (ww) units for ALL fish tissues parameters unless specifically told otherwise by IDEM/OWQ.

Recent Revisions to this Document:

3/1/2017	Added notes to show which fields are required fields for each record type. Required Fields are **Bold in Red**.
02/01/2016	Updated contact information for Technical Logistics and Services section chief. Corrected footnotes for Narrative Records.
06/05/2009	Added Method Detection Limit and Method Detection Limit Units to DS and QC records
6/10/2005	Added language clarifying selections from Units Table (page i) and the Note in Result Field in Sample Number Record (page 5).
6/28/2004	Updated units for coliforms
12/11/2003	Added descriptions for Dup_Reporting_Limit and Dup_Reporting_Limit_Units in the QC records where duplicates may be present. (DU, LC, MS)
5/15/2003	Merged EDI Export format Description with this document.
12/5/2002	Redefined Sample_Medium_ID where 'F' is Biological Tissues including Fish & Plants
10/30/2002	Corrected Typos
6/12/2002	This format is to be used for Lakes Data and Field Data. Added Sample_Depth, and Sample_Depth_Units to Sample Number Header/Footer Records. Added Descriptions for Field Data Records. These additional fields are only required if the EDI includes Lakes data or Field Measured Data (Dissolved oxygen, pH, Water Temperature, Specific conductivity, Turbidity, % Saturation, Chloride, Chlorophyll-a, or Weather Codes)
5/2/2002	Altered unique combination for QC records to CAS_Number + CAS_Num_Qualifier +Test_Method +Test_SubMethod + Sample_Medium_ID + RECORD_ID + RUN_BATCH_NUM + LAB_SAMPLE_NUM (See note on Page 10) Added units ng/L and Ratio to accepted units list.
3/25/2002	Added language Clarifying the Measure_Flags field in QC records is to record the QC Flag for the QC sample and not the regular sample.
3/12/2002	Added the reporting limit and reporting limit units fields to QC records. Modified examples to reflect the additional fields. Added instructions for reporting results below the Min. Reporting Limit or above the Max. Reporting Limit (see Sample Number Record Description) to QC Records Measured_Value, Dup_Measure_Value, True_Value
6/11/2001	Added instructions for reporting results below the Min. Reporting Limit or above the Max. Reporting Limit (see Sample Number Record Description). Added instructions for Lab_Sample_Num, Run_Batch_Num, or Prep_Batch_Num in Project Narrative Header/Footer Records. Added Table for selection of Units. Updated Table of Contents page references for QC Record types: IB, IC, CB, SI, LR
4/19/2001	Added Sample_Medium_ID to Sample Number and QC Header Records
3/28/2001	Added instructions in Sample Number Record for Results exceeding the maximum reporting limit for a test. Added Note in QC Records emphasizing each record must have a unique combination of : CAS_Number + CAS_Num_Qualifier +Test_Method +Test_SubMethod + Sample_Medium_ID + RECORD_ID + RUN_BATCH_NUM + RUN_DATE + RUN_TIME+LAB_SAMPLE_NUM Added Descriptive format for Bacteriological QC Records: KP, PA, EC. Revised Real World Example (final page). Revised Descriptions for Sample Narrative & Added a Table of Contents
2/26/2001	Added MS-DOS Text format requirement to the file requirements.
2/20/2001	Corrected Omissions in Format and Examples in record descriptions (pg. 15)
2/7/2001	Added Dup_Dilution_Mult to Lab QC Records & properly referenced Serial Dilutions in 'Duplicate' QC Records.
2/1/2001	Added choice of 'Free' to CAS_Num_Qualifier
1/29/2001	Replaced Date & Time of file/batch creation with Date_Rec (Date analysis set received by lab) and Time_Rec (Time analysis set received by lab) in: 1) Analysis Set Header/Footer Records 2) Sample Number Header/Footer Records
	Added Sample_Medium_ID to Analysis Set Header/Footer Records.
1/10/2001	Added File Revision Date to this Document.

TABLE OF CONTENTS

EDI Submission Set Header/Footer Records:

The EDI Submission Set Header Record is placed prior to the first line of an EDI Transmission file. An EDI Submission Set Footer Record is placed after the last line of the file, forming a matched pair.

Field Name	Description	Format	Example
Record_ID	Identifies EDI Submission Set Header Record (“HE”) Or – EDI Submission Set Footer Record (“FE”)	"HE" or “FE”	HE
Lab_ID	Name of Lab Submitting Lab Analysis Data Results	XXXXXXXX	ISDH
Date	Date of file/batch creation	MMDDYYYY	11191999
Time	24-Hour Time of file/batch creation	HHMMSS	220156
Count	Number of Records in this file, excluding EDI Submission Set Header and Footer Lines	nnnnn	43

Record_ID|Lab_ID|Date|Time|Count|

Description Example:

HE|XXXXXXXX|MMDDYYYY|HHMMSS|NNNNN|

Real World Example:

HE|ISDH|11191999|220156|43| (EDI Submission Set Header Record)
----Analysis Set1 Header Record---
----Sample Number1 Header Record---
----Sample Number1 Records---
----Sample Number1 Footer Record---
----Sample Number2 Header Record---
----Sample Number2 Records---
----Sample Number2 Footer Record---
----Narrative1 Header Record---
----Narrative1 Records---
----Narrative1 Footer Record---
----Narrative2 Header Record---
----Narrative2 Records---
----Narrative2 Footer Record---
----QC Header Record---
----QC Records---
----QC Footer Record---
----Analysis Set1 Footer Record---
----Analysis Set2 Header Record---
----Sample Number Header Record---
----Sample Number Records---
----Sample Number Footer Record---
----Narrative Header Record---
----Narrative Records---
----Narrative Footer Record---
----QC Header Record---
----QC Records---
----QC Footer Record---
----Analysis Set2 Footer Record---
FE|ISDH|11191999|220156|43| (EDI Submission Set Footer Record)

Analysis Set Header/Footer Records:

Analysis Set Header Records are placed prior to the first line of an Analysis Set Batch. An Analysis Set Footer Record is placed after the last line of the Analysis Set Batch, forming a matched pair.

Field Name	Description	Format	Example
Record_ID	Identifies Analysis Set Header Record ("HA") Or – Analysis Set Footer Record ("FA")	"HA" or "FA"	HA
Lab_ID	Name of Lab Submitting Lab Analysis Data Results	XXXXXXXX	ISDH
Lab_Job_Num	Number used internally by Lab to identify the entire group of samples being analyzed for IDEM	XXXXXXXX	BB345678
OWQ_Analysis_Set	IDEM Assigned Analysis Set Number	XXXXXXXX	00TSW190
Analysis_Set_SubmitCount	On first submission of analysis set test results, =1; if samples are re-analyzed & re-submitted, =2 (or 3 for a 2nd re-analysis/submittal, etc.)	NN	1
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Date_Rec	Date Analysis Set Received by Lab	MMDDYYYY	11191999
Time_Rec	24-Hour Time Analysis Set Received by Lab	HHMMSS	220156
Count	Number of Data Records in this batch (related to this specific Analysis Set Header Record)	nnnnnn	43

Record_ID|Lab_ID|Lab_Job_Num|OWQ_Analysis_Set|Analysis_Set_SubmitCount| Sample_Medium_ID | Date_Rec|Time_Rec|Count|

Description Example:
HA|XXXXXXXX| |XXXXXXXX|XXXXXXXX|NN|X|MMDDYYYY|HHMMSS|NNNN|

Real World Example:
HA|ISDH| |BB345678|00TSW190|1|W|11191999|220156|43| (Analysis Set Header Record)
----Sample Number1 Header Record---
----Sample Number1 Records---
----Sample Number1 Footer Record---
----Sample Number2 Header Record---
----Sample Number2 Records---
----Sample Number2 Footer Record---
----Narrative1 Header Record---
----Narrative1 Records---
----Narrative1 Footer Record---
----Narrative2 Header Record---
----Narrative2 Records---
----Narrative2 Footer Record---
----QC Header Record---
----QC Records---
----QC Footer Record---
FA|ISDH| |BB345678|00TSW190|1|11191999|220156|43| (Analysis Set Footer Record)

Sample Number Header/Footer Records:

Sample Number Header Records are placed prior to the first line of a Sample Number's lab analysis result set. A Sample Number Footer Record is placed after the last line of the Sample Number record, forming a matched pair.

Field Name	Description	Format	Example
Record_ID	Identifies Sample Number Header Record ("HS") Or – Sample Number Footer Record ("FS")	"HS" or "FS"	HS
Lab_ID	Name of Lab Submitting Lab Analysis Data Results	XXXXXXXX	ISDH
Sample_ID	IDEM assigned Sample ID	XXnnnnn	DA12345
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Lab_Sample_Num	Number used internally by Lab to identify IDEM Sample being analyzed	XXXXXXXX	AA345678
Lab_Job_Num	Number used internally by Lab to identify the entire group of samples being analyzed for IDEM	XXXXXXXX	BB345678
OWQ_Analysis_Set	IDEM Assigned Analysis Set Number	XXXXXXXX	00TSW190
Analysis_Set_SubmitCount	On first submission of analysis set test results, =1; if samples are re-analyzed & re-submitted, =2 (or 3 for a 2nd re-analysis/submittal, etc.)	NN	1
Date_Rec	Date Analysis Set Received by Lab	MMDDYYYY	11191999
Time_Rec	24-Hour Time Analysis Set Received by Lab	HHMMSS	220156
Count	Number of Data Records in this batch (related to this specific Header Record)	nnnn	43
Sample_Depth	Depth the sample was taken in meters (Use 0 for surface water samples)	NN.NN	6.00
Sample_Depth_Units	Units for Sample_Depth (leave blank if Sample_depth is not used)	XXX	m

Record_ID|Lab_ID|Sample_ID|Sample_Medium_ID|Lab_Sample_Num|Lab_Job_Num|OWQ_Analysis_Set|
Analysis_Set_SubmitCount|Date_Rec|Time_Rec|Count|Sample_Depth|Sample_Depth_Units|

Description Example:
HS|XXXXXXXX|XXNNNNN|X|XXXXXXXX|XXXXXXXX|XXXXXXXX|NN|MMDDYYYY|HHMMSS|NNNN|NNNN|XXX|

Real World Examples:
HS|ISDH|DA12345|W|AA345678|BB345678|00TSW190|1|11191999|220156|3| (Sample Number1 Header Record)
----Sample Number Record1---
----Sample Number Record2---
----Sample Number Record3---
FS|ISDH|DA12345|W|AA345678|BB345678|00TSW190|1|11191999|220156|3| (Sample Number1 Footer Record)
HS|ISDH|DA54321|S|345678|363783|00TSW190|1|11191999|142112|2| (Sample Number2 Footer Record)
----Sample Number2 Record1---
----Sample Number2 Record2---
FS|ISDH|DA54321|S|345678|363783|00TSW190|1|11191999|142112|2| (Sample Number2 Footer Record)

Sample Number Record:

Field Name	Description	Format	Example
Record_ID	Identifies Field Data Record	"DS"	DS
Lab_Sample_Num	Number used internally by Lab to identify IDEM Sample being analyzed	XXXXXXXX	AA345678
CAS_Number	CAS # of substance being tested for	XXXXXXXXXX	257301-77-2
CAS_Num_Qualifier	Does this record show the substance's value as 'Total' (=T), 'Dissolved' (=D), 'Free' (=F), or 'Simultaneously Extracted Metals' (SEM) (=S)?	"T", "D", "F", or "S"	T
Test_Method	Test method used by lab	XXXXXXXXXX	200.7
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Potential Values: 'N/A'=No Sub-Method; 'SCAN'=Scanning Mode; 'SIM'=Selection Ion Monitoring Mode	"N/A", "SCAN", or "SIM"	SCAN
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Report_Limit	Lab's Reporting limit for test (Method Reporting Limit X Dilution Multiplier) or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Report_Limit_Units	Lab Reporting limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Result	Parameter test result Use the following if the results are between the Method Detection Limit (MDL) and the Min. Reporting Limit (MRL): Case 1 (Actual Values Requested) then use the Actual value measured Case 2 (Actual Values Not Requested) then use "-1" In Case 1 and Case 2, include '<' in the **Result_Flags field.** if the Result exceeds the Max. Reporting Limit, then use '-2' in the Result field and include '>' in **Result_Flags field**.	nnnnnnnn.nnnn	5.0
Result_Units	Result Units (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Result_Flags	Lab Flags for this record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table) **Use "<" symbol if Result is less than Reporting Limit** and use ">" if Result exceeds the Maximum Reporting Limit.	XXXXX	<gx
Prep_Batch_Num	Lab-Internal Alphanumeric identifier indicating batch within which sample was prepped	XXXXXXXX	768
Prep_Date	Date sample prepped (if applicable)	MMDDYYYY	12251999
Prep_Time	24-Hour Time sample prepped for analysis (if applicable)	HHMMSS	163403
Prep_Method	Prep Method Used (if applicable)	XXXXXXXXXX	3050
Run_Batch_Num	Lab-Internal Alphanumeric identifier indicating batch within which sample was analyzed	XXXXXXXX	8043
Run_Date	Date Field Measurements Taken	MMDDYYYY	12251999
Run_Time	24-Hour Time Field Measurements Taken	HHMMSS	163403
Dilution_Mult	Number indicating dilution magnitude required for analysis	nnnn	10
Lab_MDL	Lab's Detection limit for test (Method Detection Limit X Dilution Multiplier	nnnnnnnn.nnnn	5.0
Lab_MDL_Units	Lab Detection limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg

Record Format (in actual data records, all on one line):
Record_ID|Lab_Sample_Num|CAS_Number|CAS_Num_Qualifier|Test_Method|Test_SubMethod|Sample_Medium_ID|Report_Limit|
Report_Limit_Units|Result|Result_Units|Result_Flags|Prep_Batch_Num|Prep_Date|Prep_Time|Prep_Method|
Run_Batch_Num|Run_Date|Run_Time|Dilution_Mult|Lab_MDL|Lab_MDL_Units|

Description Example:
DS|XXXXXXXX|XXXXXXXXXX|X|XXXXXXXXXX|XXXX|X|NNNNNNNN.NNNN|XXXXX|NNNNNNNN.NNNN|XXXXX|XXXXX|
XXXXXXXX|MMDDYYYY|HHMMSS|XXXXXXXX|XXXXXXXX|MMDDYYYY|HHMMSS|NNNN|NNNNNNNN.NNNN|XXXXX|

Real World Examples:
DS|AA345678|257301-77-2|T|200.7|N/A|W|1.0|ug/l|8.1|ug/l|<gx|768|12251999|163403|3050|8043|12251999|163403|10|0.3|ug/l|
DS|AA345678|257301-77-2|T|200.7|N/A|W|1.0|ug/l|8.1|ug/l|<gx| | | ||8043|12251999|163403|10|0.3|ug/l|

Field Data Record:

Field Name	Description	Format	Example
Record_ID	Identifies Field Data Record	"DS"	DS
Lab_Sample_Num	Number used internally by Lab to identify IDEM Sample being analyzed	XXXXXXXX	AA345678
CAS_Number	CAS # of substance being tested for	XXXXXXXXXX	E-14539
CAS_Num_Qualifier	Does this record show the substance's value as 'Total' (=T), 'Dissolved' (=D), 'Free' (=F), or 'Simultaneously Extracted Metals' (SEM) (=S)?	"T", "D", "F", or "S"	D
Test_Method	Test method used by Field Sampler	XXXXXXXXXX	SM4500-OG
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Potential Values: 'N/A'=No Sub-Method; 'SCAN'=Scanning Mode; 'SIM'=Selection Ion Monitoring Mode	"N/A", "SCAN", or "SIM"	N/A
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Report_Limit	Lab's Reporting limit for test (Method Reporting Limit X Dilution Multiplier) or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	0.01
Report_Limit_Units	Lab Reporting limit units (see page i for selection of units.)	XXXXX	mg/L
Result	Parameter test result (If the results are between the Method Detection Limit and the Min. Reporting Limit. Include "<" symbol in Result_Flags field and use the actual value measured, if actual values have been requested, or '-1' in the result field. Include '>' in Result_Flags field and use '-2' in the Result field if the Result exceeds the Max. Reporting Limit.	nnnnnnnn.nnnn	7.68
Result_Units	Result Units (see page i for selection of units.)	XXXXX	mg/L
Result_Flags	Lab Flags for this record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table) Use "<" symbol if Result is less than Reporting Limit and use ">" if Result exceeds the Maximum Reporting Limit.	XXXXX	<gx
Prep_Batch_Num	UNUSED (but please add Pipe Delimiter for placeholder)		
Prep_Date	UNUSED (but please add Pipe Delimiter for placeholder)		
Prep_Time	UNUSED (but please add Pipe Delimiter for placeholder)		
Prep_Method	UNUSED (but please add Pipe Delimiter for placeholder)		
Run_Batch_Num	Lab-Internal Alphanumeric identifier indicating batch within which sample was analyzed	XXXXXXXX	8043
Run_Date	Date analysis run	MMDDYYYY	12251999
Run_Time	24-Hour Time analysis run	HHMMSS	163403
Dilution_Mult SampleDepth	Number indicating dilution magnitude required for analysis Water depth at which sample collected.	nnnn nnnnn.n	1.0 0.0
Lab_MDL	Lab's Detection limit for test (Method Detection Limit X Dilution Multiplier	nnnnnnnn.nnnn	5.0
Lab_MDL_Units	Lab Detection limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg

Record Format (in actual data records, all on one line):
Record_ID|Lab_Sample_Num|CAS_Number|CAS_Num_Qualifier|Test_Method|Test_SubMethod|Sample_Medium_ID|Report_Limit|
Report_Limit_Units|Result|Result_Units|Result_Flags|Prep_Batch_Num|Prep_Date|Prep_Time|Prep_Method|
Run_Batch_Num|Run_Date|Run_Time|Dilution_Mult| SampleDepth|Lab_MDL|Lab_MDL_Units|

Description Example:
DS|XXXXXXXX|XXXXXXXXXX|X|XXXXXXXXXX|XXXX|X|NNNNNNNN.NNNN|XXXXX|NNNNNNNN.NNNN|XXXXX|XXXXX|
XXXXXXXX|MMDDYYYY|HHMMSS|XXXXXXXX|XXXXXXXX|MMDDYYYY|HHMMSS|NNNN|NNN.NNNN|NNNNNNNN.NNNN|XXXXX|

Real World Examples:
DS|AA345678|257301-77-2|T|200.7|N/A|W|1.0|ug/l|8.1|ug/l|<gx|768|12251999|163403|3050|8043|12251999|163403|10| 0.3|ug/l|
DS|AA345678|257301-77-2|T|200.7|N/A|W|1.0|ug/l|8.1|ug/l|<gx| | | ||8043|12251999|163403|10|0| 0.3|ug/l|

Project Narrative Header/Footer Records

Project Narrative Header Records are placed prior to the first line of a Project Narrative. Project Narrative Footer Record is placed after last line of the Project Narrative, forming a matched pair.

Field Name	Description	Format	Example
Record_ID	Identifies Project Narrative Header Record (“HN”) Or – Project Narrative Footer Record (“FN”)	"HN"	HN
Lab_ID	Name of Lab Submitting Lab Analysis Data Results	XXXXXXXX	ISDH
Lab_Job_Num	Number used internally by Lab to identify the entire group of samples being analyzed for IDEM	XXXXXXXX	BB345678
OWQ_Analysis_Set	IDEM Assigned Analysis Set Number	XXXXXXXX	00TSW190
Analysis_Set_SubmitCount	On first submission of analysis set test results, =1; if samples are re-analyzed & re-submitted, =2 (or 3 for a 2nd re-analysis/submittal, etc.)	NN	1
Lab_Sample_Num ①	Number used internally by Lab to identify IDEM Sample being analyzed	XXXXXXXX	AA345678
Prep_Batch_Num②	Lab-Internal Alphanumeric identifier indicating batch within which sample was prepped	XXXXXXXX	768
Run_Batch_Num ②	Lab-Internal Alphanumeric identifier indicating batch within which sample was analyzed	XXXXXXXX	8043
Refer_Record_ID	Record_ID describing type of record being referred to (“DS”, “CC”, “BL”, “LC”, “CS”, “SS”, “IS”, “MS”, or “DU”) – for definitions, see the Record_ID field in the Sample Number Record and Lab QC Records: General Format Description sections of this document.	XX	DS
CAS_Number	CAS # of substance being tested for	XXXXXXXXXX	257301-77-2
CAS_Num_Qualifier	Does this record show the substance’s value as ‘Total’ (=T), ‘Dissolved’ (=D), ‘Free’ (=F), or ‘Simultaneously Extracted Metals’ (SEM) (=S)?	“T”, “D”, “F”, or ”S”	T
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Test_Method	Test method used by lab	XXXXXXXXXX	200.7
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Values: 'N/A'=No Sub-Method; ‘SCAN’=Scanning Mode; ‘SIM’=Selection Ion Monitoring Mode	"N/A”, “SCAN", or "SIM"	SCAN
Prep_Method	Prep Method Used (if applicable)	XXXXXXXXXX	3050
Date	Date of file/batch creation	MMDDYYYY	11191999
Time	24-Hour Time of file/batch creation	HHMMSS	220156
Count	Number of Narrative records in batch (for this Header Record)	nnnn	7

Record Format(in actual data records, all on one line):

Record_ID|Lab_ID|Lab_Job_Num|OWQ_Analysis_Set|Analysis_Set_SubmitCount|Lab_Sample_Num|Prep_Batch_Num|
Run_Batch_Num|Refer_Record_ID|CAS_Number|CAS_Num_Qualifier|Sample_Medium_ID|Test_Method|Test_SubMethod|
Prep_Method|Date|Time|Count|

Project Narrative Header Description Example:

HN|XXXXXXXX|XXXXXXXX|XXXXXXXX|NN|XXXXXXXX|XXXXXXXX|XXXXXXXX|XX|XXXXXXXXXX|X|X|XXXXXXXXXX|XXXX|
XXXXXXXXXX| HHMMSS|NNNN|MMDDYYYY|

① IF VALID FOR BATCH, PROVIDE BATCH AND NOT INTERNAL SAMPLE NUMBER

② IF VALID FOR CERTAIN SAMPLES, PROVIDE INTERNAL SAMPLE NUMBER, BUT NOT BATCH NUMBER

Project Narrative Data Record:

Field Name	Description	Format	Example
Record_ID	Identifies Project Narrative Data Record	"DN"	DN
Narrative	Projective Narrative Text in a continuous line	XXXXXXXXXX	Analysis Resul…

Record Format:
Record_ID|Narrative|

Description Example:
PN|XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX|

Real World Example of Project Narrative Header, Data, and Footer Records:
HN|ISDH|BB345678|00TSW190|1|AA345678|768|8043|DR|257301-77-2|T|S|200.7|N/A|3050|11191999|220156|2|
DN|Analysis resulted in an unusually high analyte concentration. Sample tested positive for presence of sulfuric acid preservative. It is possible that nitric acid is also present in sample.| (This is ONE Line of Text)
FN|ISDH|BB345678|00TSW190|1|AA345678|768|8043|DR|257301-77-2|T|S|200.7|N/A|3050|11191999|220156|2|
HN|ISDH|BB345678|00TSW190|1|AA345679|768|8043|DR|257301-77-2|T|S|200.7|N/A|3050|11191999|220156|3|
---Project Narrative Record---
---Project Narrative Record---
---Project Narrative Record---
FN|ISDH|BB345678|00TSW190|1|AA345679|768|8043|DR|257301-77-2|T|S|200.7|N/A|3050|11191999|220156|3|
HN|ISDH|BB345678|00TSW190|1|AA345680|768|8043|DR|257301-77-2|T|S|200.7|N/A|3050|11191999|220156|6|
---Project Narrative Record---
---Project Narrative Record---
---Project Narrative Record---
---Project Narrative Record---
---Project Narrative Record---
---Project Narrative Record---
FN|ISDH|BB345678|00TSW190|1|AA345680|768|8043|DR|257301-77-2|T|S|200.7|N/A|3050|11191999|220156|6|

QC Header/Footer Records:

QC Header Records are placed prior to the first line of an Analysis Set's QC Section. QC Footer Record is placed after last line of the QC Section, forming a matched pair.

There is one QC Header/Footer Pair per Analysis Set. QC Detail Records include several types of QC performed by the labs.

Field Name	Description	Format	Example
Record_ID	Identifies QC Header Record ("HQ") Or – QC Footer Record ("FQ")	"HQ" or "FQ"	HQ
Lab_ID	Name of Lab Submitting Lab Analysis Data Results	XXXXXXXX	ISDH
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Lab_Job_Num	Number used internally by Lab to identify the entire group of samples being analyzed for IDEM	XXXXXXXX	BB345678
OWQ_Analysis_Set	IDEM Assigned Analysis Set Number	XXXXXXXX	00TSW190
Analysis_Set_SubmitCount	On first submission of analysis set test results, =1; if samples are re-analyzed & re-submitted, =2 (or 3 for a 2nd re-analysis/submittal, etc.)	NN	1
Date	Date of file/batch creation	MMDDYYYY	11191999
Time	24-Hour Time of file/batch creation	HHMMSS	220156
Count	Number of records in this batch (for all QC Records)	nnnn	43

Record ID|Lab_ID|Sample_Medium_ID|Lab_Job_Num|OWQ_Analysis_Set|Analysis_Set_SubmitCount|Date|Time|Count|

Description Example:
HQ|XXXXXXXX|X|XXXXXXXX|XXXXXXXX|NN|MMDDYYYY|HHMMSS|NNNN|

Real World Examples:
HQ|ISDH|W|BB345678|00TSW190|1|11191999|220156|3| (QC Header Record)
----QC Record1---
----QC Record2---
----QC Record3---
FQ|ISDH|W|BB345678|00TSW190|1|11191999|220156|3| (QC Footer Record)

Lab QC Records: General Format Description

Field Name	Description	Format	Example
Record_ID	Identifies type of QC record: Blank Record = “BL” Laboratory Control Standard Record = “LC” Laboratory Duplicate Record = “DU” Matrix Spike/Matrix Spike Dup. Record = “MS” Post Digestion Spike/Spike Dup Record = “PS” Serial Dilution Duplicate=”SD” Initial Calibration Blank=”IB” Initial Calibration Standard=”IC” Continuing Calibration Blank=”CB” Spectral Interference Check Standard=”SI” Continuing Calibration Verification Record = “CC” Control Spike=“CS” Internal Standard=”IS” Surrogate Standard=“SS” Linear Upper Range Standard=”LR” Mass Spectrometry Tuning or Performance Standard=”TS” Neg. E. Coli, Pos Coliform = “KP” Negative Coliform =”PA” Positive E. Coli =”EC”	XX	LC
CAS_Number	CAS # of substance being tested for	XXXXXXXXX	257301-77-2
CAS_Num_Qualifier	Does this record show the substance’s value as ‘Total’ (=T), ‘Dissolved’ (=D), ‘Free’ (=F), or ‘Simultaneously Extracted Metals’ (SEM) (=S)?	“T”, “D”, “F”, or ”S”	T
Test_Method	Test method used by lab	XXXXXXXXX	200.7
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Values: 'N/A'=No Sub-Method; ‘SCAN’=Scanning Mode; ‘SIM’=Selection Ion Monitoring Mode	"N/A”, “SCAN", or "SIM"	SCAN
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Prep_Batch_Num	Lab’s Alphanumeric identifier of batch within which Sample prepped	XXXXXXXX	768
Prep_Date	Date sample prepped for analysis (if applicable)	MMDDYYYY	12251999
Prep_Time	24-Hour Time sample prepped for analysis (if applicable)	HHMMSS	163403
Prep_Method	Prep Method Used (if applicable)	XXXXXXXX	3050
Run_Batch_Num	Lab’s Alphanumeric identifier of batch within which Sample analyzed	XXXXXXXX	8043
Run_Date	Date analysis run	MMDDYYYY	12251999
Run_Time	24-Hour Time analysis run	HHMMSS	163403
Dup_Run_Date	Date analysis run for the DUP, MSD, or PSD	MMDDYYYY	12251999
Dup_Run_Time	24-Hour Time analysis run for the DUP, MSD, or PSD	HHMMSS	163403
True_Value	True Value of substance added to sample (See Note for Result in Sample Number Records)	Nnnnnnnn.nnnn	5.0
True_Value_Units	Units for True_Value (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Measured_Value	Value Measured (See Note for Result in Sample Number Records)	Nnnnnnnn.nnnn	4.4
Measured_Units	Units for Measured_Value (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Pcnt_Recovered	Percentage Recovered	nnn.nn	88.00
Dup_Measure_Value	Value Measured in Duplicate, MSD, or PSD (See Note for Result in Sample Number Records)	Nnnnnnnn.nnnn	4.0
Dup_Measure_Units	Units for Dup_Measure_Value, MSD, or PSD	XXXXX	ug/l, mg/kg
Dup_Pcnt_Recover	Percentage Recovered for Duplicate, MSD, or PSD	nnn.nn	80.0
Dup_RPD	% Difference Between Measured_Value and Dup_Measure_Value	nnn.nn	9.50
M_Z_Ratio	Mass to Charge Ratio of Ion Fragment (use for Mass Spectrometry Tuning Standard)	nnn	177
M_Z_Ref	Reference Mass to Charge Ratio of Parent Peak or Secondary Ion (use for Mass Spectrometry Tuning/Performance Ion Abundance Criteria)	nnn	176
MS_Spike_Added	Matrix or Post Digestion Spike Added	Nnnnnnnn.nnnn	4.0
MS_Spike_Units	Units for Matrix Spike Added (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Measure_Flags	Lab Flags for this QC record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Dup_Measure_Flags	Lab Flags for this QC Dup record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Lower_Limit	Lower Percent Recovered Limit (in percent)	nnn.n	80.0
Upper_Limit	Upper Percent Recovered Limit (in percent)	nnn.n	120.0
Lab_Sample_Num	Number used internally by Lab to identify Sample analyzed	XXXXXXXX	AA345678
Dup_Lab_Sample_Num	Number used internally by Lab to identify Sample Dup analyzed	XXXXXXXX	AA345679

Field Name	Description	Format	Example
Dilution_Mult	Number indicating dilution magnitude required for analysis	nnnn	10
Dup_Dilution_Mult	Number indicating dilution magnitude of Duplicate required for analysis	nnnn	10
Report_Limit	Lab's Reporting limit for test (Method Reporting Limit X Dilution Multiplier) or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Report_Limit_Units	Lab Reporting limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Dup_Report_Limit	Lab's Reporting Limit for Duplicate test (Method Reporting Limit X Dilution Multiplier)or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Dup_Report_Limit_Units	Lab Reporting Limit units for Duplicate test (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Lab_MDL	Lab's Detection limit for test (Method Detection Limit X Dilution Multiplier	nnnnnnnn.nnnn	5.0
Lab_MDL_Units	Lab Detection limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg

Record Format (in actual QC data records, all on one line):
Record_ID|CAS_Number|CAS_Num_Qualifier| Test_Method|Test_SubMethod|Sample_Medium_ID|Prep_Batch_Num|Prep_Date|
Prep_Time|Prep_Method|Run_Batch_Num|Run_Date|Run_Time|Dup_Run_Date|Dup_Run_Time|True_Value|True_Value_Units|
Measured_Value|Measured_Units|Pcnt_Recovered|Dup_Measure_Value|Dup_Measure_Units|Dup_Pcnt_Recover|Dup_RPD|
M_Z_Ratio|M_Z_Ref|MS_Spike_Added|MS_Spike_Units|Measure_Flags|Dup_Measure_Flags|Lower_Limit|Upper_Limit|Lab_Sample_Num|
Dup_Lab_Sample_Num|Dilution_Mult|Dup_Dilution_Mult| Report_Limit| Report_Limit_Units| Dup_Report_Limit |
Dup_Report_Limit_Units|Lab_MDL|Lab_MDL_Units|

Description Example:
LC|XXXXXXXXXX|X|XXXXXXXXXX|XXXX|X|XXXXXXXX|MMDDYYYY|HHMMSS|XXXXXXXX|XXXXXXXX|MMDDYYYY|HHMMSS|MMDDYYYY|HHMMSS| NNNNNNNN.NNNNNN|XXXXX|NNNNNNNN.NNNNNN|XXXXX|NNN.N|NNNNNNNN.NNNNNN|XXXXX|NNN.N| NNN.N|
XXXXXXXXXX|XXXXXXXXXX|NNNNNNNN.NNNNNN|XXXXX|XXXXX|XXXXX|NNN.N|NNN.N|XXXXXXXX|XXXXXXXX|NNNN|NNNN|
NNNNNNNN.NNNN|XXXXX|NNNNNNNN.NNNN|XXXXX|NNNNNNNN.NNNN|XXXXX|

EACH QC RECORD MUST HAVE A UNIQUE COMBINATION OF:
CAS_Number + CAS_Num_Qualifier + Test_Method + Test_SubMethod + Sample_Medium_ID + RECORD_ID + RUN_BATCH_NUM + LAB_SAMPLE_NUM

It may be necessary to create an arbitrary Lab_Sample_Num (i.e. CCV1, CCV2, Blank1, Blank2, etc.) in order to achieve this unique combination. A unique Lab_Sample_Num could be generated by concatenating the Lab_Sample_Num & Run_Time fields. Only 4 characters would be need from the Run_Time field. Note that Run_Time does not contain any colons or slashes.

Example: CCV1 run at 080000 would be CCV1-0800
CCV1 run at 083000 would be CCV1-0830, Etc.

Lab QC Records: Format for QC Records of following types: 'Blank', 'Initial Calibration Blank', or 'Continuing Calibration Blank'

Field Name	Description	Format	Example
Record_ID	Identifies type of QC record: Blank Record = "BL" Initial Calibration Blank="IB" Continuing Calibration Blank="CB"	XX	BL
CAS_Number	CAS # of substance being tested for	XXXXXXXXXX	257301-77-2
CAS_Num_Qualifier	Does this record show the substance's value as 'Total' (=T), 'Dissolved' (=D), 'Free' (=F), or 'Simultaneously Extracted Metals' (SEM) (=S)?	"T", "D", "F", or "S"	T
Test_Method	Test method used by lab	XXXXXXXXXX	200.7
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Values: 'N/A'=No Sub-Method; 'SCAN'=Scanning Mode; 'SIM'=Selection Ion Monitoring Mode	"N/A", "SCAN", or "SIM"	SCAN
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Prep_Batch_Num	Lab's Alphanumeric identifier of batch within which Sample prepped	XXXXXXXX	768
Prep_Date	Date sample prepped for analysis (if applicable)	MMDDYYYY	12251999
Prep_Time	24-Hour Time sample prepped for analysis (if applicable)	HHMMSS	163403
Prep_Method	Prep Method used (if applicable)	XXXXXXXX	3050
Run_Batch_Num	Lab's Alphanumeric identifyier of batch within which Sample analyzed	XXXXXXXX	8043
Run_Date	Date analysis run	MMDDYYYY	12251999
Run_Time	24-Hour Time analysis run	HHMMSS	163403
Dup_Run_Date	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Run_Time	UNUSED (but please add Pipe Delimiter for placeholder)		
True_Value	UNUSED (but please add Pipe Delimiter for placeholder)		
True_Value_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Measured_Value	Value Measured (See Note for Result in Sample Number Records)	nnnnnnnn.nnnn	4.4
Measured_Units	Units for Measured_Value (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Pcnt_Recovered	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Measure_Value	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Measure_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Pcnt_Recover	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_RPD	UNUSED (but please add Pipe Delimiter for placeholder)		
M_Z_Ratio	UNUSED (but please add Pipe Delimiter for placeholder)		
M_Z_Ref	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Added	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Measure_Flags	Lab Flags for this Blank QC record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Dup_Measure_Flags	UNUSED (but please add Pipe Delimiter for placeholder)		
Lower_Limit	UNUSED (but please add Pipe Delimiter for placeholder)		
Upper_Limit	UNUSED (but please add Pipe Delimiter for placeholder)		
Lab_Sample_Num	Number used internally by Lab to identify Sample analyzed	XXXXXXXX	AA345678
Dup_Lab_Sample_Num	UNUSED (but please add Pipe Delimiter for placeholder)		
Dilution_Mult	Number indicating dilution magnitude required for analysis	nnnn	10
Dup_Dilution_Mult	UNUSED (but please add Pipe Delimiter for placeholder)		
Report_Limit	Lab's Reporting limit for test (Method Reporting Limit X Dilution Multiplier) or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Report_Limit_Units	Lab Reporting limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Dup_Report_Limit	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Report_Limit_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Lab_MDL	Lab's Detection limit for test (Method Detection Limit X Dilution Multiplier	nnnnnnnn.nnnn	5.0
Lab_MDL_Units	Lab Detection limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg

Record Format (in actual data records, all on one line):

Record_ID|CAS_Number|CAS_Num_Qualifier|Test_Method|Test_SubMethod|Sample_Medium_ID|Prep_Batch_Num|Prep_Date|Prep_Time|Prep_Method|Run_Batch_Num|Run_Date|Run_Time| | | |Measured_Value|Measured_Units| | | | | | | |Measure_Flags| | | |Lab_Sample_Num| |Dilution_Mult| | Report_Limit| Report_Limit_Units| | |Lab_MDL|Lab_MDL_Units|

Description Example:

BL|XXXXXXXXXX|T|XXXXXXXXXX|XXXX|X|XXXXXXXX|MMDDYYYY|HHMMSS|XXXXXXXX|XXXXXXXX|MMDDYYYY|HHMMSS| | | | NNNNNNNN.NNNNNN|XXXXX| | | | | | | |XXXXX| | | |XXXXXXXX| |NNNN| | NNNNNNNN.NNNN|XXXXX| | |NNNNNNNN.NNNN|XXXXX|

Lab QC Records: Format for QC Records of following types: Continuing Calibration Verification, Initial Calibration Standard, Linear Upper Range Standard, or Spectral Interference Check Standard

Field Name	Description	Format	Example
Record_ID	Continuing Calibration Verification Record = “CC” Initial Calibration Standard=”IC” Linear Upper Range Standard=”LR” Spectral Interference Check Standard=”SI”	XX	CC
CAS_Number	CAS # of substance being tested for	XXXXXXXXX	257301-77-2
CAS_Num_Qualifier	Does this record show the substance’s value as ‘Total’ (=T), ‘Dissolved’ (=D), ‘Free’ (=F), or ‘Simultaneously Extracted Metals’ (SEM) (=S)?	“T”, “D”, “F”, or ”S”	T
Test_Method	Test method used by lab	XXXXXXXXX	200.7
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Values: 'N/A'=No Sub-Method; ‘SCAN’=Scanning Mode; ‘SIM’=Selection Ion Monitoring Mode	"N/A", “SCAN", or "SIM"	SCAN
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Prep_Batch_Num	Lab’s Alphanumeric identifier of batch within which Sample prepped	XXXXXXXX	768
Prep_Date	Date sample prepped for analysis (if applicable)	MMDDYYYY	12251999
Prep_Time	24-Hour Time sample prepped for analysis (if applicable)	HHMMSS	163403
Prep_Method	Prep Method Used (if applicable)	XXXXXXXX	3050
Run_Batch_Num	Lab’s Alphanumeric identifyier of batch within which Sample analyzed	XXXXXXXX	8043
Run_Date	Date analysis run	MMDDYYYY	12251999
Run_Time	24-Hour Time analysis run	HHMMSS	163403
Dup_Run_Date	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Run_Time	UNUSED (but please add Pipe Delimiter for placeholder)		
True_Value	True Value of substance added to sample (See Note for Result in Sample Number Records)	nnnnnnnn.nnnn	5.0
True_Value_Units	Units for True_Value (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Measured_Value	Value Measured (See Note for Result in Sample Number Records)	nnnnnnnn.nnnn	4.4
Measured_Units	Units for Measured_Value (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Pcnt_Recovered	Percentage Recovered	nnn.n	88.0
Dup_Measure_Value	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Measure_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Pcnt_Recover	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_RPD	UNUSED (but please add Pipe Delimiter for placeholder)		
M_Z_Ratio	UNUSED (but please add Pipe Delimiter for placeholder)		
M_Z_Ref	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Added	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Measure_Flags	Lab Flags for this QC record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Dup_Measure_Flags	UNUSED (but please add Pipe Delimiter for placeholder)		
Lower_Limit	Lower Percent Recovered Limit (in percent)	nnn.n	80.0
Upper_Limit	Upper Percent Recovered Limit (in percent)	nnn.n	120.0
Lab_Sample_Num	Number used internally by Lab to identify Sample analyzed	XXXXXXXX	AA345678
Dup_Lab_Sample_Num	UNUSED (but please add Pipe Delimiter for placeholder)		
Dilution_Mult	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Dilution_Mult	UNUSED (but please add Pipe Delimiter for placeholder)		
Report_Limit	Lab’s Reporting limit for test (Method Reporting Limit X Dilution Multiplier) or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Report_Limit_Units	Lab Reporting limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Dup_Report_Limit	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Report_Limit_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Lab_MDL	Lab’s Detection limit for test (Method Detection Limit X Dilution Multiplier	nnnnnnnn.nnnn	5.0
Lab_MDL_Units	Lab Detection limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg

Record Format (in actual data records, all on one line):
Record_ID|CAS_Number|CAS_Num_Qualifier|Test_Method|Test_SubMethod|Sample_Medium_ID|Prep_Batch_Num|Prep_Date|

Prep_Time|Prep_Method|Run_Batch_Num|Run_Date|Run_Time| | |True_Value|True_Value_Units|Measured_Value|Measured_Units|
Pcnt_Recovered| | | | | | | |Measure_Flags| |Lower_Limit|Upper_Limit| Lab_Sample_Num| | | | Report_Limit| Report_Limit_Units| |
|Lab_MDL|Lab_MDL_Units|

Description Example:
CC|XXXXXXXXXX|T|XXXXXXXXXX|XXXX|X|XXXXXXXX|MMDDYYYY|HHMMSS|XXXXXXXX|XXXXXXXX|MMDDYYYY|HHMMSS| | |
NNNNNNNN.NNNNNN|XXXXX|NNNNNNNN.NNNNNN|XXXXX|NNN.N| | | | | | | |XXXXX| |NNN.N|NNN.N|XXXXXXXX| | | |
NNNNNNNN.NNNN|XXXXX| | |NNNNNNNN.NNNN|XXXXX|

Lab QC Records: Format for 'Duplicate' or 'Serial Dilution' QC Records

Field Name	Description	Format	Example
Record_ID	Identifies type of QC record: Duplicate Record = "DU"; Serial Dilution = "SD"	XX	DU
CAS_Number	CAS # of substance being tested for	XXXXXXXXXX	257301-77-2
CAS_Num_Qualifier	Does this record show the substance's value as 'Total' (=T), 'Dissolved' (=D), 'Free' (=F), or 'Simultaneously Extracted Metals' (SEM) (=S)?	"T", "D", "F", or "S"	T
Test_Method	Test method used by lab	XXXXXXXXXX	200.7
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Values: 'N/A'=No Sub-Method; 'SCAN'=Scanning Mode; 'SIM'=Selection Ion Monitoring Mode	"N/A", "SCAN", or "SIM"	SCAN
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Prep_Batch_Num	Lab's Alphanumeric identifier of batch within which Sample prepped	XXXXXXXX	768
Prep_Date	Date sample prepped for analysis (if applicable)	MMDDYYYY	12251999
Prep_Time	24-Hour Time sample prepped for analysis (if applicable)	HHMMSS (military time)	163403 (4:34:03 PM)
Prep_Method	Prep Method Used (if applicable)	XXXXXXXX	3050
Run_Batch_Num	Lab's Alphanumeric identifyier of batch within which Sample analyzed	XXXXXXXX	8043
Run_Date	Date analysis run	MMDDYYYY	12251999
Run_Time	24-Hour Time analysis run	HHMMSS	163403
Dup_Run_Date	Date analysis run	MMDDYYYY	12251999
Dup_Run_Time	24-Hour Time analysis run	HHMMSS	163403
True_Value	UNUSED (but please add Pipe Delimiter for placeholder)		
True_Value_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Measured_Value	Value Measured (See Note for Result in Sample Number Records)	nnnnnnnn.nnnn	4.4
Measured_Units	Units for Measured_Value (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Pcnt_Recovered	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Measure_Value	Value Measured in Duplicate (See Note for Result in Sample Number Records	nnnnnnnn.nnnn	4.0
Dup_Measure_Units	Units for Dup_Measure_Value	XXXXX	ug/l, mg/kg
Dup_Pcnt_Recover	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_RPD	% Difference Between Measured_Value and Dup_Measure_Value	nnn.n	9.5
M_Z_Ratio	UNUSED (but please add Pipe Delimiter for placeholder)		
M_Z_Ref	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Added	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Measure_Flags	Lab Flags for this record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Dup_Measure_Flags	Lab Flags for record duplicate (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Lower_Limit	UNUSED (but please add Pipe Delimiter for placeholder)		
Upper_Limit	UNUSED (but please add Pipe Delimiter for placeholder)		
Lab_Sample_Num	Number used internally by Lab to identify Sample analyzed	XXXXXXXX	AA345678
Dup_Lab_Sample_Num	Number used internally by Lab to identify Sample Dup analyzed	XXXXXXXX	AA345679
Dilution_Mult	Number indicating dilution magnitude required for analysis	nnnn	10
Dup_Dilution_Mult	Number indicating dilution magnitude of Duplicate required for analysis	nnnn	10
Report_Limit	Lab's Reporting limit for test (Method Reporting Limit X Dilution Multiplier) or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Report_Limit_Units	Lab Reporting limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Dup_Report_Limit	Lab's Reporting Limit for Duplicate test (Method Reporting Limit X Dilution Multiplier)or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Dup_Report_Limit_Units	Lab Reporting Limit units for Duplicate test (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Lab_MDL	Lab's Detection limit for test (Method Detection Limit X Dilution Multiplier	nnnnnnnn.nnnn	5.0
Lab_MDL_Units	Lab Detection limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg

Record Format (in actual data records, all on one line):
Record_ID|CAS_Number|CAS_Num_Qualifier|Test_Method|Test_SubMethod|Sample_Medium_ID|Prep_Batch_Num|Prep_Date|
Prep_Time|Prep_Method|Run_Batch_Num|Run_Date|Run_Time|Dup_Run_Date|Dup_Run_Time| | |Measured_Value|Measured_Units| |
Dup_Measure_Value|Dup_Measure_Units| |Dup_RPD| | | | |Measure_Flags|Dup_Measure_Flags| | |Lab_Sample_Num|

Dup_Lab_Sample_Num|Dilution_Mult|Dup_Dilution_Mult| Report_Limit| Report_Limit_Units| Dup_Report_Limit |
Dup_Report_Limit_Units|Lab_MDL|Lab_MDL_Units|

Description Example:
DU|XXXXXXXXXX|T|XXXXXXXXXX|XXXX|X|XXXXXXXX|MMDDYYYY|HHMMSS|XXXXXXXX|XXXXXXXX|MMDDYYYY|HHMMSS|
MMDDYYYY|HHMMSS| | |NNNNNNNN.NNNNNN|XXXXX| |NNNNNNNN.NNNNNN|XXXXX| |NNN.N| | | |XXXXX|XXXXX| | |XXXXXXXX|
XXXXXXXX|NNNN|NNNN| NNNNNNNN.NNNN|XXXXX| NNNNNNNN.NNNN|XXXXX|NNNNNNNN.NNNN|XXXXX|

Lab QC Records: Format for 'Matrix Spike', 'Matrix Spike Duplicate' Records

Field Name	Description	Format	Example
Record_ID	Identifies type of QC record: Matrix Spike/Matrix Spike Dup. Record = "MS" Post Digestion Spike/Spike Dup Record = "PS"	XX	MD
CAS_Number	CAS # of substance being tested for	XXXXXXXXXX	257301-77-2
CAS_Num_Qualifier	Does this record show the substance's value as 'Total' (=T), 'Dissolved' (=D), 'Free' (=F), or 'Simultaneously Extracted Metals' (SEM) (=S)?	"T", "D", "F", or "S"	T
Test_Method	Test method used by lab	XXXXXXXXX	200.7
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Values: 'N/A'=No Sub-Method; 'SCAN'=Scanning Mode; 'SIM'=Selection Ion Monitoring Mode	"N/A", "SCAN", or "SIM"	SCAN
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Prep_Batch_Num	Lab's Alphanumeric identifier of batch within which Sample prepped	XXXXXXXX	768
Prep_Date	Date sample prepped for analysis (if applicable)	MMDDYYYY	12251999
Prep_Time	24-Hour Time sample prepped for analysis (if applicable)	HHMMSS	163403
Prep_Method	Prep Method Used (if applicable)	XXXXXXXX	3050
Run_Batch_Num	Lab's Alphanumeric identifyier of batch within which Sample analyzed	XXXXXXXX	8043
Run_Date	Date analysis run for the MS or PS	MMDDYYYY	12251999
Run_Time	24-Hour Time analysis run for the MS or PS	HHMMSS	163403
Dup_Run_Date	Date analysis run for the MSD or PSD	MMDDYYYY	12251999
Dup_Run_Time	24-Hour Time analysis run for the MSD or PSD	HHMMSS	163403
Unspiked_Value	Measured Value of substance in unspiked sample Use measured value if known or '-1' if below the detection limit. (See Note for Result in Sample Number Records) If the value is '0' then use '-1'	nnnnnnnn.nnnn	5.0
Unspiked_Units	Units for Unspiked_Value	XXXXX	ug/l, mg/kg
Measured_Value	Value Measured in Matrix Spike Sample (See Note for Result in Sample Number Records)	nnnnnnnn.nnnn	8.5
Measured_Units	Units for Measured_Value (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Pcnt_Recovered	Percentage Recovered	nnn.n	88.0
Dup_Measure_Value	Value Measured in Matrix Spike Duplicate (See Note for Result in Sample Number Records)	nnnnnnnn.nnnn	8.2
Dup_Measure_Units	Units for Dup_Measure_Value	XXXXX	ug/l, mg/kg
Dup_Pcnt_Recover	Percentage Recovered for Duplicate	nnn.n	80.0
Dup_RPD	% Difference Between Measured_Value and Dup_Measure_Value	nnn.n	3.6
M_Z_Ratio	UNUSED (but please add Pipe Delimiter for placeholder)		
M_Z_Ref	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Added	Matrix Spike Added	nnnnnnnn.nnnn	4.0
MS_Spike_Units	Units for Matrix Spike Added	XXXXX	ug/l, mg/kg
Measure_Flags	Lab Flags for the **MS** record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table) DO NOT USE THE LAB FLAG FOR THE UNSPIKED_VALUE	XXXXX	<gx
Dup_Measure_Flags	Lab Flags for **MSD or PSD** record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Lower_Limit	Lower Percent Recovered Limit (in percent)	nnn.n	80.0
Upper_Limit	Upper Percent Recovered Limit (in percent)	nnn.n	120.0
Lab_Sample_Num	Number used internally by Lab to identify Sample analyzed (unspiked sample)	XXXXXXXX	AA345678
Dup_Lab_Sample_Num	Number used internally by Lab to identify MSD or PSD analyzed	XXXXXXXX	AA345679
Dilution_Mult	Number indicating dilution magnitude required for analysis	nnnn	10
Dup_Dilution_Mult	Number indicating dilution magnitude of MSD required for analysis	nnnn	10
Report_Limit	Lab's Reporting limit for test (Method Reporting Limit X Dilution Multiplier) or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Report_Limit_Units	Lab Reporting limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Dup_Report_Limit	Lab's Reporting Limit for Duplicate test (Method Reporting Limit X Dilution Multiplier)or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Dup_Report_Limit_Units	Lab Reporting Limit units for Duplicate test (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Lab_MDL	Lab's Detection limit for test (Method Detection Limit X Dilution Multiplier	nnnnnnnn.nnnn	5.0
Lab_MDL_Units	Lab Detection limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg

Record Format (in actual data records, all on one line):
Record_ID|CAS_Number|CAS_Num_Qualifier|Test_Method|Test_SubMethod|Sample_Medium_ID|Prep_Batch_Num|Prep_Date|
Prep_Time|Prep_Method|Run_Batch_Num|Run_Date|Run_Time|Dup_Run_Date|Dup_Run_Time|Unspiked_Value|Unspiked_Units|
Measured_Value|Measured_Units|Pcnt_Recovered|Dup_Measure_Value|Dup_Measure_Units|Dup_Pcnt_Recover|Dup_RPD| | |
MS_Spike_Added|MS_Spike_Units|Measure_Flags|Dup_Measure_Flags|Lower_Limit|Upper_Limit|Lab_Sample_Num|
Dup_Lab_Sample_Num|Dilution_Mult|Dup_Dilution_Mult| Report_Limit| Report_Limit_Units| Dup_Report_Limit|
Dup_Report_Limit_Units|Lab_MDL|Lab_MDL_Units|

Description Example:
MS|XXXXXXXXXX|T|XXXXXXXXXX|XXXX|X|XXXXXXXX|MMDDYYYY|HHMMSS|XXXXXXXX|XXXXXXXX|MMDDYYYY|HHMMSS|
MMDDYYYY|HHMMSS|NNNNNNNN.NNNNNN|XXXXX|NNNNNNNN.NNNNNN|XXXXX|NNN.N|NNNNNNNN.NNNNNN|XXXXX|NNN.N|
NNN.N| | |NNNNNNNN.NNNNNN|XXXXX|XXXXX|XXXXX|NNN.N|NNN.N|XXXXXXXX|XXXXXXXXX|NNNN.NN|NNNN.NN|NNNNNNNN.NNNN|
XXXXX| NNNNNNNN.NNNN|XXXXX|NNNNNNNN.NNNN|XXXXX|

Lab QC Records: Format for Records of following types: 'Control Spike', 'Internal Standard', 'Laboratory Control Standard', 'Surrogate Standard'

Field Name	Description	Format	Example
Record_ID	Identifies QC record type: Control Spike="CS"; Internal Standard="IS"; Laboratory Control Standard = "LC"; Surrogate Standard="SS"	XX	LC
CAS_Number	CAS # of substance being tested for	XXXXXXXXXX	257301-77-2
CAS_Num_Qualifier	Does this record show the substance's value as 'Total' (=T), 'Dissolved' (=D), 'Free' (=F), or 'Simultaneously Extracted Metals' (SEM) (=S)?	"T", "D", "F", or "S"	T
Test_Method	Test method used by lab	XXXXXXXXXX	200.7
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Values: 'N/A'=No Sub-Method; 'SCAN'=Scanning Mode; 'SIM'=Selection Ion Monitoring Mode	"N/A", "SCAN", or "SIM"	SCAN
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Prep_Batch_Num	Lab's Alphanumeric identifier of batch within which Sample prepped	XXXXXXXX	768
Prep_Date	Date sample prepped for analysis (if applicable)	MMDDYYYY	12251999
Prep_Time	24-Hour Time sample prepped for analysis, in 24-hour time (if applicable)	HHMMSS	163403
Prep_Method	Prep Method Used (if applicable)	XXXXXXXX	3050
Run_Batch_Num	Lab's Alphanumeric identifyier of batch within which Sample analyzed	XXXXXXXX	8043
Run_Date	Date analysis run	MMDDYYYY	12251999
Run_Time	24-Hour Time analysis run, in 24-hour time	HHMMSS	163403
Dup_Run_Date	Date analysis run for the duplicate, if applicable		
Dup_Run_Time	24-Hour Time analysis run for the duplicate, if applicable		
True_Value	True Value of substance added to sample (See Note for Result in Sample Number Records)	nnnnnnnn.nnnn	5.0
True_Value_Units	Units for True_Value	XXXXX	ug/l, mg/kg
Measured_Value	Value Measured (See Note for Result in Sample Number Records)	nnnnnnnn.nnnn	4.4
Measured_Units	Units for Measured_Value (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Pcnt_Recovered	Percentage Recovered	nnn.n	88.0
Dup_Measure_Value	Value Measured in Duplicate (See Note for Result in Sample Number Records)	nnnnnnnn.nnnn	4.0
Dup_Measure_Units	Units for Dup_Measure_Value	XXXXX	ug/l, mg/kg
Dup_Pcnt_Recover	Percentage Recovered for Duplicate	nnn.n	80.0
Dup_RPD	% Difference Between Measured_Value and Dup_Measure_Value	nnn.n	9.5
M_Z_Ratio	UNUSED (but please add Pipe Delimiter for placeholder)		
M_Z_Ref	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Added	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Measure_Flags	Lab Flags for this QC record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Dup_Measure_Flags	Lab Flags for dup record, if applicable (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Lower_Limit	Lower Percent Recovered Limit (in percent)	nnn.n	80.0
Upper_Limit	Upper Percent Recovered Limit (in percent)	nnn.n	120.0
Lab_Sample_Num	Number used internally by Lab to identify Sample analyzed	XXXXXXXX	AA345678
Dup_Lab_Sample_Num	Number used internally by Lab to identify Sample Dup analyzed (if applicable)	XXXXXXXX	AA345678
Dilution_Mult	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Dilution_Mult	UNUSED (but please add Pipe Delimiter for placeholder)		
Report_Limit	Lab's Reporting limit for test (Method Reporting Limit X Dilution Multiplier) or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Report_Limit_Units	Lab Reporting limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Dup_Report_Limit	Lab's Reporting Limit for Duplicate test (Method Reporting Limit X Dilution Multiplier)or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Dup_Report_Limit_Units	Lab Reporting Limit units for Duplicate test (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Lab_MDL	Lab's Detection limit for test (Method Detection Limit X Dilution Multiplier	nnnnnnnn.nnnn	5.0
Lab_MDL_Units	Lab Detection limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg

Record Format (in actual data records, all on one line):
Record_ID|CAS_Number|CAS_Num_Qualifier|Test_Method|Test_SubMethod|Sample_Medium_ID|Prep_Batch_Num|Prep_Date|
Prep_Time|Prep_Method|Run_Batch_Num|Run_Date|Run_Time| | |True_Value|True_Value_Units|Measured_Value|Measured_Units|
Pcnt_Recovered|Dup_Measure_Value|Dup_Measure_Units|Dup_Pcnt_Recover|Dup_RPD| | | |Measure_Flags| |Lower_Limit|Upper_Limit|

Lab_Sample_Num| | | | Report_Limit| Report_Limit_Units| Dup_Report_Limit | Dup_Report_Limit_Units |Lab_MDL|Lab_MDL_Units|

Description Example:
LC|XXXXXXXXXX|T|XXXXXXXXXX|XXXX|X|XXXXXXXX|MMDDYYYY|HHMMSS|XXXXXXXX|XXXXXXXX|MMDDYYYY|HHMMSS| | |
NNNNNNNN.NNNNNN|XXXXX|NNNNNNNN.NNNNNN|XXXXX|NNN.N|NNNNNNNN.NNNNNN|XXXXX|NNN.N|NNN.N| | | | |XXXXX| |
NNN.N|NNN.N|XXXXXXXX| | | | NNNNNNNN.NNNN|XXXXX| NNNNNNNN.NNNN | XXXXX |NNNNNNNN.NNNN|XXXXX|

Lab QC Records: Format for Records of following types: 'Tuning Standard'

Field Name	Description	Format	Example
Record_ID	Identifies type of QC record: Mass Spectrometry Tuning or Performance Standard="TS"	XX	TS
CAS_Number	CAS # of substance being tested for (Tuning Standard)	XXXXXXXXXX	257301-77-2
CAS_Num_Qualifier	Does this record show the substance's value as 'Total' (=T), 'Dissolved' (=D), 'Free' (=F), or 'Simultaneously Extracted Metals' (SEM) (=S)?	"T", "D", "F", or "S"	T
Test_Method	Test method used by lab	XXXXXXXXXX	200.7
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Values: 'N/A'=No Sub-Method; 'SCAN'=Scanning Mode; 'SIM'=Selection Ion Monitoring Mode	"N/A", "SCAN", or "SIM"	SCAN
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Prep_Batch_Num	Lab's Alphanumeric identifier of batch within which Sample prepped	XXXXXXXX	768
Prep_Date	Date sample prepped for analysis (if applicable)	MMDDYYYY	12251999
Prep_Time	24-Hour Time sample prepped for analysis (if applicable)	HHMMSS	163403
Prep_Method	Prep Method Used (if applicable)	XXXXXXXX	3050
Run_Batch_Num	Lab's Alphanumeric identifier of batch within which Sample analyzed	XXXXXXXX	8043
Run_Date	Date analysis run	MMDDYYYY	12251999
Run_Time	24-Hour Time analysis run	HHMMSS	163403
Dup_Run_Date	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Run_Time	UNUSED (but please add Pipe Delimiter for placeholder)		
True_Value	UNUSED (but please add Pipe Delimiter for placeholder)		
True_Value_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Measured_Value	Ion Abundance (Percent of Parent Peak)	Nnnnnnnn.nnnn	4.4
Measured_Units	Units for Ion Abundance	XXXXX	%
Pcnt_Recovered	Percent Ion Abundance to Reference Peak m/z	nnn.nn	88.00
Dup_Measure_Value	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Measure_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Pcnt_Recover	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_RPD	UNUSED (but please add Pipe Delimiter for placeholder)		
M_Z_Ratio	Mass to Charge Ratio of Ion Fragment (use for Mass Spectrometry Tuning Standard)	nnn	177
M_Z_Ref	Reference Mass to Charge of Parent or Secondary (use for Mass Spectrometry Tuning/Performance Ion Abundance Criteria)	nnn	176
MS_Spike_Added	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Measure_Flags	Lab Flags for this QC record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Dup_Measure_Flags	UNUSED (but please add Pipe Delimiter for placeholder)		
Lower_Limit	Lower Percent Recovered Limit (in percent)	nnn.n	80.0
Upper_Limit	Upper Percent Recovered Limit (in percent)	nnn.n	120.0
Lab_Sample_Num	Number used internally by Lab to identify Sample analyzed	XXXXXXXX	AA345678
Dup_Lab_Sample_Num	UNUSED (but please add Pipe Delimiter for placeholder)		
Dilution_Mult	Number indicating dilution magnitude required for analysis	nnnn	10
Dup_Dilution_Mult	UNUSED (but please add Pipe Delimiter for placeholder)		
Report_Limit	Lab's Reporting limit for test (Method Reporting Limit X Dilution Multiplier) or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Report_Limit_Units	Lab Reporting limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Dup_Report_Limit	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Report_Limit_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Lab_MDL	UNUSED (but please add Pipe Delimiter for placeholder)		
Lab_MDL_Units	UNUSED (but please add Pipe Delimiter for placeholder)		

Record Format (in actual QC data records, all on one line):

Record_ID|CAS_Number|CAS_Num_Qualifier| Test_Method|Test_SubMethod|Sample_Medium_ID|Prep_Batch_Num| Prep_Date|Prep_Time|Prep_Method|Run_Batch_Num|Run_Date|Run_Time| | | |Measured_Value|Measured_Units|Pcnt_Recovered| | | | | | M_Z_Ratio|M_Z_Ref| | Measure_Flags| |Lower_Limit|Upper_Limit|Lab_Sample_Num| |Dilution_Mult| | Report_Limit| Report_Limit_Units| | | | |

Description Example:

TS|XXXXXXXXXX|X| XXXXXXXXXX|XXXX|X|XXXXXXXX|MMDDYYYY|HHMMSS|XXXXXXXX|XXXXXXXX| MMDDYYYY|HHMMSS| | | | |NNNNNNNN.NNNNNN|XXXXX|NNN.N| | | | | XXXXXXXXXX|XXXXXXXXXX| | |XXXXX| |NNN.N|NNN.N|XXXXXXXX| |NNNN| | NNNNNNNN.NNNN|XXXXX| | | | |

Lab QC Records: Format for Records of following types: 'Neg. E. Coli, Pos Coliform (KP)', 'Negative Coliform (PA)', 'Positive E. Coli (EC)'

Field Name	Description	Format	Example
Record_ID	Identifies QC record type: Neg. E. Coli, Pos Coliform="KP"; Negative Coliform="PA"; Positive E. Coli = "EC	XX	KP
CAS_Number	CAS # of substance being tested for (ECOLI for E. coli, or TCOLI for Total Coliforms, or FCOLI for Fecal Coliform)	XXXXXXXXXX	ECOLI
CAS_Num_Qualifier	Does this record show the substance's value as 'Total' (=T), 'Dissolved' (=D), 'Free' (=F), or 'Simultaneously Extracted Metals' (SEM) (=S)?	"T", "D", "F", or "S"	T
Test_Method	Test method used by lab	XXXXXXXXXX	SM 9223B
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Values: 'N/A'=No Sub-Method; 'SCAN'=Scanning Mode; 'SIM'=Selection Ion Monitoring Mode	"N/A", "SCAN", or "SIM"	N/A
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Biological Tissues such as Fish)	X	W
Prep_Batch_Num	UNUSED (but please add Pipe Delimiter for placeholder)		
Prep_Date	UNUSED (but please add Pipe Delimiter for placeholder)		
Prep_Time	UNUSED (but please add Pipe Delimiter for placeholder)		
Prep_Method	UNUSED (but please add Pipe Delimiter for placeholder)		
Run_Batch_Num	Lab's Alphanumeric identifyier of batch within which Sample analyzed	XXXXXXXX	8043
Run_Date	Date analysis run	MMDDYYYY	12251999
Run_Time	24-Hour Time analysis run, in 24-hour time	HHMMSS	163403
Dup_Run_Date	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Run_Time	UNUSED (but please add Pipe Delimiter for placeholder)		
True_Value	UNUSED (but please add Pipe Delimiter for placeholder)		
True_Value_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Measured_Value	Value Measured (If the results are between the Method Detection Limit and the Min. Reporting Limit. Include "<" symbol in Result_Flags field and use the actual value measured, if actual values have been requested, or '-1' in the result field. Include '>' in Result_Flags field and use '-2' in the Result field if the Result exceeds the Max. Reporting Limit.	nnnnnnnn.nnnn	4.4
Measured_Units	Units for Measured_Value (see page i for selection of units.)	XXXXX	MPN/100mL
Pcnt_Recovered	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Measure_Value	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Measure_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Pcnt_Recover	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_RPD	UNUSED (but please add Pipe Delimiter for placeholder)		
M_Z_Ratio	UNUSED (but please add Pipe Delimiter for placeholder)		
M_Z_Ref	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Added	UNUSED (but please add Pipe Delimiter for placeholder)		
MS_Spike_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Measure_Flags	Lab Flags for this QC record (Labs must provide cross-reference of flag codes and interpretations; IDEM will incorporate into translation table)	XXXXX	<gx
Dup_Measure_Flags	UNUSED (but please add Pipe Delimiter for placeholder)		
Lower_Limit	UNUSED (but please add Pipe Delimiter for placeholder)		
Upper_Limit	UNUSED (but please add Pipe Delimiter for placeholder)		
Lab_Sample_Num	Number used internally by Lab to identify Sample analyzed	XXXXXXXX	AA345678
Dup_Lab_Sample_Num	UNUSED (but please add Pipe Delimiter for placeholder)		
Dilution_Mult	Number indicating dilution magnitude required for analysis	nnnn	1
Dup_Dilution_Mult	UNUSED (but please add Pipe Delimiter for placeholder)		
Report_Limit	Lab's Reporting limit for test (Method Reporting Limit X Dilution Multiplier) or if Result exceeds the Maximum Reporting Limit enter Maximum Reporting Limit X Dilution Multiplier)	nnnnnnnn.nnnn	5.0
Report_Limit_Units	Lab Reporting limit units (see page i for selection of units.)	XXXXX	ug/l, mg/kg
Dup_Report_Limit	UNUSED (but please add Pipe Delimiter for placeholder)		
Dup_Report_Limit_Units	UNUSED (but please add Pipe Delimiter for placeholder)		
Lab_MDL	UNUSED (but please add Pipe Delimiter for placeholder)		
Lab_MDL_Units	UNUSED (but please add Pipe Delimiter for placeholder)		

Record Format (in actual data records, all on one line):

Record_ID|CAS_Number|CAS_Num_Qualifier|Test_Method|Test_SubMethod|Sample_Medium_ID| | | |Run_Batch_Num|Run_Date| Run_Time| | | |Measured_Value|Measured_Units| | | | | | | | |Measure_Flags| |Lower_Limit|Upper_Limit| Lab_Sample_Num| | | | Report_Limit| Report_Limit_Units| | | | |

Description Example:
LC|XXXXXXXXXX|T|XXXXXXXXXX|XXXX|X| | | | |XXXXXXXX|MMDDYYYY|HHMMSS| | | | |NNNNNNNN.NNNNNN|XXXXX| | | | | | | | |XXXXX|
|NNN.N|NNN.N|XXXXXXXX| |NN| | NNNNNNNN.NNNN|XXXXX| | | | |

Note:
These QC samples require separate records for Total Coliform and e. Coli.

Real World Example:
KP	TCOLI	T	SM 9223B	N/A	W					252	09252000	205000					8.4	MPN/100mL											1	2400	26835		1					
KP	ECOLI	T	SM 9223B	N/A	W					252	09252000	205000					1	MPN/100mL									<		1	1	26835		1					
PA	TCOLI	T	SM 9223B	N/A	W					252	09252000	205000					1	MPN/100mL									<		1	1	26836		1					
PA	ECOLI	T	SM 9223B	N/A	W					252	09252000	205000					1	MPN/100mL									<		1	1	26836		1					
EC	TCOLI	T	SM 9223B	N/A	W					252	09252000	205000					21.1	MPN/100mL											1	2400	26837		1					
EC	ECOLI	T	SM 9223B	N/A	W					252	09252000	205000					21.1	MPN/100mL											1	2400	26837		1					

Example for a complete batch transmission file:

HE|ISDH|11191999|220156|50| (EDI Submission Set Header Record)
HA|ISDH| |BB345678|00TSW190|1|11191999|220156|31| (Analysis Set1 Header Record)
HS|ISDH|DA12345|W|AA345678|BB345678|00TSW190|1|11191999|220156|10| (Sample Number1 Header Record)
DS|AA345678|7429-90-5|T|200.7|N/A|W|1.0|ug/l|8.1|ug/l|<gx| | | ||8042|12251999|163403|10|
DS|AA345678|7440-43-9|T|200.7|N/A|W|2.0|ug/l|8.1|ug/l|<gx| | | ||8042|12251999|163403| |
DS|AA345678|7440-47-3|T|200.7|N/A|W|3.0|ug/l|8.1|ug/l|<gx| | | ||8042|12251999|163403| |
DS|AA345678| 309-00-2|T|608|N/A|W|0.03|ug/l|8.1|ug/l|<gx| | | ||843|12251999|163303| |
DS|AA345678|57-74-9|T|608|N/A|W|0.14|ug/l|1.7|ug/l|<gx| | | ||843|12251999|163303| |
DS|AA345678|50-29-3|T|608|N/A|W|0.125|ug/l|14|ug/l|<gx| | | ||843|12251999|163303| |
DS|AA345678|76-44-8|T|608|N/A|W|0.03|ug/l|1.1|ug/l|<gx| | | ||843|12251999|163303| |
DS|AA345678|1134-23-2|T|525.2|N/A|W|0.01|ug/l|88.1|ug/l|<gx| | | ||71|12251999|163303| |
DS|AA345678|5836-10-2|T|525.2|N/A|W|0.1|ug/l| ||<gx| | | ||71|12251999|163303| |
DS|AA345678|14797-65-0|T|354.1|N/A|W|0.01|mg/l|250|mg/l|<gx| | | ||71|12251999|163303| |
FS|ISDH|DA12345|W|AA345678|BB345678|00TSW190|1|11191999|220156|10| (Sample Number1 Footer Record)
HS|ISDH|DA54321|S|345678|BB345678|00TSW190|1|11191999|142112|5| (Sample Number2 Header Record)
DS|345678|7429-90-5|T|200.7|N/A|S|5.0|mg/Kg|8.1|mg/Kg|<gx|768|12251999|163403|3050|8043|12251999|163403|10|
DS|345678|7440-43-9|T|200.7|N/A|S|1.0|mg/Kg|18.1|mg/Kg|<gx|768|12251999|163403|3050|8043|12251999|163403|10|
DS|345678|7440-47-3|T|200.7|N/A|S|5.0|mg/Kg|9|mg/Kg|<gx|768|12251999|163403|3050|8043|12251999|163403|10|
DS|345678|7440-50-8|T|200.7|N/A|S|2.0|mg/Kg|4|mg/Kg|<gx|768|12251999|163403|3050|8043|12251999|163403|10|
DS|345678|7439-92-1|T|200.7|N/A|S|15.0|mg/Kg|80|mg/Kg|<gx|768|12251999|163403|3050|8043|12251999|163403|10|
FS|ISDH|DA54321|S|345678|BB345678|00TSW190|1|11191999|142112|5| (Sample Number2 Footer Record)
HN|ISDH|BB345678|00TSW190|1|AA345678| |71|DR|14797-65-0|T|W|354.1|N/A| |11191999|142112|1|
DN|Analysis resulted in an unusually high analyte concentration. Sample tested positive for presen|ce of sulfuric acid preservative. It is possible that nitric acid is also present in sample, which would account for high concentration. Nitric Acid presence in sample cannot be positively determined.|
FN|ISDH|BB345678|00TSW190|1|AA345678| |71|DR|14797-65-0|T|W|354.1|N/A| |11191999|142112|1| (Narrative1 Footer)
HN|ISDH|BB345678|00TSW190|1|345678|768|8043|DR|7439-92-1|T|S|200.7|N/A|3050|11191999|142112|1| (Narrative2 Header)
DN|Analysis resulted in an unusually high analyte concentration. Do Not Eat the Sediments!|
FN|ISDH|BB345678|00TSW190|1|345678|768|8043|DR|7439-92-1|T|S|200.7|N/A|3050|11191999|142112|1| (Narrative2 Footer)
HQ|ISDH|W|BB345678|00TSW190|1|11191999|220156|3| (QC Header Record)
CC|7429-90-5 |T|200.7|N/A|S|768|12251999|163403|3050|8043|12251999|163403| | |25.0|mg/kg|24.0|mg/kg|96.0|| | | | | | | | |90|110|345678| | | |1.0|ug/l| | |
CC|7440-43-9 |T|200.7|N/A|S| | | | |8042|12251999|163403| | |50.0|mg/kg|42.0|mg/kg|96.0| | | | | | | | | |80|120|AA345678| | | |2.0|ug/l| | |
CC|14797-65-0|T|354.1|N/A|S| | | | |71|12251999|163403| | |10.0|mg/kg|9.0|mg/kg|90.0| | | | | | | | | |90|110|SS345678| | | |0.01|mg/L| | |
FQ|ISDH|W|BB345678|00TSW190|1|11191999|220156|3| (QC Footer Record)
FA|ISDH| |BB345678|00TSW190|1|11191999|220156|31| (Analysis Set1 Footer Record)
HA|ISDH| |BB345679|00TSW191|1|11201999|140156|16| (Analysis Set2 Header Record)
HS|ISDH|DA12346|W|DD345678|BB345679|00TSW191|1|11201999|140156|1| (Sample Number1 Header Record)
DS|DD345678|14797-65-0|T|354.1|N/A|W|0.01|mg/l|250|mg/l|<gx| | | ||71|12251999|163303| |
FS|ISDH|DA12346|W|DD345678|BB345679|00TSW191|1|11201999|140156|1| (Sample Number1 Footer Record)
HS|ISDH|DA54320|S|DD34567|BB345679|00TSW191|1|11201999|140156|2| (Sample Number2 Header Record)
DS|DD34567|7429-90-5|T|200.7|N/A|S|5.0|mg/Kg|8.1|mg/Kg|<gx|768|12251999|163403|3050|8043|12251999|163403|10|
DS|DD34567|7439-92-1|T|200.7|N/A|S|15.0|mg/Kg|80|mg/Kg|<gx|768|12251999|163403|3050|8043|12251999|163403|10|
FS|ISDH|DA54320|S|DD34567|BB345679|00TSW191|1|11201999|140156|2| (Sample Number2 Footer Record)
HN| ISDH|BB345679|00TSW191|1|DD345678| |71|DR|14797-65-0|T|W|354.1|N/A | |11191999|142112|1| (Narrative1 Header)
DN|Analysis resulted in an unusually high analyte concentration. Sample tested positive for presence of sulfuric acid preservative. It is possible that nitric acid is also present in sample.|
FN|ISDH|BB345679|00TSW191|1|DD345678| |71|DR|14797-65-0|T|W|354.1|N/A| |11191999|142112|1| (Narrative1 Footer)
HN|ISDH|BB345679|00TSW191|1|DD34567|768|8043|DR|7439-92-1|T|N/A|S|200.7|3050|11191999|142112|1| (Narrative2 Header)
DN|Analysis resulted in an unusually high analyte concentration. Do Not Eat the Sediments!|
FN|ISDH|BB345679|00TSW191|1|DD34567|768|8043|DR|7439-92-1|T|S|200.7|N/A|3050|11191999|142112|1| (Narrative2 Footer)
HQ|ISDH|W|BB345679|00TSW191|1|11201999|140156|1| (QC Header Record)
CC|14797-65-0|T|354.1|N/A|S| | | | |71|12251999|163403| | |10.0|mg/kg|9.0|mg/kg|90.0| | | | | | | | | |90|110|SS345678| | | |0.01|mg/L| | |
FQ|ISDH|W|BB345679|00TSW191|1|11201999|140156|1| (QC Footer Record)
FA|ISDH| |BB345679|00TSW191|1|11201999|140156|16| (Analysis Set2 Footer Record)
FE|ISDH|11191999|220156|50| (EDI Submission Set Footer Record)

Another Example for a complete batch transmission file:

HE|MYLAB|01262001|082259|55| (EDI Submission Set Header Record)
HA|MYLAB|00.05223|99WQW399|1|W|09282000|110000|53| (Analysis Set Header Record)
HS|MYLAB|DX50410|W|382573|00.05223|99WQW399|1|09282000|110000|1| (Sample Number1 Header Record)
DS|382573|E-10195|T|415.1|N/A|W|1.0|mg/L|4.2|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50410|W|382573|00.05223|99WQW399|1|09282000|110000|1| (Sample Number1 Footer Record)
HS|MYLAB|DX50411|W|382574|00.05223|99WQW399|1|09282000|110000|1| (Sample Number2 Header Record)
DS|382574|E-10195|T|415.1|N/A|W|1.0|mg/L|4.6|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50411|W|382574|00.05223|99WQW399|1|09282000|110000|1| (Sample Number2 Footer Record)
HS|MYLAB|DX50412|W|382575|00.05223|99WQW399|1|09282000|110000|1| (Sample Number3 Header Record)
DS|382575|E-10195|T|415.1|N/A|W|1.0|mg/L|4.0|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50412|W|382575|00.05223|99WQW399|1|09282000|110000|1| (Sample Number3 Footer Record)
HS|MYLAB|DX50413|W|382576|00.05223|99WQW399|1|09282000|110000|1| (Sample Number4 Header Record)
DS|382576|E-10195|T|415.1|N/A|W|1.0|mg/L|3.8|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50413|W|382576|00.05223|99WQW399|1|09282000|110000|1| (Sample Number4 Footer Record)
HS|MYLAB|DX50414|W|382577|00.05223|99WQW399|1|09282000|110000|1| (Sample Number5 Header Record)
DS|382577|E-10195|T|415.1|N/A|W|1.0|mg/L|3.1|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50414|W|382577|00.05223|99WQW399|1|09282000|110000|1| (Sample Number5 Footer Record)
HS|MYLAB|DX50415|W|382578|00.05223|99WQW399|1|09282000|110000|1| (Sample Number6 Header Record)
DS|382578|E-10195|T|415.1|N/A|W|1.0|mg/L|5.4|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50415|W|382578|00.05223|99WQW399|1|09282000|110000|1| (Sample Number6 Footer Record)
HS|MYLAB|DX50416|W|382579|00.05223|99WQW399|1|09282000|110000|1| (Sample Number7 Header Record)
DS|382579|E-10195|T|415.1|N/A|W|1.0|mg/L|4.9|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50416|W|382579|00.05223|99WQW399|1|09282000|110000|1| (Sample Number7 Footer Record)
HS|MYLAB|DX50417|W|382580|00.05223|99WQW399|1|09282000|110000|1| (Sample Number8 Header Record)
DS|382580|E-10195|T|415.1|N/A|W|1.0|mg/L|7.2|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50417|W|382580|00.05223|99WQW399|1|09282000|110000|1| (Sample Number8 Footer Record)
HS|MYLAB|DX50418|W|382581|00.05223|99WQW399|1|09282000|110000|1| (Sample Number9 Header Record)
DS|382581|E-10195|T|415.1|N/A|W|1.0|mg/L|4.4|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50418|W|382581|00.05223|99WQW399|1|09282000|110000|1| (Sample Number9 Footer Record)
HS|MYLAB|DX50419|W|382582|00.05223|99WQW399|1|09282000|110000|1| (Sample Number10 Header Record)
DS|382582|E-10195|T|415.1|N/A|W|1.0|mg/L|1.9|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50419|W|382582|00.05223|99WQW399|1|09282000|110000|1| (Sample Number10 Footer Record)
HS|MYLAB|DX50420|W|382583|00.05223|99WQW399|1|09282000|110000|1| (Sample Number11 Header Record)
DS|382583|E-10195|T|415.1|N/A|W|1.0|mg/L|2.6|mg/L| | | | | |265|09282000|235900|1|
FS|MYLAB|DX50420|W|382583|00.05223|99WQW399|1|09282000|110000|1| (Sample Number11 Footer Record)
HS|MYLAB|DX50421|W|382584|00.05223|99WQW399|1|09282000|110000|1| (Sample Number12 Header Record)
DS|382584|E-10195|T|415.1|N/A|W|100000|mg/L|-2|mg/L| >| | | | |265|09282000|235900|1| (Sample Number13 Result Above the Upper Reporting Limit)
FS|MYLAB|DX50421|W|382584|00.05223|99WQW399|1|09282000|110000|1| (Sample Number12 Footer Record)
HS|MYLAB|DX50422|W|382585|00.05223|99WQW399|1|09282000|110000|1| (Sample Number13 Header Record)
DS|382585|E-10195|T|415.1|N/A|W|1.0|mg/L|-1|mg/L|<| | | | |265|09282000|235900|1| (Sample Number13 Result below the Reporting Limit)
FS|MYLAB|DX50422|W|382585|00.05223|99WQW399|1|09282000|110000|1| (Sample Number13 Footer Record
HN|MYLAB|00.05223|99WQW399|1|382580| |E-10195|T|415.1|N/A| |09282000|110000|1| (Sample Number8 Project Narrative Header Record)
DN|Sample was received improperly preserved. Sulfuric acid was added to sample by the laboratory upon receipt| (Project Narrative Record)
FN|MYLAB|00.05223|99WQW399|1|382580| |E-10195|T|415.1|N/A| |09282000|110000|1| (Sample Number8 Project Narrative Footer Record)
HQ|MYLAB|W|00.05223|99WQW399|1|01262001|082259|9| (QC Header Record)
BL|E-10195|T|415.1|N/A|W|0| | | |265|09282000|235900| | | | |1.0|mg/L| | |mg/L| | | | | |<| | | | BLANK1| |1| |1.0|mg/L| (Blank QC Record)
BL|E-10195|T|415.1|N/A|W|0| | | |265|09282000|235900| | | | |1.0|mg/L| | |mg/L| | | | | |<| | | | BLANK2| |1| |1.0|mg/L|
BL|E-10195|T|415.1|N/A|W|0| | | |265|09282000|235900| | | | |1.0|mg/L| | |mg/L| | | | | |<| | | | BLANK3| |1| |1.0|mg/L|
CC|E-10195|T|415.1|N/A|W|0| | | |265|09282000|235900| | |5.0|mg/L|4.90|mg/L|98.0| | | | | | | | | | |90|110|CCV1 | | | |1.0|mg/L| | | (CCV QC Record)
CC|E-10195|T|415.1|N/A|W|0| | | |265|09282000|235900| | |5.0|mg/L|4.93|mg/L|98.6| | | | | | | | | | |90|110|CCV2 | | | |1.0|mg/L| | |
CC|E-10195|T|415.1|N/A|W|0| | | |265|09282000|235900| | |5.0|mg/L|4.92|mg/L|98.4| | | | | | | | | | |90|110| CCV3| | | |1.0|mg/L| | |
(MS/MSD Record Follows:)
MS|E-10195|T|415.1|N/A|W|0| | | |265|09282000|235900|09282000|235900|3.8|mg/L|8.61|mg/L|96.2|8.84|mg/L|100.8|2.6| | |5.0|mg/L| | |80|120|382576|382576|1|1|1.0|mg/L|1.0|mg/L|1.0|mg/L|
LC|E-10195|T|415.1|N/A|W|0| | | |265|09282000|235900| | |10.|mg/L|10.4|mg/L|104.0|10.2|mg/L|102.0|1.4 | | | | | |90|110| LCS1| LCSD| | |1.0|mg/L|1.0|mg/L| (LC with LC Duplicate Record)
DU| E-10195|T|415.1|N/A|W|0| | | |265|09282000|235900| | | |5.80|mg/L| |5.50|mg/L| |5.3| | | | | | | |382576|382576|1|1|1.0|mg/L|1.0|mg/L| (Duplicate Record)
FQ|MYLAB|W|00.05223|99WQW399|1|01262001|082259|9| (QC Footer Record)

FA|MYLAB|00.05223|99WQW399|1|W|09282000|110000|53| (Analysis Set Footer Record)
FE|MYLAB|01262001|082259|55| (EDI Submission Set Footer Record)

EDI EXPORT FORMAT DESCRIPTION

Introduction

Previously IDEM OWQ defined an EDI Format has proven extremely useful for guaranteeing accurate Lab Test Result Information would be provided by the Laboratories to IDEM OWQ. There has been a tremendous savings in time that previously was spent keying in data and reviewing it for errors. More information is now being stored per sample, and a higher degree of data accuracy is being achieved with less effort.

IDEM OWQ would like to reciprocate by providing the labs with EDI files describing Analysis Sets, Sample Numbers, and Lab Test Parameters for those Analysis Sets and Sample Numbers. In adopting this format, the laboratories can read sample numbers, analysis sets, and laboratory test parameters into their system error-free, with a savings in labor spent on keystroking and QC of the data entry to ensure accuracy. IDEM will benefit from this likewise by achieving a complete correspondence between our sample numbers provided to and received from the labs, along with electronic submission of lab test parameter information to the labs.

The following document describes formats for EDI files to be submitted to labs (when possible) that will provide EDI information to the labs describing Analysis Sets, Sample Numbers, and Test Parameters to be performed by the laboratory. Each of the three files will contain the field names as the first line.

Analysis Set Sample Number List EDI File

Purpose

The Analysis Set Sample Number List will provide the Laboratory with an accurate list of Sample Numbers being sent as part of an analysis set. The Analysis Set Sample Number List will correspond to the Sample Numbers provided to the Lab in the Chain of Custody, and could serve as a useful verification tool against hand-prepared Chain of Custody documents, as well as against the actual samples. Perhaps the most beneficial aspect of the Analysis Set Sample Number List would be to eliminate keystroke errors (which occasionally occur), and the associated QA of data entry. Sample Numbers and analysis sets would be guaranteed to exactly correspond with data stored in the submitting organization (in this case, IDEM).

File Naming Convention: The file will be recognizable as the Analysis Set Sample Number List by using the following naming convention:

File Name: [Submit_Org] & "_" [OWQ_Analysis_Set] & "_SampleEDI.txt"
Ex: for Analysis Set 02WQW397, the Analysis Set Sample Number EDI file would be named "IDEM_02WQW397_SampleEDI.txt"

EDI Format: After the last line of data, an extra line will be appended that has one field indicating the line count of data records in this EDI file (i.e., excluding the extra line). Here is the Analysis Set Sample Number Data Record Format

Field Name	Description	Format	Example
Submit_Org	Name of Organization Submitting Data (In our case, always 'IDEM')	XXXXXXXXXX	IDEM
OWQ_Analysis_Set	IDEM Assigned Analysis Set Number	nnXXXnnnn	02WQW397
Sample_ID	IDEM assigned Sample ID	XXnnnnnnnn	AA12345
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Fish Tissue)	X	W
Date_Collected	Date Sample was collected by IDEM	MM/DD/YYYY	1/12/2002
Time_Collected	24-Hr Time Sample collected by IDEM (if time not important, can be blank)	HH:MM	12:35
Container_Count	Total Count of Containers used to deliver Sample to Lab	nn	1
Record_Count	Total number of Sample (records) in this file (excluding the descriptive header line).	nn	4

Submit_Org|OWQ_Analysis_Set|Sample_ID|Sample_Medium_ID|Date_Collected|Time_Collected|Container_Count|Record_Count|CloseDelim

Description Example:
IDEM|nnXXXnnnn|XXnnnnnnnnn|X|MM/DD/YYYY|HH:MM|nn|

Real World Example (File Name: IDEM_02WQW397_SampleEDI.txt):
Submit_Org|OWQ_Analysis_Set|Sample_ID|Sample_Medium_ID|Date_Collected|Time_Collected|Container_Count|Record_Count|CloseDelim
IDEM|02WQW397|AA12345|W|1/12/2002|12:35|1|
IDEM|02WQW397|AA12346|W|1/12/2002|13:45|1|
IDEM|02WQW397|AA12347|W|1/13/2002|08:35|1|
IDEM|02WQW397|AA12349|W|1/13/2002|10:35|1|

Analysis Set Parameter List EDI File

Purpose: The Analysis Set Parameter List will provide the Laboratory with an accurate list of Parameter Tests to be performed on the entire analysis set (where Sample_ID='*'), and specific Sample Numbers being sent as part of an analysis set. The Analysis Set Parameter List will correspond to the test regimes provided in many cases through the Lab in the Chain of Custody, and could serve as a useful verification tool against hand-prepared Chain of Custody documents, as well as against the actual samples. Perhaps the most beneficial aspect of the Analysis Set Parameter List would be to eliminate keystroke errors (which occasionally occur), and the associated QA of data entry. Parameter Tests for Sample Numbers and analysis sets would be guaranteed to exactly correspond with data stored by the submitting organization (in this case, IDEM).

Each line of the file will be valid for either an individual sample number, or for the entire group (sample_ID='*'). Each line will describe tests either for a Parameter Group (ex: Nutrients) as defined in the Parameter Group Definitions EDI file (see next page), or for a specific parameter (ex: Mercury).

File Naming Convention: The file will be recognizable as the Analysis Set Parameter List by using the following naming convention:

File Name: [Submit_Org] & "_" & [OWQ_Analysis_Set] & "_ParameterEDI.txt"

Ex: for Analysis Set 02WQW397, the Analysis Set Parameter EDI file would be named "IDEM_02WQW397_ParameterEDI.txt"

EDI Format Description: After the last line of data, an extra line will be appended that has one field indicating the line count of data records in this EDI file (i.e., excluding the extra line). Here is the Analysis Set Parameter Data Record Format

Field Name	Description	Format	Example
Submit_Org	Name of Organization Submitting Data (In our case, always 'IDEM')	XXXXXXXXXX	IDEM
OWQ_Analysis_Set	IDEM Assigned Analysis Set Number	nnXXXnnnn	02WQW397
Sample_ID	IDEM assigned Sample ID (if tests for entire analysis set, = '*')	XXnnnnnnnn	AA12345
Parameter_Group	Name of Group of substances being tested for	XXXXXXXXXX	Metals
Parameter_Name	Name of substance being tested for	XXXXXXXXXX	Mercury
CAS_Number	CAS # of substance being tested for	XXXXXXXXXX	7439-97-6
CAS_Num_Qualifier	Does this record show the substance's value as 'Total' (=T), 'Dissolved' (=D), 'Free' (=F), or 'Simultaneously Extracted Metals' (SEM) (=S)?	X	T
Test_Method	Test method used by lab	XXXXXXXXXX	1631
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Potential Values: 'N/A'=No Sub-Method; 'SCAN'=Scanning Mode; 'SIM'=Selection Ion Monitoring Mode	XXXX	N/A
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Fish Tissue)	X	W
Record_Count	Total number of Sample (records) in this file (excluding the descriptive header line).	nn	4

Submit_Org|OWQ_Analysis_Set|Sample_ID|ParameterGroup|ParameterName|CAS_Number|CAS_Num_Qualifier|Test_Method|Test_SubMethod|Sample_Medium_ID|

Description Example:

IDEM|nnXXXnnnn|XXnnnnnnnnn|XXXXXXXXXXX|XXXXXXXXXXX|XXXXXXXXXXX|X|XXXXXXXXXXX|XXXX|X|

Real World Example (File Name: IDEM_02WQW397_ParameterEDI.txt):

```
Submit_Org|OWQ_Analysis_Set|Sample_ID|Parameter_Group|Parameter_Name|CAS_Number|CAS_Num_Qualifier|Test_Method|Test_SubMethod|Sample_Medium_ID|Record_Count|CloseDelim
IDEM|02WQW397|*|Nutrients| | | | | |
IDEM|02WQW397|*| |Mercury|7439-97-6|T|1631|N/A|W|
IDEM|02WQW397|AA12345|Pesticides| | | | | |
IDEM|02WQW397|AA12346| |2,4'-DDT|789-02-6|T|608|N/A|W|
```

Parameter Group Definition List EDI File

Purpose: The Parameter Group Definition List will provide the Laboratory with definitions of each Parameter Group referenced in the Analysis Set Parameter List EDI file. Perhaps the most beneficial aspect of the Parameter Group Definition List would be to eliminate keystroke errors (which occasionally occur), and the associated QA of data entry. Parameter Tests for Sample Numbers and analysis sets would be guaranteed to exactly correspond with data stored by the submitting organization (in this case, IDEM).

File Naming Convention: The file will be recognizable as the Parameter Group Definition List by using the following naming convention:

File Name: [Submit_Org] & "_" & [OWQ_Analysis_Set] & "_GroupDefEDI.txt"

Ex: for Analysis Set 02WQW397, the Parameter Group Definitions EDI file would be named "IDEM_02WQW397_GroupDefEDI.txt"

EDI Format Description: After the last line of data, an extra line will be appended that has one field indicating the line count of data records in this EDI file (i.e., excluding the extra line). Here is the Parameter Group Definition Data Record Format:

Field Name	Description	Format	Example
Submit_Org	Name of Organization Submitting Data (In our case, always 'IDEM')	XXXXXXXXXX	IDEM
OWQ_Analysis_Set	IDEM Assigned Analysis Set Number	nnXXXnnnn	02WQW397
Parameter_Group	Name of Group of substances being tested for	XXXXXXXXXX	Metals
Parameter_Name	Name of substance being tested for	XXXXXXXXXX	Mercury
CAS_Number	CAS # of substance being tested for	XXXXXXXXXX	257301-77-2
CAS_Num_Qualifier	Does this record show the substance's value as 'Total' (=T), 'Dissolved' (=D), 'Free' (=F), or 'Simultaneously Extracted Metals' (SEM) (=S)?	X	T
Test_Method	Test method used by lab	XXXXXXXXXX	200.7
Test_SubMethod	Identifies Method's elective process when it produces different MDL (as in 200.8; others possible). Potential Values: 'N/A'=No Sub-Method; 'SCAN'=Scanning Mode; 'SIM'=Selection Ion Monitoring Mode	XXXX	SCAN
Sample_Medium_ID	What is the medium of the sample being tested? (W=Water, S=Sediment, or F=Fish Tissue)	X	W
Record_Count	Total number of Sample (records) in this file (excluding the descriptive header line).	nn	4

Submit_Org|OWQ_Analysis_Set|Parameter_Group|Parameter_Name|CAS_Number|CAS_Num_Qualifier|Test_Method| Test_SubMethod|Sample_Medium_ID|Record_Count|CloseDelim

Description Example:

IDEM|nnXXXnnnn|XXXXXXXXXX|XXXXXXXXXX|XXXXXXXXXX|X|XXXXXXXXXX |XXXX|X|

Real World Examples (File Name: IDEM_02WQW397_GroupDefEDI.txt):

Submit_Org|OWQ_Analysis_Set|Parameter_Group|Parameter_Name|CAS_Number|CAS_Num_Qualifier|Test_Method| Test_SubMethod|Sample_Medium_ID|Record_Count|CloseDelim
IDEM|02WQW397|Nutrients|TDS|E-10173|D|160.1|N/A|W|
IDEM|02WQW397|Nutrients|TOC|E-10195|T|SM5310|N/A|W|
IDEM|02WQW397|Nutrients|COD|E-10117|T|410|N/A|W|
IDEM|02WQW397|Pesticides|4,4'-DDD|72-54-8|T|525.2|N/A|W|
IDEM|02WQW397|Pesticides|4,4'-DDE|72-55-9|T|525.2|N/A|W|

IDEM|02WQW397|Pesticides|4,4'-DDT|50-29-3|T|525.2|N/A|W|
IDEM|02WQW397|Pesticides|83-32-9|XXXXXXXXXXX|T|525.2|N/A|W|
IDEM|02WQW397|Pesticides|Acenaphthylene|208-96-8|T|525.2|N/A|W|
IDEM|02WQW397|Pesticides|Benzo[a]anthracene|56-55-3|T|525.2|N/A|W|
IDEM|02WQW397|Pesticides|Benzo[a]pyrene|50-32-8|T|525.2|N/A|W|
IDEM|02WQW397|Pesticides|Benzo[b]fluoranthene|205-99-2|T|525.2|N/A|W|