OWQ- WATERSHED ASSESSMENT & PLANNING BRANCH
IDEM/OWQ/WAPB/WM
VIRTUAL FILE CABINET INDEX FORM

Program: Water Monitoring

Document Type: Report

***Document Date:** 1/14/2021

***Security:** Public

***Project Name:** 2021 Vernon Fork Muscatatuck River Watershed

***Project Type:** TMDL

***Report Type:** Work Plan

HUC Code: 05120207 Muscatatuck

Site #:

Route Name:

Document Control # B-050-OWQ-WAP-XXX-21-W-R1

Analysis Set #

County: Jennings

Cross Reference ID:

Comments: 2021 Watershed Characterization Work Plan for Vernon Fork Muscatatuck River Watershed (Hydrologic Unit Code 0512020707); TMDL Project Manager: Lindsay Hylton Adams; Also Jackson County

Redaction Reference ID:

2021 Watershed Characterization Work Plan for Vernon Fork Muscatatuck River Watershed (Hydrologic Unit Code 0512020707)

PREPARED BY

Lindsay Hylton Adams and Allie Gates

Indiana Department of Environmental Management
Office of Water Quality
Watershed Assessment and Planning Branch
Watershed Planning and Restoration Section
100 North Senate Avenue
MC65-40-2 Shadeland
Indianapolis, Indiana 46204-2251

January 14, 2021

B-050-OWQ-WAP-XXX-21-W-R1

This page is intended to be blank

Approval Signatures

Timothy J. Beckman Date 1/12/2021
Tim Beckman, Project Manager
Targeted Monitoring Section

Caleb Rennaker Date 1/12/2021
Caleb Rennaker, TMDL Lead
Watershed Planning and Restoration Section

Timothy Bowren Date 1/12/2021
Timothy Bowren, Project Quality Assurance Officer
Technical and Logistical Services Section

Stacey L Sobat Date 1/8/2021
Stacey Sobat, Section Chief
Probabilistic Monitoring Section

Cyndi Wags Date 1/12/2021
Cyndi Wagner, Section Chief
Targeted Monitoring Section

Kristen Arnold Date 1/13/2021
Kristen Arnold, Section Chief
Technical and Logistical Services Section

Jody Arthur Date 1/12/2021
Jody Arthur, Integrated Report Coordinator
Watershed Assessment and Planning Branch

Marylou Renshaw Date 1/8/2021
Marylou Renshaw, Branch Chief
Watershed Assessment and Planning Branch

IDEM Quality Assurance Staff reviewed and approves this work plan.

James E Bailey Date 15 Jan 2021
Quality Assurance Staff
IDEM Office of Program Support

This page is intended to be blank

Addendum

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Eric J. Holcomb — *Governor*
Bruno L. Pigott — *Commissioner*

Memorandum

TO: Interested Parties

FROM: Lindsay Hylton Adams
TMDL Project Manager
Watershed Planning & Restoration Section
Watershed Assessment and Planning Branch
Office of Water Quality

DATE: September 30, 2021

SUBJECT: Amendment to 2021 Watershed Characterization Work Plan for Vernon Fork Muscatatuck River Watershed (Hydrologic Unit Code 0512020707) B-050-OWQ-WAP-XXX-21-W-R1

This memorandum serves as an amendment to the 2021 Watershed Characterization Work Plan for Vernon Fork Muscatatuck River Watershed (Hydrologic Unit Code 0512020707) B-050-OWQ-WAP-XXX-21-W-R1. Additional water chemistry and nutrient sampling will be performed at three sites (T26, T27, and T28) added to the watershed characterization project in September 2021 (Table 1). These sites have been added to better understand the source of recurring high total phosphorus discovered at site T02 during previous sampling events. The three new sites will be sampled in September and October 2021, during separate sampling events, following the normal collection of samples at the existing 23 sampling sites. The two additional sampling events will include a set of quality control samples, which include the duplicate, field blank, and MS/MSD. The addition of these three sites will increase the total number of sampling sites in the project from 23 to 26.

The data collected at these three sites in September and October 2021 will serve to provide additional information for regulatory purposes and will not be incorporated into the development of the TMDL report for the Vernon Fork Muscatatuck River watershed.

Table 1. Amended site list for the 2021 Vernon Fork Muscatatuck River Watershed Characterization Study, with added sites to be sampled in September and October highlighted

Site #	AIMS Site #	Stream Name	Location	County	Latitude	Longitude	AUID
21T-001	WEM090-0003	Rider Ditch	CR 600 S	Jackson	38.79353578	-85.88407544	INW0776_T1022
21T-002	WEM-07-0010	Grassy Creek	CR 600 S	Jackson	38.79404813	-85.86931487	INW0776_T1019
21T-003	WEM090-0008	Vernon Fork Muscatatuck River	CR 400 S	Jackson	38.82206239	-85.8841949	INW0776_05
21T-005	WEM-07-0015	John McDonald Ditch	CR 125 S	Jackson	38.86303512	-85.84559017	INW0776_T1009
21T-006	WEM-07-0021	Tea Creek	CR 650 S	Jennings	38.88831496	-85.68897148	INW0775_T1003
21T-007	WEM070-0029	Tea Creek	CR 650 W	Jennings	38.88604596	-85.73130525	INW0775_T1003
21T-008	WEM070-0039	Vernon Fork Muscatatuck River	CR 500 S	Jennings	38.91091206	-85.73012452	INW0775_01
21T-009	WEM070-0020	Vernon Fork Muscatatuck River	US HWY 31	Jackson	38.90610115	-85.82106187	INW0775_05
21T-010	WEM090-0015	Vernon Fork Muscatatuck River	CR 50 N	Jackson	38.88857071	-85.85168772	INW0776_03
21T-011	WEM080-0015	Sandy Branch	US HWY 31	Jackson	38.93120545	-85.83400946	INW0774_T1005
21T-012	WEM080-0014	Mutton Creek Ditch	CR 400 N	Jackson	38.940733	-85.81562399	INW0774_02
21T-013	WEM-07-0016	Tributary of Mutton Creek	CR 700 N	Jackson	38.98394506	-85.82854896	INW0774_T1003
21T-014	WEM080-0027	Mutton Creek	CR 800 N	Jackson	38.99864464	-85.80638235	INW0774_02
21T-015	WEM080-0025	Mutton Creek	CR 300 N	Jennings	39.02796877	-85.76541025	INW0774_01
21T-016	WEM080-0013	Storm Creek Ditch	CR 400 N	Jackson	38.94055313	-85.80592841	INW0773_02
21T-017	WEM080-0005	Tributary of Richart Lake	CR 900 W	Jennings	38.96953087	-85.77740246	INW0773_T1002
21T-018	WEM-07-0014	Storm Creek	Base Road	Jennings	38.98320116	-85.78670909	INW0773_01
21T-019	WEM-07-0017	Sixmile Creek	CR 500 S	Jennings	38.91115337	-85.76232742	INW0772_06
21T-020	WEM-07-0018	Sixmile Creek	CR 200 S	Jennings	38.95438451	-85.73213824	INW0772_05
21T-021	WEM-07-0019	Sixmile Creek	CR 175 N	Jennings	39.0100959	-85.70497622	INW0772_04
21T-022	WEM-07-0020	Sixmile Creek	SR 7	Jennings	39.04575934	-85.67644156	INW0772_01A
21T-023	WEM070-0036	Vernon Fork Muscatatuck River	CR 400 W	Jennings	38.95429488	-85.68498536	INW0771_02
21T-025	WEM070-0001	Vernon Fork Muscatatuck River	CR 60 S	Jennings	38.97635892	-85.62004239	INW0771_03
21T-026	WEM-07-0022	Nehrt Ditch	E CR 600 S	Jackson	38.793730	-85.856081	INW0776_T1018
21T-027	WEM-07-0023	Blau Ditch	CR 1000 E	Jackson	38.8012585	-85.8513440	INW0776_T1016
21T-028	WEM-07-0024	Grassy Creek	US HWY 31	Jackson	38.817926	-85.837428	INW0776_T1015

21T-### gray shading of the Site # denotes that these are the selected pour points for this project (7 sites)

Work Plan Organization

This work plan is an extension of the existing Watershed Assessment and Planning Branch (WAPB), March 2017 Quality Assurance Project Plan (QAPP) for Indiana Surface Water Programs (Surface Water QAPP) (IDEM 2017a) and serves as a link to the existing QAPP as well as an independent QAPP of the project. Per the United States Environmental Protection Agency (U.S. EPA) 2006 Guidance on Systematic Planning Using the Data Quality Objectives (DQO) Process (U.S. EPA 2006) and the U.S. EPA 2002 Guidance for Quality Assurance Project Plans (U.S. EPA 2002), this work plan establishes criteria and specifications, pertaining to a specific water quality monitoring project, usually described in the following four groups or sections of a QAPP per Guidance for Quality Assurance Project Plans (U.S. EPA 2002).

Group A. Project Management

- Project Objective
- Project Organization and Schedule
- Background and Project Description
- Data Quality Objectives
- Training and Staffing Requirements

Group B. Data Generation and Acquisition

- Sampling Procedures
- Analytical Methods
- Sample and Data Acquisition Requirements
- Quality Control Measures Specific to the Project

Group C. Assessment and Oversight

- External and Internal Checks
- Audits
- Data Quality Assessments
- Quality Assurance and Quality Control Review Reports

Group D. Data Validation and Usability

- Data Handling and Associated Quality Assurance and Quality Control activities

This page is intended to be blank

Table of Contents

List of Attachments

List of Figures

List of Tables

List of Acronyms

AIMS	Assessment Information Management System
ASTM	American Society for Testing and Materials
AUID	Assessment Unit IDs
CFU	Colony Forming Units
DO	Dissolved Oxygen
DQA	Data Quality Assessment
DQO	Data Quality Objectives
E. coli	*Escherichia coli*
GPS	Global Positioning System
HUC	Hydrologic Unit Code
IAC	Indiana Administrative Code
IBI	Index of Biotic Integrity
IDEM	Indiana Department of Environmental Management
µS/cm	Micro Siemens per Centimeter
mg/L	Milligram per liter
MHAB	Multihabitat
mL	Milliliter
NTU	Nephelometric Turbidity Unit(s)
OHEPA	Ohio Environmental Protection Agency
OWQ	Office of Water Quality
PPE	Personal Protective Equipment
QA/QC	Quality Assurance and Quality Control
QAPP	Quality Assurance Project Plan
QHEI	Qualitative Habitat Evaluation Index
S.U.	Standard Units
SM	Standard Methods
SOP	Standard Operating Procedures
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
U.S. EPA	United States Environmental Protection Agency
WAPB	Watershed Assessment and Planning Branch

DEFINITIONS

Assessment Unit	Reaches of waterbodies, with similar features, assigned unique identifiers to which all assessment information for that specific reach is associated and which allow for mapping with geographic information systems
Elutriate	To purify, separate, or remove lighter or finer particles by washing, decanting, and settling.
Fifteen-(15-)minute pick	A component of the multihabitat macroinvertebrate sampling method, used to maximize taxonomic diversity while in the field, in which the one-minute kick sample and fifty-meter sweep sample collected at a site are first combined and elutriated. Macroinvertebrates are then manually removed from the resulting sample for 15 minutes.
Fifty-(50-)meter sweep sample	A component of the multihabitat macroinvertebrate sampling method in which approximately 50 meters of all available habitat in a stream or river is sampled with a standard 500 micrometer mesh width D-frame dip net by taking 20-25 individual “jab” or “sweep” samples, which are then composited.
Geometric site	Sampling site chosen according to its drainage area within a watershed.
Macroinvertebrate	Aquatic animals which lack a backbone, are visible without a microscope, and spend some period of their lives in or around water.
One-(1-)minute kick sample	A component of the multihabitat macroinvertebrate sampling method in which approximately 1 m^2 of riffle or run substrate habitat in a stream or river is sampled with a standard 500 µm mesh width D-frame dip net for approximately 1 minute.
Pour point	The outlet of a subwatershed or the common point where all the water flows out of any given subwatershed.
Reach	A segment of a stream used for sampling.
Targeted site	A sampling site intentionally selected based on specific monitoring objectives or decisions to be made.

A. PROJECT MANAGEMENT

A.1. Project Objective

IDEM selected the Vernon Fork Muscatatuck River ("Vernon Fork") watershed (10-digit Hydrologic Unit Code or HUC 0512011118) (Figure 2, Table 3) for a watershed characterization project. The main objective of the watershed characterization monitoring project is to use an intensive targeted watershed design which characterizes the current condition of an individual watershed. This type of monitoring provides valuable data for the purposes of assessment, TMDL development, watershed planning, and allows for future comparisons to evaluate changes in the water quality within the watershed 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.

The water quality data generated from this monitoring effort is anticipated to provide information needed to characterize the watershed for the TMDL program, for local water quality managers, to identify sources of impairment, to designate critical areas, and to enable users in making valid and informed watershed decisions. By design, this project also adds new stream reaches which allow for assessment of aquatic life use support, recreational use support, and future comparisons to evaluate changes in water quality.

The draft 303(d) list for 2020 submitted to the U.S. EPA (IDEM 2020a) identifies 280.72 miles of impaired streams in the Vernon Fork watershed with some reaches affected by multiple impairments. The total number of miles per each impairment in the Vernon Fork watershed is reported in the following ways:

- Category 5(a): Impaired Biotic Community (IBC), 169.80 miles
- Category 5(a): Dissolved Oxygen Impaired (DO), 162.81 miles
- Category 5(a): *Escherichia coli (E. coli)*, 93.78 miles
- Category 5(b): Mercury (Hg), 48.83 miles

Assessment data have been collected in this watershed from multiple IDEM programs and projects.

A.2. Project Organization and Schedule

The main project objective is to provide a comprehensive assessment of the Vernon Fork watershed streams' capability to support aquatic life and recreational uses. Sampling will begin in November 2020 and end in October 2021. Barring any hazardous weather conditions or unexpected physical barriers to access a site, sampling activities will be conducted for physical, chemical and bacteriological parameters, and biological communities.

Sampling activity timeframes include:

1. Site reconnaissance activities will be completed in July 2020. Reconnaissance activities will be conducted in the office and through physical site visits.
2. Water chemistry will be sampled monthly at all watershed sites during the recreational season, defined as April through October in [327 IAC 2-1-6]. During the months of November through March, only sites at the pour point of each 12-digit HUC will be sampled monthly (six sites for this project). The first sampling event will be conducted in November 2020 and the study will conclude in October 2021.
3. Biological sampling activities will begin in the summer of 2021 and end no later than October 18, 2021. Fish and macroinvertebrate community sampling will be conducted at all watershed sites via the observation, counting, and collection techniques described in the "Sampling Methods and Sample Handling" section of this work plan. Habitat quality will also be assessed at all watershed sites. Fish and macroinvertebrate community collection specific dates cannot be given, since sampling may be postponed due to a high-water event resulting in scouring of the stream substrate or instream cover creating nonrepresentative samples. Bacteriological sampling for *E. coli* at all sites in the watershed will take place monthly from April through October of 2021. In addition, *E. coli* samples will be collected five times from each site at equally spaced intervals over a 30-day period during the recreational season of April to October 2021 to determine a geometric mean.

A.3. Background and Project Description

The Watershed Characterization Monitoring program was instituted to assist in characterizing existing conditions in watersheds throughout the state. The Vernon Fork watershed data set will be utilized by the TMDL program and shared with local watershed groups and any other interested parties. The monitoring will provide data for TMDL development and watershed planning and will aid in future evaluations of changes within the basin. For this study, the following data will be used for assessment purposes: water chemistry, bacteriological contamination in the form of *E. coli*, fish community, macroinvertebrate assemblages, and habitat evaluations.

A.4. Data Quality Objectives (DQOs)

The DQO process (U.S. EPA 2006) is a planning tool for data collection activities. The process provides a basis for balancing decision uncertainty with available resources. The DQO process is recommended by U.S. EPA when selecting between two alternatives or deriving an estimate of contamination. The DQO process is a seven-step systematic planning process used to clarify study objectives; define the types of data needed to achieve the objectives; and establish decision criteria for evaluating data quality. Results of the DQO seven step process for the watershed characterization monitoring of the Vernon Fork watershed are documented in the following seven sections.

1. State the Problem
   Indiana is required to assess all waters of the state to determine their designated use attainment status. Surface waters of the state are designated for full-body contact recreation; will be capable of supporting a well-balanced, warm water aquatic community; and put-and-take trout fishing [327 IAC 2-1-3] in some northern portions of the state. Data from the intensive sampling of the Vernon Fork watershed is needed to fully characterize the current water quality of the watershed. This project will gather water chemistry, bacteriological, biological (fish and macroinvertebrates), and habitat data for the purpose of assessing the designated use attainment status of the Vernon Fork watershed.

2. Identify the Goals of the Study
   The main objective of this study is to fully assess whether the surface waters in this watershed are supporting or nonsupporting for aquatic life use and recreational use. In addition, the data from the watershed characterization monitoring will be used for TMDL development and may also be used for watershed planning and future comparisons to evaluate changes in water quality within the watershed studied.

3. Identify Information Inputs
   Grab samples will be collected at the surface water sampling locations for *E. coli* and the parameters listed in Table 5. Field measurements listed in Table 6 will be conducted at each site during each sampling event. Visual field observations will include weather conditions, stream conditions, and percent stream canopy at each sampling location. All samples collected for bacteriological samples will be analyzed for *E. coli* using SM9223B (IDEM 2019a) Idexx Colilert Enzyme Substrate Standard Method. Surface water chemistry samples will be collected monthly and processed and analyzed by TestAmerica Laboratories using the analytical methods listed in Table 5. A fish and macroinvertebrate community sample will be collected once at each site with a corresponding habitat evaluation.

4. Define the Boundaries of the Study
   The Vernon Fork watershed covers 212.41 square miles and is located in Jackson and Jennings counties. The watershed is approximately 40% Forest, 24% Agriculture, 24% Hay/Pasture, 9% Developed Land (combined types), 2% Wetlands, and 1% other uses. (Figure 1)

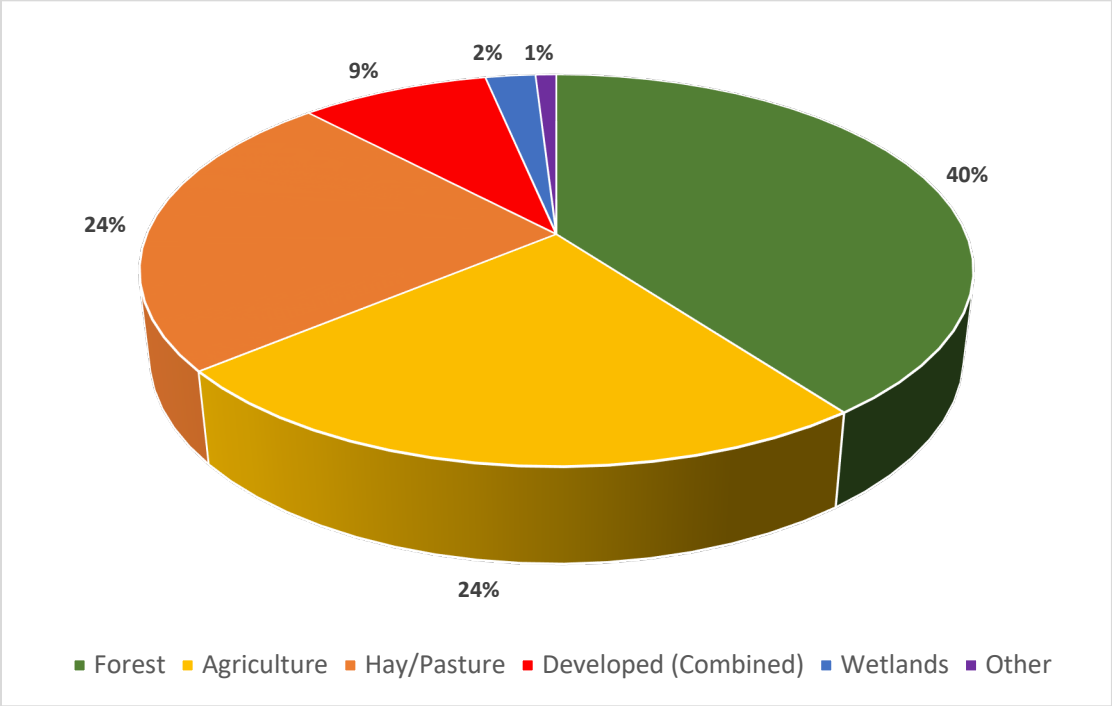
   Sampling locations for the 2021 Vernon Fork watershed characterization study are listed in Table 3 and can be viewed spatially in Figure 2.

   Site reconnaissance activities will be completed in July 2020. Sampling activities will begin in November 2020 and will conclude in October 2021. Water chemistry will be sampled monthly during the recreational season, defined as April through October in [327 IAC 2-1-6]. Biological sampling activities will be conducted in the summer of 2021 and end no later than October 18, 2021. Bacteriological sampling activities will be conducted from April through October of 2021.

   Sampling activities will not be conducted when stream flow is potentially too dangerous for staff to enter the stream, hazardous weather conditions (e.g. thunderstorms or heavy rain in the vicinity) exist, or unexpected physical barriers to accessing the site exist. The field crew chief will make the final determination as to whether or not a stream is safe to enter.

   Even when weather conditions and stream flow are safe, sample collections for biological communities may be postponed at a particular site for one to four weeks. The cause of the postponement would be a high-water event resulting in scouring of the stream substrate or instream cover creating nonrepresentative samples.

Figure 1. Vernon Fork Muscatatuck River Watershed Land Use



[4] Data collected/calculated from USDA National Agricultural Statistics Service 2019 Cropland Data Layer

5. Develop the Analytical Approach
   Samples will be collected for physical, chemical, and bacteriological parameters, as well as biological communities. Samples will be analyzed for *E.coli* in the IDEM *E. coli* mobile laboratory or IDEM Shadeland laboratory with the Idexx™ Colilert Test. The Colilert Test is a multiple-tube enzyme substrate standard method SM-9223B (Clesceri et al. 2012). Samples will be analyzed for nutrient and general chemistry parameters at TestAmerica Laboratories. The nutrient and general chemistry parameters and respective test methods are listed in Table 5 of this work plan. Field parameters of DO, pH, water temperature, specific conductance, and DO percent saturation will be measured with a datasonde. Turbidity will be measured with a Hach™ turbidity kit.

6. Specify Performance or Acceptance Criteria
   Sampling design error is minimized by utilizing a comprehensive checklist of informational sources, evaluation of historical information, and a thorough watershed presurvey. Described in Section B.1.5.3 of the Surface Water QAPP (IDEM 2017a), 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.

   Good quality data are essential for minimizing decision error. By minimizing both sampling design error and measurement error for physical and biological parameters, more confidence can be placed in the conclusions drawn on the stressors and sources affecting the water quality in the study area.

Site specific aquatic life use and recreational use assessments include program specific controls to identify the introduction of errors. These controls include blanks and duplicates for water chemistry and bacteriological samples; biological site revisits or duplicates; and laboratory controls through verification of species identifications as described in field procedure manuals (IDEM 1992a, 1992b, 2002, 2015, 2017a, 2018a, 2019a, 2019b, 2019c, 2019d, 2020c).

The QA/QC process detects deficiencies in the data collection as set forth in the Surface Water QAPP (IDEM 2017a). The QAPP requires all contract laboratories to adhere to rigorous standards during sample analyses and to provide good quality usable data. Laboratory accreditation is verified before the lab contract is awarded and before the project begins (Attachment 10). Laboratory performance studies are reviewed annually in October. Chemists within the WAPB review the laboratory analytical results for quality assurance. Lab QA/QC for each data set is compared against acceptance limits as specified in laboratory methods, the laboratory's QA Manual, the Surface Water QAPP Section B5.3 (Laboratory Quality Control Checks), and the Surface Water QAPP Section D3 (Reconciliation with DQO). The data is validated based on the QA/QC review. Any data which is "Rejected" due to analytical problems or errors will not be used for water quality assessment decisions. Any data flagged as "Estimated" may be used on a case-by-case basis and is noted in the QA/QC report. Criteria for acceptance or rejection of results as well as application of data quality flags is presented in the following Surface Water QAPP tables:

- Table D3-1: Data Qualifiers and Flags
- Table A7-1: Precision and Accuracy Goals for Data Acceptability by Matrix (Precision and accuracy goals with acceptance limits for applicable analytical methods)
- Table B2.1.1.8-2: Field Parameters

Further investigation will be conducted in response to consistent "rejected" data to determine the source of error. Field techniques, used during sample collection and preparation along with laboratory procedures, will be subject to evaluation by both the WAPB QA manager and project manager to troubleshoot error introduced throughout the entire data collection process. Corrective actions will be implemented once the source of error is determined.

Sites will be evaluated as supporting or nonsupporting following the decision-making processes described in Indiana's 2020 Consolidated Assessment Listing Methodology (CALM), which is based upon the water quality criteria shown in Table 1.

Recreational use attainment decisions will be based on bacteriological criteria developed to protect primary contact recreational activities [327 IAC 2-1-6]. Aquatic life use support decisions will include independent evaluations of biological and chemical data. The fish assemblage data will be evaluated at each site using the appropriate IBI

(Simon and Dufour, 2005). Macroinvertebrate MHAB samples will also be evaluated using a statewide IBI developed for lowest practical taxonomic level identifications.

Indiana narrative biological criteria [327 IAC 2-1-3] states that "(2) All waters, except [limited use waters] will be capable of supporting: (A) a well-balanced, warm water aquatic community." The water quality standard definition of a "well-balanced aquatic community" is "[327 IAC 2-1-9] (59)] An aquatic community that: (A) is diverse in species composition; (B) contains several different trophic levels; and (C) is not composed mainly of pollution tolerant species." An interpretation or translation of narrative biological criteria into numeric criteria would be as follows: A stream segment is nonsupporting for aquatic life use when the monitored fish or macroinvertebrate community receives an Index of Biotic Integrity (IBI) score of less than 36 (on a scale of 0-60 for fish and 12-60 for macroinvertebrate communities), which is considered "Poor" or "Very Poor" (IDEM 2020b).

In addition, data for several nutrient parameters will be evaluated with the benchmarks listed below (IDEM 2020b). Assuming a minimum of three sampling events, if two or more of the conditions below are met on the same date, the waterbody will be classified as nonsupporting due to nutrients.

- Total Phosphorus (TP):
  - One or more measurements greater than 0.3 mg/L
- Nitrogen (measured as Nitrate + Nitrite):
  - One or more measurements greater than 10.0 mg/L
- Dissolved Oxygen (DO):
  - Any measurement less than 4.0 mg/L
  - Any measurements consistently at or close to the standard, range 4.0-5.0 mg/L
- DO Percent Saturation
  - Any measurement greater than 120%
- pH:
  - Any measurement greater than 9.0 SU
  - Measurements consistently at or close to the standard, range 8.7-9.0 SU

Assessment of each site sampled will be reported to U.S. EPA in the 2022 update of Indiana's Integrated Water Monitoring and Assessment Report (Integrated Report). Site-specific data will be used to classify associated assessment units into one of five major categories in the State's Consolidated 303(d) list. Category definitions are available in Indiana's CALM (IDEM 2020b, pp. 1-48 and 1-49).

Table 1. Water Quality Criteria [327 IAC Article 2]

Parameters	Water Quality Criteria	Criterion
E. coli (April-October Recreational season)	≤125 MPN/100 mL	5-Sample Geometric Mean
	≤235 MPN/100 mL	Single Sample Maximum
Total Ammonia (NH_3-N)	Calculated based on pH and Temperature	Calculated CAC
Nitrate+Nitrite-Nitrogen	≤10 mg/L	Human Health point of drinking water intake
Sulfate	Calculated based on hardness and chloride	In all waters outside the mixing zone
Dissolved Oxygen	At least 5.0 mg/L (Warm Waters)	Daily Average
	Not less than 4.0 mg/L at any time	Single Reading
pH	6.0 – 9.0 S.U. except for daily fluctuations that exceed 9.0 due to photosynthetic activity	Single Reading
Temperature	Varies Monthly	1% Annual; Maximum Limits
Chloride	Calculated based on hardness and sulfate values	Calculated CAC
Dissolved Solids	750 mg/L	Public water supply

MPN = Most Probable Number, CAC = Chronic Aquatic Criterion, S.U. = Standard Units

7. Optimize the Plan for Obtaining Data
   A Modified Geometric Design (OHEPA 1999, 2012) site selection process in Attachment 1 will be used in this study to get the necessary spatial representation of the entire study area. Sites within this watershed have been selected based on a geometric progression of drainage areas and then located to the nearest bridge. Sample sites at road crossings allow for more efficient sampling of the watershed.

A.5. Training and Staffing Requirements

Table 2. Project Roles, Experience, and Training

Role	Required Training or Experience	Responsibilities	Training References
Project Manager	- AIMS II database experience - Demonstrated experience in project management and QA/QC procedures	- Establish Project in the AIMS II database - Oversee development of project work plan - Oversee entry and QC of field data - Querying data from AIMS II to determine results not meeting Water Quality Criteria	- IDEM 2017a, 2017b - U.S. EPA 2006
Field Crew Chief Biological Community Sampling	- At least one year of experience in sampling methodology and taxonomy of aquatic communities in the region - Annually review the Principles and Techniques of Electrofishing - Annually review relevant safety procedures - Annually review relevant SOP documents for field operations	- Completion of field data sheets - Taxonomic accuracy - Sampling efficiency and representation - Voucher specimen tracking - Overall operation of the field crew when remote from central office - Adherence to safety and field SOP procedures by crew members - Ensure that multiprobe analyzers are calibrated weekly prior to field sampling activities - Ensure that field sampling equipment is functioning properly and loaded into field vehicles prior to field sampling activities	- YSI 2017 - IDEM 1992a, 1992b, 2002, 2008, 2010a, 2010b, 2015, 2017a, 2018a, 2019b, 2019c, 2019d - Newhouse 1998a, 1998b - YSI 2018
Field Crew Members Biological Community Sampling	- Complete hands-on training for sampling methodology prior to participation in field sampling activities - Review the Principles and Techniques of Electrofishing - Review relevant safety procedures - Review relevant SOP documents for field operations	- Follow all safety and SOP procedures while engaged in field sampling activities - Follow direction of field crew chief while engaged in field sampling activities	- YSI 2017 - IDEM 1992a, 1992b, 2002, 2008, 2010a, 2010b, 2015, 2017a, 2018a, 2019b, 2019c, 2019d - Newhouse 1998a, 1998b - YSI 2018

Role	Required Training or Experience	Responsibilities	Training References
Field Crew Chief – Water Chemistry or Bacteriological Sampling	- At least one year of experience in sampling methodology - Annually review relevant safety procedures - Annually review relevant SOP documents for field operations	- Completion of field data sheets - Sampling efficiency and representation - Overall operation of the field crew when remote from central office - Adherence to safety and field SOP procedures by crew members - Ensure multiprobe analyzers are calibrated weekly prior to field sampling activities - Ensure field sampling equipment is functioning properly and loaded into field vehicles prior to field sampling activities	- YSI 2017 - IDEM 1997, 2002, 2008, 2010a, 2010b, 2015, 2017a, 2019a - YSI 2018
Field Crew Members – Water Chemistry or Bacteriological Sampling	- Complete hands-on training for sampling methodology prior to participation in field sampling activities - Review relevant safety procedures - Review relevant SOP documents for field operations	- Follow all safety and SOP procedures while engaged in field sampling activities - Follow direction of field crew chief while engaged in field sampling activities	- YSI 2017 - IDEM 1997, 2002, 2008, 2010a, 2010b, 2015, 2017a, 2019a - YSI 2018
Laboratory Supervisor – Biological Community Sample Processing	- At least one year of experience in taxonomy of aquatic communities in the region - Annually review relevant safety procedures - Annually review relevant SOP documents for laboratory operations	- Adherence to safety and SOP procedures by laboratory staff - Assist with identification of fish or macroinvertebrate specimens - Verify taxonomic accuracy of samples - Voucher specimen tracking - QC calculations on data sheets, check for completeness - Ensure data are entered into AIMS II correctly	- IDEM 1992a, 1992b, 2008, 2010a, 2010b, 2017b - Newhouse 1998a, 1998b
Laboratory Staff – Biological Community Sample Processing	- Complete hands-on training for laboratory sample processing	- Adhere to safety and SOP procedures	- IDEM 1992a, 1992b, 2008, 2010a, 2010b, 2017b

Role	Required Training or Experience	Responsibilities	Training References
	methodology prior to laboratory sample processing activities - Annually review relevant safety procedures and relevant SOP documents for laboratory operations	- Follow Laboratory Supervisor direction while processing samples - Identify fish or macroinvertebrate specimens - Perform necessary calculations on data, enter field sheets	- Newhouse 1998a, 1998b
Laboratory Supervisor – Water Chemistry or Bacteriological Sample Processing	- Annually review relevant safety procedures - Annually review relevant SOP documents for field operations	- Adherence to safety and SOP procedures by laboratory staff - Completion of laboratory data sheets - Check data for completeness - Perform all necessary calculations on the data - Ensure data are entered into the AIMS II database	- IDEM 1997, 2002, 2008, 2010a, 2010b, 2015a, 2017a, 2017b, 2019a - Newhouse 1998a
Quality Assurance Officer	- Familiarity with QA/QC practices and methodologies - Familiarity with the Surface Water QAPP and data qualification methodologies	- Ensure adherence to QA/QC requirements of Surface Water QAPP - Evaluate data collected by sampling crews for adherence to project work plan - Review data collected by field sampling crews for completeness and accuracy - Perform a data quality analysis of data generated by the project - Assign data quality levels based on the data quality analysis - Import data into the AIMS II database - Ensure field sampling methodology audits are completed according to WAPB procedures	- IDEM 2017a, 2017b - U.S. EPA 2006

B. DATA GENERATION AND ACQUISITION

B.1. Sampling Sites and Sampling Design

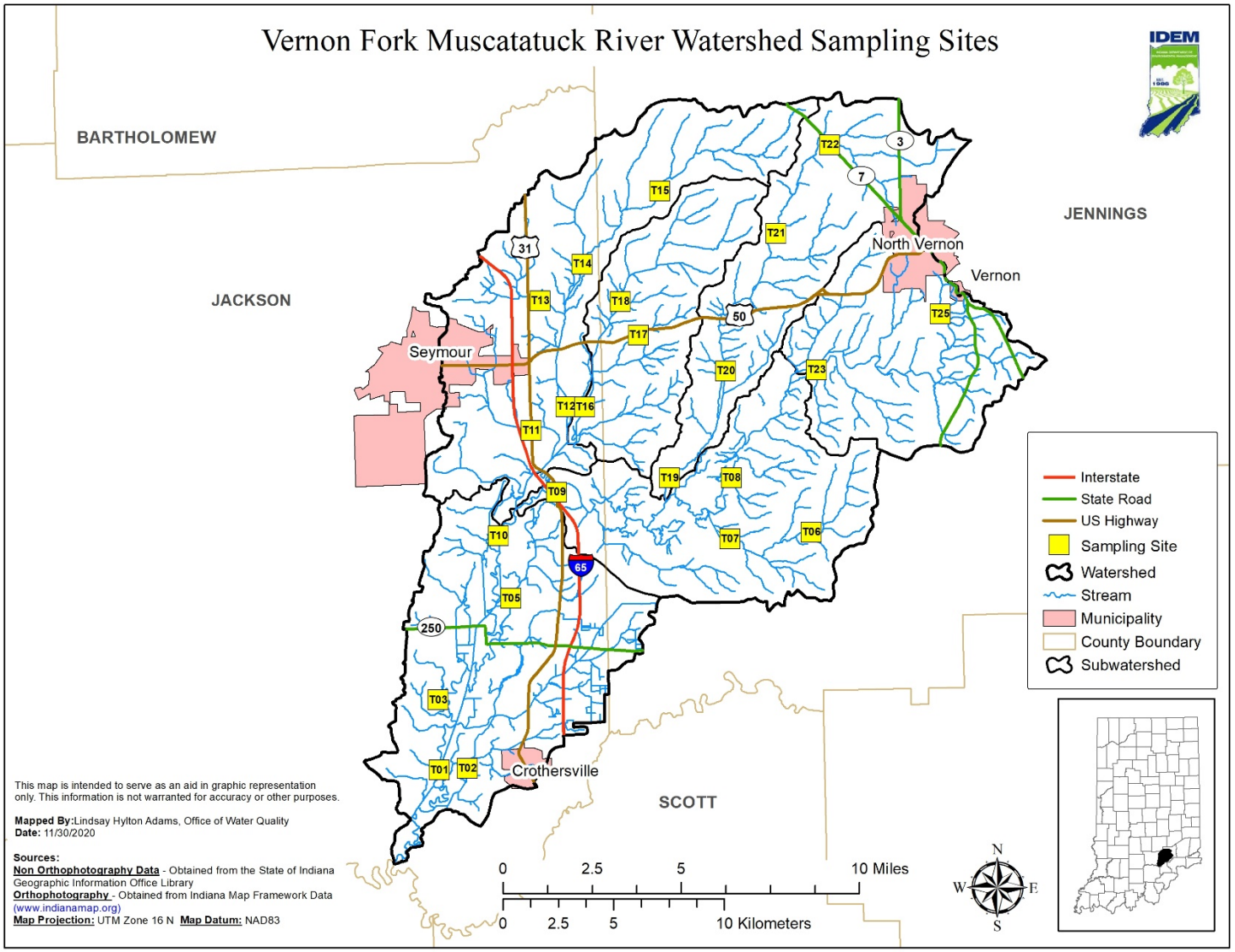
Sample sites will be chosen using a modified geometric site selection process as well as targeted site selection in order to obtain the necessary spatial representation of the entire watershed. Sites within this watershed will be selected based on a geometric progression of drainage areas starting with the area at the mouth of the main stem stream and then working upstream through the tributaries to the headwaters. Monitoring sites will then be established at the nearest bridge.

A more complete description of the Modified Geometric Design Steps for Watershed Characterization Studies selection process is included as Attachment 1. Sample sites will also be chosen at the bridge nearest to the pour point of each 12-digit HUC in the watershed or chosen to characterize sources for TMDL development.

Site reconnaissance activities will be 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. All information will be recorded on the IDEM OWQ Site Reconnaissance Form (Attachment 2) and entered into the AIMS II database. Precise coordinates for each site will be determined during the physical site visits or at the beginning of the sampling phase of this project, using a Trimble Juno ™ SB Global Positioning System or a Trimble Juno 3D GPS (IDEM 2015), both of which have an accuracy of two to five meters. These coordinates will be entered into the AIMS II database. Digital photos will also be taken upstream and downstream of the site during reconnaissance. Digital photos will be stored on the shared drive upon return to the office in a specific folder for the Vernon Fork watershed characterization. Photos will be labeled with the site number and indication of whether the photo faces upstream or downstream.

Table 3 provides a list of the selected sampling sites with the stream name, AUID, AIMS Site Number, County Name, and the latitude and longitude of each site. Figure 2 gives a spatial overview of the site locations for this project.

Figure 2. Vernon Fork Muscatatuck River Watershed Characterization Sampling Area



[1] Map site numbers refer to last two digits of site number from Table 3; e.g., 21T-010 is site T10 on map

Table 3. Sampling Locations for Watershed Characterization of Vernon Fork Muscatatuck River (HUC 0512020707)

Site #	AIMS Site #	Stream Name	Location	County	Latitude	Longitude	AUID
21T-001	WEM090-0003	Rider Ditch	CR 600 S	Jackson	38.79353578	-85.88407544	INW0776_T1022
21T-002	WEM-07-0010	Grassy Creek	CR 600 S	Jackson	38.79404813	-85.86931487	INW0776_T1019
21T-003	WEM090-0008	Vernon Fork Muscatatuck River	CR 400 S	Jackson	38.82206239	-85.8841949	INW0776_05
21T-005	WEM-07-0015	John McDonald Ditch	CR 125 S	Jackson	38.86303512	-85.84559017	INW0776_T1009
21T-006	WEM-07-0021	Tea Creek	CR 650 S	Jennings	38.88831496	-85.68897148	INW0775_T1003
21T-007	WEM070-0029	Tea Creek	CR 650 W	Jennings	38.88604596	-85.73130525	INW0775_T1003
21T-008	WEM070-0039	Vernon Fork Muscatatuck River	CR 500 S	Jennings	38.91091206	-85.73012452	INW0775_01
21T-009	WEM070-0020	Vernon Fork Muscatatuck River	US HWY 31	Jackson	38.90610115	-85.82106187	INW0775_05
21T-010	WEM090-0015	Vernon Fork Muscatatuck River	CR 50 N	Jackson	38.88857071	-85.85168772	INW0776_03
21T-011	WEM080-0015	Sandy Branch	US HWY 31	Jackson	38.93120545	-85.83400946	INW0774_T1005
21T-012	WEM080-0014	Mutton Creek Ditch	CR 400 N	Jackson	38.940733	-85.81562399	INW0774_02
21T-013	WEM-07-0016	Tributary of Mutton Creek	CR 700 N	Jackson	38.98394506	-85.82854896	INW0774_T1003
21T-014	WEM080-0027	Mutton Creek	CR 800 N	Jackson	38.99864464	-85.80638235	INW0774_02
21T-015	WEM080-0025	Mutton Creek	CR 300 N	Jennings	39.02796877	-85.76541025	INW0774_01
21T-016	WEM080-0013	Storm Creek Ditch	CR 400 N	Jackson	38.94055313	-85.80592841	INW0773_02
21T-017	WEM080-0005	Tributary of Richart Lake	CR 900 W	Jennings	38.96953087	-85.77740246	INW0773_T1002
21T-018	WEM-07-0014	Storm Creek	Base Road	Jennings	38.98320116	-85.78670909	INW0773_01
21T-019	WEM-07-0017	Sixmile Creek	CR 500 S	Jennings	38.91115337	-85.76232742	INW0772_06
21T-020	WEM-07-0018	Sixmile Creek	CR 200 S	Jennings	38.95438451	-85.73213824	INW0772_05
21T-021	WEM-07-0019	Sixmile Creek	CR 175 N	Jennings	39.0100959	-85.70497622	INW0772_04
21T-022	WEM-07-0020	Sixmile Creek	SR 7	Jennings	39.04575934	-85.67644156	INW0772_01A
21T-023	WEM070-0036	Vernon Fork Muscatatuck River	CR 400 W	Jennings	38.95429488	-85.68498536	INW0771_02
21T-025	WEM070-0001	Vernon Fork Muscatatuck River	CR 60 S	Jennings	38.97635892	-85.62004239	INW0771_03

[2]21T-### gray shading of the Site # denotes that these are the selected pour points for this project (7 sites).

B.2. Sampling Methods and Sample Handling

1. Water Chemistry Sampling
   One team of two staff will collect water chemistry grab samples, record water chemistry field measurements, and record physical site descriptions on the IDEM OWQ Stream Sampling Field Data Sheet (Attachment 3). All water chemistry sampling will adhere to the Water Chemistry Field Sampling Procedures (IDEM 2020c). Samples will be preserved as specified below in Table 4, and all applicable holding times will be followed.

Table 4. Water Chemistry Sample Handling

Parameter	Preservative	Holding Times
Alkalinity (as $CaCO_3$)	Ice	14 days
Solids, Total Residue (TS)	Ice	7 days
Solids, Nonfilterable Residue (TSS)	Ice	7 days
Solids, Filterable Residue (TDS)	Ice	7 days
Sulfate (Dissolved)	Ice	28 days
Chloride	Ice	28 days
Hardness (as $CaCO_3$)	HNO_3	6 months
Nitrogen, as Ammonia	H_2SO_4	28 days
Nitrogen, Kjeldahl (TKN)	H_2SO_4	28 days
Nitrogen, Nitrate-nitrite	H_2SO_4	28 days
Phosphorous (Applicable to all)	H_2SO_4	28 days
Total Organic Carbon (TOC)	H_2SO_4	28 days
Chemical Oxygen Demand	H_2SO_4	28 days
Calcium	HNO_3	6 months
Magnesium	HNO_3	6 months

2. Bacteriological Sampling
   Bacteriological sampling will be conducted by one team consisting of one or two staff. Samples will be processed in an IDEM fixed or mobile *E. coli* laboratory equipped with all materials and equipment necessary to perform the Colilert® Test Method (Standard Method 9223B), per Project Organization and Schedule (above) (IDEM 2019a). The expected time frame for bacteriological sampling will be April through October of 2021. Staff will collect the samples in a 120 mL presterilized wide-mouth container from the center of flow, if the stream is wadeable, or from the shoreline using a pole sampler, if the stream is not wadeable. This is subject to field staff determination based on available PPE, turbidity, and other factors. However, streams waist deep or shallower

are generally considered wadeable. All samples will be consistently labeled, cooled, and held at a temperature less than 10ºC during transport. Samples will be preserved with 0.0008% $Na_2S_2O_3$ for CL_2. While still in the field and at the end of each sampling run, water samples will be processed and analyzed for *E. coli* within the six-hour holding time for collection and transportation, and the two-hour holding time for sample processing (IDEM 2019a).

The IDEM mobile *E. coli* laboratory facilitates *E. coli* testing by eliminating the necessity to transport samples to distant contract laboratories within a six-hour holding time. The IDEM mobile *E. coli* laboratory (van) provides a work space containing sample storage; supplies for Colilert® Quanti-tray testing; and all equipment needed for collecting, preparing, incubating, and analyzing results in the same manner as the IDEM fixed *E. coli* laboratory. All supplies will be obtained from IDEXX Laboratories, Inc., Westbrook, Maine.

3. Fish Community Measurements
   The fish community sampling will be completed by teams of three to five staff. Sampling will be performed using various standardized electrofishing methodologies dependent upon the stream size and site accessibility. Fish assemblage assessments will be performed in a sampling reach of 15 times the average wetted width, with a minimum reach of 50 meters and a maximum reach of 500 meters (IDEM 2018a). An attempt will be made to sample all habitat types available within the sample reach to ensure adequate representation of the fish community present at the time of the sampling event. The list of possible electrofishers utilized include: the Smith-Root LR-24, Smith-Root LR-20B, or Midwest Lake Electrofishing System (MLES) Infinity XStream backpack electrofisher; the Smith-Root model 1.5KVA electrofishing system; the Smith-Root model 2.5 Generator Powered Pulsator electrofisher, with RCB-6B junction box and rat-tail cathode cable; or MLES Infinity Control Box with MLES junction box and rat-tail cathode cable, assembled in a canoe (if parts of the stream are not wadeable, the system may require the use of a dropper boom array outfitted in a canoe or possibly a 12 foot Loweline™ boat); or for nonwadeable sites, the Smith-Root Type VI-A or MLES Infinity Control Box electrofisher assembled in a 16-foot boat (IDEM 2018a).

   Sample collections during high flow or turbid conditions will be avoided due to 1) low collection rates which result in nonrepresentative samples and 2) safety considerations for the sampling team. Sample collection during late autumn will be avoided due to the cooling of water temperature, which may affect the responsiveness of some species to the electrical field. This lack of responsiveness can result in samples which are not representative of the streams' fish assemblage (IDEM 2018a).

   Fish will be collected using dip nets with fiberglass handles and netting of 1/8 inch mesh bag. Fish collected in the sampling reach will be sorted by species into baskets or

buckets. Young-of-the-year fish less than 20 millimeters (mm) total length will not be retained in the community sample (IDEM 2018a).

For each field taxonomist (generally the crew leader), a complete set of fish vouchers will be retained for each new or different species encountered during the summer sampling season. Vouchers may consist of either preserved specimens or digital images. Prior to processing fish specimens and completion of the IDEM OWQ Fish Collection Data Sheet (Attachment 4), one to two individuals per new species encountered may be preserved in 3.7% formaldehyde solution to serve as representative fish vouchers. If the fish specimens can be positively identified and the individuals for preservation are small enough to fit in a 2000 mL jar. If, however, the specimens are too large to preserve, a photo of key characteristics (e.g., fin shape, size, body coloration) will be taken for later examination (IDEM 2018a). Also, prior to sampling, 10% of the sites will be randomly selected for revisiting, and a few representative individuals of all species found at the site will be preserved or photographed to serve as vouchers. Taxonomic characteristics for possible species encountered in the basin of interest will be reviewed prior to field work.

Fish specimens should also be preserved if positive identification cannot be made in the field (e.g., those co-occurring like the Striped and Common Shiners or are difficult to identify when immature); individuals which appear to be hybrids or have unusual anomalies; or dead specimens which are taxonomically valuable for undescribed taxa (e.g., Red Shiner or Jade Darter); life history studies; or research projects (IDEM 2018a).

Data will be recorded for nonpreserved fish on the IDEM OWQ Fish Collection Data Sheet (Attachment 4) consisting of the following: number of individuals; minimum and maximum total length in millimeters (mm); mass weight in grams (g); and number of individuals with deformities, eroded fins, lesions, tumors, and other anomalies (DELTs). Once the data are recorded, specimens will be released within the sampling reach from which they were collected, when possible. Data will be recorded for preserved fish specimens following taxonomic identification in the laboratory (IDEM 2018a).

4. Macroinvertebrate Community Measurements
   The macroinvertebrate community sampling may be conducted immediately following the fish community sampling event or on a different date by crews of two to three staff. Samples will be collected using a modification of the U.S. EPA Rapid Bioassessment Protocol MHAB approach using a D-frame dip net with 500 µm mesh (Plafkin et al. 1989; Klemm et al. 1990; Barbour et al. U.S. EPA 1999; IDEM 2019b). The IDEM MHAB approach (IDEM 2019b) is composed of a 1-minute “kick” sample within a riffle or run (collected by disturbing one square meter of stream bottom substrate in a riffle or run habitat and collecting the dislodged macroinvertebrates within the dip net) and a 50-meter “sweep” sample of all available habitats (collected by disturbing habitat such as

emergent vegetation, root wads, coarse particulate organic matter, depositional zones, logs, and sticks; and collecting the dislodged macroinvertebrates within the dip net). The 50-meter length of riparian corridor sampled at each site will be defined using a rangefinder or tape measure. If the stream is too deep to wade, a boat will be used to sample the 50 meter zone along the shoreline with the best available habitat. In addition, a 1-minute kick sample will not be collected if the stream is too deep to wade and no available shoreline to collect the sample exists. The 1-minute “kick” and 50-meter “sweep” samples are combined in a bucket of water.

The combined sample will be elutriated through a U.S. Standard Number 35 (500 µm) sieve a minimum of five times so all rocks, gravel, sand, and large pieces of organic debris are removed from the sample. The remaining sample is then transferred from the sieve to a white plastic tray. The collector, while still on-site, will conduct a 15-minute pick of macroinvertebrates at a single organism rate endeavoring to pick for maximum organism diversity, and relative abundance through turning and examining the entire sample in the tray. The resulting picked sample will be preserved in 80% isopropyl alcohol; returned to the laboratory for identification at the lowest practical taxonomic level (usually genus or species level, if possible); and evaluated using the MHAB macroinvertebrate IBI. Before leaving the site, an IDEM OWQ Macroinvertebrate Header Form (IDEM 2019c, Attachment 5) will be completed for the sample.

5. Habitat Assessments
   Habitat assessments will be completed immediately following macroinvertebrate and fish community sample collections at each site using a slightly modified version of the Ohio Environmental Protection Agency (OHEPA) QHEI, 2006 edition (Rankin 1995; OHEPA 2006). A separate IDEM OWQ Biological QHEI (Attachment 6) must be completed for each sample type, since the sampling reach length may differ (i.e., 50 meters for macroinvertebrates and between 50 and 500 meters for fish). IDEM 2019d describes the method used in completing the QHEI.

6. Field Parameter Measurements
   Dissolved oxygen (DO), pH, water temperature, specific conductance, and DO percent saturation will be measured with a datasonde, during each sampling event regardless of the sample type collected. Measurement procedures and operation of the datasonde shall be performed according to the manufacturers’ manuals (YSI 2017; YSI 2018) and Sections 2.0 and 4.0 of the Water Chemistry Field Sampling Procedures TSOP (IDEM 2020c). Turbidity will be measured with a Hach™ turbidity kit and the meter number written in the comments under the field parameter measurements. If a Hach™ turbidity kit is not available, the datasonde measurement for turbidity will be recorded and noted in the comments. During each sampling run, field observations from each site and ambient weather conditions at the time of sampling will be noted and documented on IDEM Stream Sampling Field Data Sheets (Attachment 3).

B.3. Analytical Methods

1. Laboratory Procedure for *E. coli* Measurements:
   All waters sampled will be processed and analyzed for *E. coli* in the IDEM *E. coli* mobile laboratory or IDEM Shadeland laboratory, which is equipped with required materials and equipment necessary for the Idexx™ Colilert Test. The Colilert Test is a multiple-tube enzyme substrate standard method SM-9223B Enzyme Substrate Coliform Test Method (Clesceri et al., 2012). The *E. coli* test method and quantification limit are identified in Table 5.
2. Nutrient and General Chemistry Parameters Measurements:
   Analyses of nutrient and general chemistry parameters will be performed at TestAmerica Laboratories, in accordance with preapproved test methods and within the allotted time frames. The nutrient and general chemistry parameters, and respective test methods and quantification limits are identified below in Table 5.

Table 5. *E.coli*, Nutrient, and General Chemistry Parameters Test Methods[4]

Parameter	Method	Limits of Quantification	Units
E. coli	SM-9223B Enzyme Substrate Test	1.0	*MPN/100 mL
Alkalinity (as $CaCO_3$)	EPA 310.2	10.0	mg/L
Solids, Total Residue (TS)	SM 2540B	10.0	mg/L
Solids, Nonfilterable Residue (TSS)	SM 2540D	1.0	mg/L
Solids, Filterable Residue (TDS)	SM 2540C	10.0	mg/L
Sulfate (Dissolved)	EPA 300.0	0.05	mg/L
Chloride	EPA 300.0	0.06	mg/L
Hardness (as $CaCO_3$)	SM 2340B	1.41	mg/L
Nitrogen, as Ammonia	SM 4500NH3-D	0.10	mg/L
Nitrogen, Kjeldahl (TKN)	SM4500N(Org)-B	0.30	mg/L
Nitrogen, Nitrate-nitrite	SM4500NO3-F	0.10	mg/L
Phosphorous (Applicable to all)	EPA 365.1	0.05	mg/L
Total Organic Carbon (TOC)	SM 5310C	1.0	mg/L
Chemical Oxygen Demand	EPA 410.4	10.0	mg/L
Calcium	EPA 200.7	40	mg/L
Magnesium	EPA 200.7	100	mg/L

***** Clesceri et al., 2012. 1 MPN = 1 CFU/100 mL [4] Methods accredited by EPA (State of Illinois, 2018)

3. Field Parameters Measurements:
   The field measurements of DO, temperature, pH, conductivity, and turbidity will be taken each time a sample is collected. The field parameters, respective test methods, and sensitivity limits are identified in Table 6. The datasonde should be located in the center of flow during sampling. The field staff member collecting the sample should wait for all readings to stabilize before recording the readings on the IDEM Stream Sampling Field Data Sheet (Attachment 3).

Table 6. Field Parameters Test Methods

Parameter	Method	Sensitivity Limit	Units
DO (Datasonde optical)	ASTM D888-09(C)	0.01	mg/L
DO (Membrane Probe)	SM4500-OG[5]	0.03	mg/L
DO % Saturation (Datasonde optical)	ASTM D888-09(C)	0.01	%
Turbidity (Datasonde)	SM2130B	0.02	NTU
Turbidity (Hach Turbidimeter)	EPA 180.1[5]	0.01	NTU
Specific Conductance (Datasonde)	SM 2510B	1.0	µS/cm
Temperature (Datasonde)	SM 2550B(2)	0.1	°C
Temperature (field meter)	SM 2550B(2)[5]	0.1	°C
pH (Datasonde)	EPA 150.2	0.01	SU
pH (field meter)	SM 4500-HB[5]	0.01	SU

[5] Method used for Field Calibration Verification

B.4. Quality Control and Custody Requirements

Quality assurance protocols will follow part B5 of the Surface Water QAPP (IDEM 2017a).

1. Field Instrument Testing and Calibrations
   The datasonde will be calibrated prior to each week's sampling (IDEM 2002). Calibration results and drift values will be recorded, maintained, stored, and archived in log books located in the calibration laboratories at the Shadeland facility. The drift value is the difference between two successive calibrations. Field parameter calibrations will conform to the procedures as described in the instrument users' manuals (YSI 2017; YSI 2018). The DO component of the calibration procedure will be conducted using the air calibration method (IDEM 2002, page 74). The unit will be field checked for accuracy once during the week by comparison with a YSI EcoSense DO200A DO Probe (IDEM 2020c, page 24), Hach™ turbidity, and an Oaktown Series 5 pH meter. Weekly calibration verification results will be recorded on the field calibrations portion of the IDEM OWQ Stream Sampling Field Data Sheets (Attachment 3) and entered into the AIMS II database. At field sites where the DO concentration is 4.0 mg/L or less, the YSI EcoSense DO meter will be used.

2. Field Measurement Data
   In-situ water chemistry field data will be collected in the field using calibrated or standardized equipment and recorded on the IDEM OWQ Stream Sampling Field Data Sheet (Attachment 3). The same staff member will collect and record the data. Calculations may be done in the field or later at the office. Analytical results, which have limited QC checks, will be included in this category. Detection limits and ranges have been set for each analysis (Table 6). Quality control checks (such as duplicate measurements, measurements of a secondary standard, or measurements using a different test method or instrument) performed on field or laboratory data, are usable for estimating precision, accuracy, and completeness for the project, as described in the Surface Water QAPP (IDEM 2017a Section C1.1 on page 176 and Section A7.2 page 56).

3. Bacteriological Measurement Data
   Analytical results, from an IDEM fixed or mobile *E. coli* laboratory, include QC check sample results from which precision, accuracy, and completeness can be determined for each batch of samples. Raw data will be archived by analytical batch for easy retrieval and review. Chain of custody procedures will be followed, including: time of collection, time of setup, time of reading the results, and time and method of disposal (IDEM 2002). The field staff member who collected the samples signs the chain of custody form upon delivery of samples to the laboratory. Any method deviations will be thoroughly documented in the raw data. All QA/QC samples will be tested according to the following guidelines:

   Field Duplicate: Field Duplicates will be collected at a frequency of one per batch or at least one for every 20 samples collected (≥ 5%).

   Field Blank: Field Blanks will be collected at a frequency of one per batch or at least one for every 20 samples collected (≥ 5%).

   Laboratory Blank: Laboratory Blanks (sterile laboratory water blanks) will be tested at a frequency of one per day.

   Positive Control: Each lot of media will be tested for performance using *E. coli* bacterial cultures.

   Negative Controls: Each lot of media will be tested for performance using non-*E. coli* and noncoliform bacterial cultures.

4. Water Chemistry Measurement Data
   Sample bottles and preservatives will be certified for purity by the manufacturer. Damaged sample bottles and preservatives are not used, and preservatives are not used past their stated expiration date. The purity of sample bottles and preservatives is checked via field blanks. Sample collection containers for each parameter, preservative, and holding time (Table 4) will adhere to U.S. EPA requirements. Field duplicates and matrix spike/matrix spike duplicates shall be collected at the rate of one per sample

analysis set or one per every 20 samples, whichever is greater. Additionally, field blank samples will be taken at a rate of one set per sample analysis set or one per every 20 samples, whichever is greater. A chain of custody (COC) form created by the AIMS II database IDEM OWQ COC (Attachment 7) and an IDEM Water Sample Analysis Request form (Attachment 8) accompany each sample set through the analytical process. The field staff member who collected the samples signs the COC form upon delivery of samples to the laboratory. Additionally, a Test America COC form (Attachment 9) will accompany samples sent to the lab. Shipping labels will be created using Test America account numbers.

5. Fish Community Measurement Data
   Fish community sampling revisits will be performed at a rate of 10 percent of the total fish community sites sampled, in this case, three in the watershed (IDEM 2018a). Revisit sampling will be performed with at least two weeks of recovery between the initial and revisit sampling events. The fish community revisit sampling and habitat assessment will be performed with either a partial or complete change in field team members (IDEM 2018a). The resulting IBI and QHEI total score between the initial visit and the revisit will be used to evaluate precision, as described in the QAPP for Biological Community and Habitat Measurements (IDEM 2019e). The IDEM OWQ COC form (Attachment 7) is used to track samples from the field to the laboratory. A field staff member from the crew signs the COC form after sampling is complete, and the samples and COC form are relinquished to a lab custodian to verify the sampling information is accurate. All raw data are: 1) checked for completeness; 2) utilized to calculate derived data (e.g., total weight of all specimens of a taxon), which is entered into the AIMS II database; and 3) checked again for data entry errors.

6. Macroinvertebrate Community Measurement Data
   Duplicate macroinvertebrate field samples will be collected at a rate of 10 percent of the total macroinvertebrate community sites sampled, in this case, three in the watershed. The macroinvertebrate community duplicate sample and corresponding habitat assessment will be performed by the same team member who performed the original sample, immediately after the initial sample is collected. The 50 meter section of stream and riffle area utilized for the duplicate sample are different from those used for the original sample but should feature as similar habitat types and availability as possible. This will result in a precision evaluation based on a 10% duplicate of samples collected, as described in the QAPP for Biological Community and Habitat Measurements (IDEM 2019e).

   The IDEM OWQ COC form (Attachment 7) is used to track samples from the field to the laboratory. A field staff member from the crew completes the OWQ COC form after sampling is complete. After completion of weekly field sampling activities, the OWQ COC form is used by the laboratory custodian to check in samples prior to long-term

storage. Laboratory identifications and QA/QC of taxonomic work is maintained by the laboratory supervisor of the Probabilistic Monitoring Section of IDEM.

C. ASSESSMENT AND OVERSIGHT

C.1. Field and laboratory performance and system audits

Performance and system audits will be conducted to ensure good quality data. The field and laboratory performance checks include: precision measurements by relative percent difference of field and laboratory duplicate (IDEM 2017a, pp. 56, 61-63); accuracy measurements by percent of recovery of matrix spike and matrix spike duplicate samples analyzed in the laboratory (IDEM 2017a, pp. 58, 61-63); and completeness measurements by the percent of planned samples actually collected, analyzed, reported, and usable for the project (IDEM 2017a, page 58). Fish taxonomic identifications made by IDEM staff in the laboratory may be verified by regionally recognized non-IDEM freshwater fish taxonomists. Ten percent of macroinvertebrate samples (the initial samples taken at sites where duplicate samples were collected) will be sent off to Rithron Associates, Inc. (Missoula, MT) for verification by an outside taxonomist (IDEM 2019c).

Laboratory audits are performed at the beginning of a laboratory contract and at least once a year during the contract. The audit includes any or all of the operational quality control elements of the laboratory's quality assurance system. All applicable elements of this QAPP and the laboratory contract requirements are addressed including, but not limited to, sampling handling, sample analysis, record keeping, preventative maintenance, proficiency testing, personnel requirements, training, and workload. (IDEM 2017a, pp. 177—178).

Field audits will be conducted every other year by staff of the IDEM WAPB to ensure sampling activities adhere to approved SOPs. Audits will be systematically conducted by WAPB staff to include all WAPB personnel engaging in field sampling activities. WAPB field staff involved with sample collection and preparation will be evaluated by staff trained in the associated sampling SOPs and in the processes related to conducting an audit. Staff will produce an evaluation report documenting each audit for review by those field staff audited as well as WAPB management. Corrective actions will be communicated to, and implemented by, field staff as a result of the audit process.

Quality assurance reports are submitted by the QA officer upon completion of the data validation of a dataset, to the program manager or WAPB branch chief. 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 section chief, project officer, or QA officer is responsible for working with relevant staff members to develop corrective actions and notifying the QA manager of corrective action progress. Depending on the associated corrective actions, either the section chief or the QA officer approves the final corrective action (IDEM 2017a, page 179).

C.2. Data Quality Assessment Levels

The samples and various types of data collected by this program will be intended to meet the quality assurance criteria and rated DQA Level 3, as described in the Surface Water QAPP (IDEM 2017a, page 182).

D. DATA VALIDATION AND USABILITY

Quality assurance reports to management, and data validation and usability are also important components of Indiana's Surface Water QAPP which ensures good quality data for this project. Quality assurance reports are submitted by the QA officer upon completion of the data validation of a dataset to the program manager or WAPB branch chief. This is done to ensure problems arising during the sampling and analysis phases of the project are investigated and corrected (IDEM 2017a, page 179). As described in Section D of the Surface Water QAPP (IDEM 2017a), data are reduced (converted from raw analytical data into final results in proper reporting units); validated (qualified based on the performance of field and laboratory QC measures incorporated into the sampling and analysis procedures); and reported (described so as to completely document the calibration, analysis, QC measures, and calculations). These steps allow users to assess the data ensuring the project DQOs have been met.

D.1. Quality Assurance, Data Qualifiers, and Flags

The various data qualifiers and flags will be used for quality assurance and validation of the data and are found on pages 184-185 of the Surface Water QAPP (IDEM 2017a).

D.2. Data Usability

The environmental data collected and its usability will be qualified per each lab or field result obtained and classified into one or more of the four categories: Acceptable Data, Enforcement Capable Results, Estimated Data, and Rejected Data as described on page 184 of the Surface Water QAPP (IDEM 2017a).

D.3. Information, Data, and Reports

Data collected in 2020-2021 will be recorded in the AIMS II database and presented in two compilation summaries. The first summary will be a general compilation of the watershed field and water chemistry data prepared for use in the 2022 Indiana Integrated Report. The second summary will be in database report format containing biological results and habitat evaluations, which will be produced for inclusion in the Integrated Report as well as individual site folders. All site folders are maintained at the WAPB facility. All data and reports will be made available to public and private entities, which may find the data useful for municipal, industrial, agricultural, and recreational decision making processes (TMDL, NPDES permit modeling, watershed restoration projects, water quality criteria refinement, etc.,). This work plan will be uploaded into the virtual file cabinet, all field sheets will be stored in the AIMS II database, and results will be uploaded to U.S. EPA's Water Quality

Portal via the Water Quality Exchange (formerly Storet), allowing the data to be shared with U.S. EPA and others. The Water Quality Exchange is a framework which allows states, tribes, and other data partners to submit and share water quality monitoring data via the web to the Water Quality Portal.

D.4. Laboratory and Estimated Cost

Laboratory analysis and data reporting for this project will comply with the Surface Water QAPP (IDEM 2017a); Request for Proposals 16-074 (see IDEM 2016); the IDEM QMP (IDEM 2018b); and TestAmerica contract SCM # 19855. Analytical tests on general chemistry and nutrient parameters outlined in Table 5 will be performed by TestAmerica Laboratories in University Park, Illinois with a total estimated cost of $34,100. IDEXX Laboratories, Inc., Westbrook, Maine supplies the bacteriological sampling supplies, with a total estimated cost of $1,400. Bacteriological samples will be tested and analyzed by IDEM staff. All fish and macroinvertebrate samples will be collected and analyzed by IDEM staff. Ten percent of macroinvertebrate samples will be verified by Rhithron Associates, Inc. in Missoula, Montana with a total estimated cost of $660. The anticipated total budget for laboratory costs for the project is $37,260.

D.5. Reference Manuals and Personnel Safety

Table 7. Personnel Safety and Reference Manuals

Role	Required Training or Experience	Training References	Training Notes
All Staff that Participate in Field Activities	- Basic First Aid and Cardio-Pulmonary Resuscitation (CPR)	- A minimum of 4 hours of in-service training provided by WAPB (IDEM 2010c)	-Staff lacking 4 hours of in-service training or appropriate certification will be accompanied in the field at all times by WAP,200B staff meeting Health and Safety Training requirements
	- Personal Protective Equipment (PPE) Policy	- IDEM 2008	- When working on boundary waters as defined by Indiana Code (IC) 14-8-2-27 or between sunset and sunrise on any waters of the state, all personnel in the watercraft must wear a high intensity whistle and Safety of Life at Sea (SOLAS) certified strobe light.
	- Personal Flotation Devices	- February 29, 2000 WAPB internal memorandum regarding use of approved Personal Flotation Devices	

REFERENCES

*Document may be inspected at the Watershed Assessment and Planning Branch office, located at 2525 North Shadeland Avenue Suite 100, Indianapolis, Indiana.

U.S. EPA 2002. Guidance for Quality Assurance Project Plans EPA QA/G-5, EPA/240R-02/009 U.S. EPA, Office of Environmental Information, Washington D.C.

U.S. EPA 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process. EPA QA/G-4. EPA/240/B-06/001. U.S. EPA, Office of Environmental Information, Washington D.C.

U.S. EPA 1999. Barbour, M.T., J. Gerritsen, B.D. Snyder and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA/841/B-99/002. U.S. EPA, Office of Water, Washington, D.C.

Indiana Administrative Code, Title 327 Water Pollution Control Division, Article 2. Water Quality Standards

IDEM 1992a, revision 1. Section 3, Quality Assurance Project Plan, Development of Biological Criteria (Fish) for the Ecoregions of Indiana. Biological Studies Section, Surveillance and Standards Branch, Office of Water Management, IDEM, Indianapolis, Indiana.*

IDEM 1992b, revision 1. Section 2, Biological Studies Section Hazards Communications Manual (List of Contents). Biological Studies Section, Surveillance and Standards Branch, OWQ, IDEM, Indianapolis, Indiana.*

IDEM 1997. Water Quality Surveys Section Laboratory and Field Hazard Communication Plan Supplement. IDEM 032/02/018/1998, Revised October 1998. Assessment Branch, IDEM, Indianapolis, Indiana.*

IDEM 2002. Water Quality Surveys Section Field Procedure Manual, Assessment Branch, IDEM, Indianapolis, Indiana. IDEM.

IDEM 2008. IDEM Personal Protective Equipment Policy, revised May 1 2008. A-059-OEA-08-P-R0. IDEM, Indianapolis, Indiana.

IDEM 2010a. IDEM Health and Safety Training Policy, revised October 1 2010. A-030-OEA-10-P-R2. IDEM, Indianapolis, Indiana.

IDEM 2010b. IDEM Injury and Illness Resulting from Occupational Exposure Policy, revised February 21, 2016. A-034-AW-16-P-R3. IDEM, Indianapolis, Indiana.

IDEM 2010c. Change in status of Water Assessment Branch staff in accordance with the Agency training policy. State Form 4336. IDEM, Indianapolis, Indiana.

REFERENCES (cont.)

IDEM 2015. Global Positioning System (GPS) Data Creation Technical Standard Operating Procedure. B-001-OWQ-WAP-XXX-15-T-R0. OWQ, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

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 2017a. Quality Assurance Project Plan (QAPP) for Indiana Surface Waters, (Rev. 4, Mar. 2017). B-001-OWQ-WAP-XX-17-Q-R4. OWQ, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

IDEM 2017b. AIMS II Database User Guide. Watershed Assessment and Planning Branch. Office of Water Quality, Indiana Department of Environmental Management. Indianapolis, Indiana.*

IDEM 2018a. Fish Community Field Collection Procedures. B-009-OWQ-WAP-XXX-18-T-R0. OWQ, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

IDEM 2018b. IDEM Quality Management Plan 2018. IDEM, Indiana Government Center North, 100 N. Senate Ave., Indianapolis, Indiana, 46204.

IDEM 2019a. *E. coli* Field Sampling and Analysis. B-013-OWQ-WAP-XXX-19-T-R0. OWQ, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

IDEM 2019b. Multihabitat (MHAB) Macroinvertebrate Collection Procedure. B-011-OWQ-WAP-XXX-19-T-R0. OWQ, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

IDEM 2019c. Procedures for Completing the Macroinvertebrate Header Field Data Sheet. B-010-OWQ-WAP-XXX-19-T-R0. Office of Water Quality, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

IDEM 2019d. Procedures for Completing the Qualitative Habitat Evaluation Index. B-003-OWQ-WAP-XX-19-T-R1. OWQ, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

IDEM 2019e. Quality Assurance Project Plan (QAPP) for Biological Community and Habitat Measurements (Draft). Office of Water Quality, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

IDEM 2020a. Appendix L: Listing Tables Including Indiana's Finalized 303(d) List of Impaired Waters (Category 5) for 2020 Listing Tables. OWQ, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

IDEM 2020b. Appendix G: IDEM’s 2020 Consolidated Assessment and Listing Methodology. OWQ, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

REFERENCES (cont.)

IDEM 2020c. Water Chemistry Field Sampling Procedures. B-015-OWQ-WAP-XXX-20-T-R0. Office of Water Quality, Watershed Assessment and Planning Branch. Indianapolis, Indiana.

OHEPA. 1999. Ohio EPA Five-Year Surface Water Monitoring Strategy: 2000 – 2004. Ohio EPA Technical Bulletin MAS/1999-7-2. Division of Surface Water, Lazarus Government Center, 211 S. Front Street, Columbus, Ohio 43215. Page 70.

OHEPA. 2006. Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI). OHIO EPA Technical Bulletin EAS/2006-06-1. Revised by the Midwest Biodiversity Institute for State of Ohio Environmental Protection Agency, Division of Surface Water, Ecological Assessment Section, Groveport, Ohio.

OHEPA. 2012. 2011 Biological and Water Quality Study of Mill Creek and Tributaries, Hamilton County, Ohio. Technical Report MBI/2012-6-10. MSD Project Number 10180900. Prepared for: Metropolitan Sewer District of Greater Cincinnati, 1081 Woodrow Street, Cincinnati, OH 45204. Submitted by: Midwest Biodiversity Institute, P.O. Box 21561, Columbus, Ohio 43221-0561. Pages 40-1.

State of Illinois Environmental Protection Agency. July 2018. Environmental Laboratory Accreditation.

Clesceri, L.S., Greenburg, A.E., Eaton, A.D., 2012. SM-Standards Methods for the Examination of Water and Wastewater 22nd Edition. American Public Health Association.

Klemm, D.J., P.A. Lewis, F. Fulk and J.M. Lazorchak. 1990. Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters. EPA/600/4-90/030. Environmental Monitoring Systems Laboratory, Monitoring Systems and Quality Assurance, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

Newhouse, S.A. 1998a. Field and laboratory operating procedures for use, handling and storage of chemicals in the laboratory. IDEM/32/03/007/1998. Biological Studies Section, Assessment Branch, Office of Water Management, IDEM, Indianapolis, Indiana.*

Newhouse, S.A. 1998b. Field and laboratory operating procedures for use, handling and storage of solutions containing formaldehyde. IDEM/32/03/006/1998. Biological Studies Section, Assessment Branch, Office of Water Management, IDEM, Indianapolis, Indiana.*

Plafkin, J.L., M.T. Barbour, K.D. Porter, S.K. Gross and R.M. Hughes. 1989. Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish. EPA/444/4-89/001. Assessment and Watershed Protection Division, U.S. Environmental Protection Agency, Washington, D.C.

REFERENCES (cont.)

Rankin, E.T. 1995. Habitat Indices in Water Resource Quality Assessments. pp. 181-208, Chapter 13, Biological Assessment and Criteria: Tools for the Risk-based Planning and Decision Making, edited by Wayne S. Davis and Thomas P. Simon, Lewis Publishers, Boca Raton, Florida.*

Simon, T.P. and R.L. Dufour. 2005. Guide to Appropriate Metric Selection for Calculating the Index of Biotic Integrity (IBI) for Indiana Large and Great Rivers, Inland Lakes, and Great Lakes nearshore. U.S. Department of the Interior, Fish and Wildlife Service, Bloomington Field Office, Bloomington, Indiana

YSI Incorporated. 2012, Operations Manual EcoSense DO200A, Yellow Springs, Ohio.

YSI Incorporated. 2017, revision g. EXO User Manual, Yellow Springs, Ohio.

YSI Incorporated. 2018, revision f. ProDIGITAL User Manual, Yellow Springs, Ohio.

DISTRIBUTION LIST

Electronic Distribution Only

Name	Organization
Kristen Arnold	IDEM/OWQ/WAPB/Technical and Logistical Services Section Chief
Jody Arthur	IDEM/OWQ/WAPB/Technical E7
James Bailey	IDEM/OPS/Recycling Education and Quality Assurance/Quality Assurance
Tim Beckman	IDEM/OWQ/WAPB/Targeted Monitoring Section
Timothy Bowren	IDEM/OWQ/WAPB/Technical and Logistical Services Section
Josh Brosmer	IDEM/OWQ/WAPB/Watershed Planning and Restoration Section
Angie Brown	IDEM/OWQ/WAPB/Watershed Planning and Restoration Section Chief
Kevin Gaston	IDEM/OWQ/WAPB/Probabilistic Monitoring Section
Lindsay Hylton Adams	IDEM/OWQ/WAPB/Watershed Planning and Restoration Section
Paul McMurray	IDEM/OWQ/WAPB/Probabilistic Monitoring Section
Caleb Rennaker	IDEM/OWQ/WAPB/Watershed Planning and Restoration Section
Marylou Renshaw	IDEM/OWQ/WAPB/Branch Chief
Stacey Sobat	IDEM/OWQ/WAPB/Probabilistic Monitoring Section Chief
Cyndi Wagner	IDEM/OWQ/WAPB/Targeted Monitoring Section Chief

ATTACHMENTS

Attachment 1: Modified Geometric Design Steps for Watershed Characterization Studies

Introduction

The Modified Geometric Site Selection process is employed within watersheds which correspond to the 12-14-digit HUC scale in order to fulfill multiple water quality management objectives, not just the conventional focus on status assessment. The design is employed at a spatial scale which is representative of the scale at which watershed management is generally being conducted.

Sites within the watershed are allocated based on a geometric progression of drainage areas starting with the area at the mouth of the main stem river or stream (pour point) and working “upwards” through the various tributaries to the primary headwaters. This approach allocates sampling sites in a semirandom fashion and according to the stratification of available stream and river sizes based on drainage area. The Geometric Site Selection process is then modified by adding a targeted selection of additional sampling sites used to focus on localized management issues such as point source discharges, habitat modifications, and other potential impacts within a watershed. These sites are then “snapped to bridges” to facilitate safe and easy access to the stream. This design also fosters data analysis which takes into consideration overlying natural and human caused influences within the streams of a watershed. The design has been particularly useful for watersheds targeted for TMDL development because missing, incomplete, or outdated assessments can be addressed prior to TMDL development.

Selection Process

In ArcGIS, download from NHD Plus site (http://www.horizon-systems.com/nhdplus/HSC-wthMS.php) the following files for Region 5 (and then again for Region 7) and zip them into the appropriate file structure.

File Description	File Name (.zip***)	Format
Region 05, Version 01_01, Catchment Grid	NHDPlus05V01_01_Catgrid	ESRI Grid
Region 05, Version 01_01, Catchment Shapefile	NHDPlus05V01_01_Catshape	Shapefile
Region 05, Version 01_02, Catchment Flowline Attributes	NHDPlus05V01_02_Cat_Flowline_Attr	DBF
Region 05, Version 01_02, Elevation Unit a	NHDPlus05V01_02_Elev_Unit_a	ESRI Grid
Region 05, Version 01_02, Elevation Unit b	NHDPlus05V01_02_Elev_Unit_b	ESRI Grid
Region 05, Version 01_02, Elevation Unit c	NHDPlus05V01_02_Elev_Unit_c	ESRI Grid
Region 05, Version 01_01, Flow Accumulation and Flow Direction Unit a	NHDPlus05V01_01_FAC_FDR_Unit_a	ESRI Grid
Region 05, Version 01_01, Flow Accumulation and Flow Direction Unit b	NHDPlus05V01_01_FAC_FDR_Unit_b	ESRI Grid
Region 05, Version 01_01, Flow Accumulation and Flow Direction Unit c	NHDPlus05V01_01_FAC_FDR_Unit_c	ESRI Grid
Region 05, Version 01_02, National Hydrography Dataset	NHDPlus05V01_03_NHD	Shapefile and DBF
Region 05, Version 01_01, Stream Gage Events	NHDPlus05V01_01_StreamGageEvent	Shapefile
Region 05, Version 01_01, QAQC Sinks Spreadsheet	NHDPlus05V01_01_QAQC_Sinks	Excel Spreadsheet

Create a new point shapefile (or geodatabase featureclass) named Geometric Design within ArcCatalog with the same projection as the unzipped layers above.

Within an ArcMap project, add the following:

- nhdflowline layer
- Geometric Design layer
- catchment shapefile
- the FlowlineAttributesFlow table

Add the following fields to the nhdflowline layer:

- LENGTHMi (type: double, precision: 9, scale 4)
- DrainMi (type: double, precision: 9, scale 4)
- MinElev (type: double, precision: 9, scale 4)
- MaxElev (type: double, precision: 9, scale 4)
- Gradient (type: double, precision: 9, scale 4)

Add the following field to the GeometricDesign layer (use the add field-batch tool):

- Geometric (type: double, precision: 5, scale 2)
- Lat (type: double, precision: 8, scale 5)
- Long (type: double, precision: 8, scale 5)
- COMID (type: long, precision: 9)

Join the nhdflowline layer with the FlowlineAttributesFlow table based on the COMID field.

Use the field calculator within the nhdflowline attribute table, with the appropriate metric to imperial conversion to populate the following fields:

- LENGTHMi (from LENGTHKM – kilometers to miles)
- DrainMia (from CumDrainage – square kilometers to square miles (sq mi))
- MinElev (from MinElevSmo – meters to feet)
- MaxElev (from MaxElevSmo – meters to feet)

- Gradient ((MaxElev-MinElev)/LENGTHMI).

Unjoin the FlowlineAttributesFlow table.

Label the “nhdflowline” layer based new “LengthMi” field – note: this field shows the cumulative drainage at the *end* of the line segment, which is rarely more than 2-3 miles in between nodes.

Calculate the geometric break points (i.e., for a 500 sq mi watershed: 500, 250, 125, 62.5, 31, 15, 7, 4, 2).

It is recommended to change the symbology (Symbology: Show Quantities: Classification (Manual)) of the actual flowline to reflect the drainage. This will help identify when and where sites need to be allocated.

Start a new editing session, with the GeometricDesign layer as your target layer.

Add a new point within this layer to the pour point for the watershed (500 sq mi in this case).

Travel upstream through the main stem and “find” the next place on the stream where the river drainage brackets 250 sq mi. Use the catchment shapefile layer to identify more precisely the drainage value, if needed.

Populate the “Geometric” field within the GeometricDesign layer accordingly to the identified drainage level, then change the symbology (Symbology: Categories: Unique Values: Geometric field) of this layer to reflect the drainage levels.

Proceed through the watershed (either around the outer portions or start with largest values and work in), adding points accordingly to each geometric level. Change the symbology to find areas or levels that were missed. Note – the drainage level must be exact. Use the catchment shapefile to subtract drainage areas from larger drainage areas until the exact drainage level is reached. It is ok to “skip” a geometric level if it is not exactly reached. Sometimes there are large tributaries whose contribution to the main stem skips a drainage level.

Populate the COMID (manually), and Lat/Long (right click on field and select calculate geometry – lat = x-coordinates and long = y-coordinates) accordingly for reference within the GeometricDesign Layer.

Once sites are selected in this fashion, they will need to be snapped to a bridge or access point.

Additional sites should be placed at pour points of subwatersheds (12-digit HUCs) to meet TMDL document requirements.

Once the initial sites are selected, the following features are taken into account to move or add sites:

- Permitted facilities
- Urban areas
- Historical sampling sites
- Assessment Unit IDs (AUID)
- External stakeholder information
- Resources - maximum of 35 sites per project

After refining site selections, there may be additional sites added to ensure spatial representation of the project area.

Sites may be removed or changed after site reconnaissance if there are problems accessing the site or if sites are dry.

Notes regarding the NHD dataset:

All units are initially set to metric and need to be converted to imperial.

Within the nhdflowline layer, the GNIS_Name/ID refers to the whole river name and ID, while the COMID is a unique identifier for the particular segment.

There is *not* a value GNIS_Name/ID for every river, especially where primary streams and ditches are concerned.

Segments within the nhdflowline layer are based on linear miles between “nodes,” which are broken up (typically) by tributary. Typically these lengths are less than 2-3 miles.

The cumulative drainage values in the NHD dataset have been compared against other and deemed “reasonable” (read – not statistically compared). Also note that the drainage is calculated through the model to be at the pour point of that segment.

The elevation values, however, are **not** reliable and require supervision. These values are calculated from the associated digital elevation model (DEM) and sometimes have null values for either the maximum or minimum elevation values. In addition, the length of the stream is not long enough (i.e. >1 mile) to calculate gradient. In either case, this associated value is helpful to identify contour changes against a USGS contour map. However, to note the calculated gradient from the NHD information has been observed to be within several tenths of mile compared to a manual calculation of gradient.

Important tables from NHD

- FlowlineAttributesFlow (found in: Region 05, Version 01_02, Catchment Flowline Attributes)
- Key fields: CumDrainag, Max ElevRaw, MinElevSmo,

Important Layers from NHD

- Region 05, Version 01_01, Catchment Shapefile
- Region 05, Version 01_02, National Hydrography Dataset

Attachment 2: IDEM OWQ Site Reconnaissance Form

IDEM

Site Reconnaissance Form

EPA Site Identifier	Rank
Recon #: Trip #:	

Site Number: Stream: County:

Location Description:

Reconnaissance Data Collected

Recon Date | Crew Members

Avg. Width (m) | Avg. Depth (m) | Max. Depth (m) | Nearest Town

Water Present? | Site Wadeable? | Riffle/Run Present? | Road/Public Access Possible?

Site Impacted by Livestock? | Collect Sediment? | Gauge Present?

Landowner/Contact Information

First Name | Last Name

Street Address

City | State | Zip

Telephone | E-Mail Address

Pamphlet Distributed? | Please Call in Advance? | Results Requested?

Rating, Results, Comments, and Planning

Site Rating By Category (1=easy, 10=difficult)
Access Route
Safety Factor
Sampling Effort

Reconnaissance Decision

Pre-Recon
Recon in process
Approved Site
No, Landowner denied access
No, Dry
No, Stream channel missing
No, Physical barriers
No, Impounded stream
No, Marsh/Wetland
No, Bridge gone or not accessible
No, Unsafe due to traffic or location
No, Site impacted by backwater
No, Other

Equipment Selected

Circle Equipment Needed

Backpack
Boat
Totebarge
Longline
Scanoe
Seine
Weighted Handline
Waders
Gill Net

Comments

Sketch of Stream & Access Route – Indicate Flow, Direction, Obstacles, & Land Use (Use Back of Page, if Necessary)

Attachment 3: IDEM OWQ Stream Sampling Field Data Sheet

Stream Sampling Field Data Sheet

Analysis Set #	EPA Site ID	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	Sample Collected Date	Time	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 (µohms/cm)	Turbidity (NTU)	% Sat.	Chlorine (mg/l)	Chloride (mg/l)	Chlorophyll (mg/l)	Weather Codes SC	WD	WS	AT
Comments														
Comments														
Comments														
Comments														
Comments														
Comments														

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

Weather Code Definitions

SC Sky Conditions		WD Wind Direction	WS Wind Strength	AT Air Temp
1 Clear	8 Rain	00 North (0 degrees)	0 Calm	1 < 32
2 Scattered	9 Snow	09 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 > 85
7 Shower			6 Gale	

Field Calibrations:

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

Calibration Type
pH
DO
Turbidity

Preservatives/Bottle Lots:

Group: Preservative	Preservative Lot #	Bottle Type	Bottle Lot #

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
MeHg	Methyl Mercury(1630): HCl	500T	500mL Teflon
		125T	125mL Teflon

Data Entered By: _____ QC1: _____
QC2: _____

Stream Sampling Field Data Sheet

Attachment 4: IDEM OWQ Fish Collection Data Sheet

IDEM
OWQ-WATERSHED ASSESSMENT AND PLANNING BRANCH

Event ID______________ Voucher jars_______ Unknown jars________ Equipment________________ Page _____ of ______
Voltage_______ Time fished (sec)________ Distance fished (m)_________ Max. depth (m)_________ Avg. depth (m)________
Avg. width (m)______ Bridge in reach_____ Is reach representative_____ If no, why____________________________________
Elapsed time at site (hh:mm)____:____ Comments____

____

____

Museum data: Initials__________ ID date__________ Jar count__________ Fish Total__________

Coding for Anomalies: D – deformities E – eroded fins L – lesions T – tumor M – multiple DELT anomalies O – other (A – anchor worm C – leeches W – swirled scales Y – popeye S – emaciated F – fungus P – parasites) H – heavy L – light (these codes may be combined with above codes)

TOTAL # OF FISH				WEIGHT (s) (mass g)				(length mm)	ANOMALIES					
								Min length	D	E	L	T	M	O
								Max length						
V		P												
								Min length	D	E	L	T	M	O
								Max length						
V		P												
								Min length	D	E	L	T	M	O
								Max length						
V		P												
								Min length	D	E	L	T	M	O
								Max length						
V		P												
								Min length	D	E	L	T	M	O
								Max length						
V		P												
								Min length	D	E	L	T	M	O
								Max length						
V		P												

KRW: Rev/09.26.18 Calculation:________ QC1 + Entry________ QC 1 ________ QC 2________

Attachment 5: IDEM OWQ Macroinvertebrate Header Form

Office of Water Quality: Macroinvertebrate Header

L-Site	Stream Name	Location	County	Surveyor

Sample Date	Sample #	Macro#	# Containers

☐ Habitat Complete ☐ Sample Quality Rejected

Macro Sample Type:
☐ Black Light ☐ Kick
☐ CPOM ☐ MHAB
☐ Hester-Dendy ☐ Qualitative

☐ Normal _____
☐ Duplicate _____
☐ Replicate _____

Macro Sub Sample (Field or Lab): _____

Macro Reach Sampled (m): _____

Riparian Zone/Instream Features

Watershed Erosion:
☐ Heavy
☐ Moderate
☐ None

Watershed NPS Pollution:
☐ No Evidence
☐ Obvious Sources
☐ Some Potential Sources

Stream Depth Riffle (m):	Stream Depth Run (m):	Stream Depth Pool (m):

Distances Riffle-Riffle (m):	Distances Bend-Bend (m):

Stream Width (m):	High Water Mark (m):

Stream Type:
☐ Cold
☐ Warm

Turbidity (Est):
☐ Clear ☐ Slightly Turbid
☐ Opaque ☐ Turbid

☐ Channelization ☐ Dam Present

Predominant Surrounding Land Use: ☐ Forest ☐ Field/Pasture ☐ Agricultural ☐ Residential ☐ Commercial ☐ Industrial
Other

Sediment

Sediment Odors: ☐ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None Other

Sediment Deposits: ☐ Sludge ☐ Sawdust ☐ Paper Fiber ☐ Sand ☐ Relic Shells Other

Sediment Oils: ☐ Absent ☐ Moderate ☐ Profuse ☐ Slight

☐ Are the undersides of stones, which are not deeply embedded, black?

Substrate Components

(Note: Select from 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, or 100% for each inorganic/ organic substrate component)

Inorganic Substrate Components (% Diameter)						
Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.1-2.5 in)	Sand (gritty)	Silt	Clay (slick)

Organic Substrate Components (% Type)			
Detritus (sticks, wood)	Detritus (CPOM)	Muck/Mud (black, fine FPOM)	Marl(gray w/ shell fragments)

Water Quality

Water Odors: ☐ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ None Other

Water Surface Oils: ☐ Slick ☐ Sheen ☐ Glob ☐ Flocks ☐ None

IDEM 03/8/18

Attachment 6: IDEM OWQ Biological Qualitative Habitat Evaluation Index (front)

OWQ Biological QHEI (Qualitative Habitat Evaluation Index)

Sample #	bioSample #	Stream Name	Location

Surveyor	Sample Date	County	Macro Sample Type	☐ Habitat Complete	QHEI Score:

1] *SUBSTRATE* Check ONLY Two predominant substrate TYPE BOXES and check every type present

BEST TYPES PREDOMINANT	BEST TYPES PRESENT P/G R/R	OTHER TYPES PREDOMINANT	OTHER TYPES PRESENT P/G R/R
☐☐ BLDR/SLABS [10]	☐☐	☐☐ HARDPAN [4]	☐☐
☐☐ BOULDER [9]	☐☐	☐☐ DETRITUS [3]	☐☐
☐☐ COBBLE [8]	☐☐	☐☐ MUCK [2]	☐☐
☐☐ GRAVEL [7]	☐☐	☐☐ SILT [2]	☐☐
☐☐ SAND [6]	☐☐	☐☐ ARTIFICIAL [0]	☐☐
☐☐ BEDROCK [5]	☐☐	(Score natural substrates; ignore sludge from point-sources)	

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN	QUALITY
☐ LIMESTONE [1]	SILT ☐ HEAVY [-2]
☐ TILLS [1]	SILT ☐ MODERATE [-1]
☐ WETLANDS [0]	SILT ☐ NORMAL [0]
☐ HARDPAN [0]	SILT ☐ FREE [1]
☐ SANDSTONE [0]	
☐ RIP/RAP [0]	SUMZONOMUM ☐ EXTENSIVE [-2]
☐ LACUSTRINE [0]	SUMZONOMUM ☐ MODERATE [-1]
☐ SHALE [-1]	SUMZONOMUM ☐ NORMAL [0]
☐ COAL FINES [-2]	SUMZONOMUM ☐ NONE [1]

Substrate Maximum 20

Comments

2] *INSTREAM COVER* Indicate presence 0 to 3: **0**–Absent; **1**–Very small amounts or if more common of marginal quality; **2**–Moderate amounts, but not of highest quality or in small amounts of highest quality; **3**–Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed root wad in deep/fast water, or deep, well-defined, functional pools.)

___ UNDERCUT BANKS [1]
___ OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]
___ POOLS > 70cm [2]
___ ROOTWADS [1]
___ BOULDERS [1]
___ OXBOWS, BACKWATERS [1]
___ AQUATIC MACROPHYTES [1]
___ LOGS OR WOODY DEBRIS [1]

AMOUNT
Check ONE (Or 2 & average)
☐ EXTENSIVE > 75% [11]
☐ MODERATE 25 - 75% [7]
☐ SPARSE 5 - < 25% [3]
☐ NEARLY ABSENT < 5% [1]

Cover Maximum 20

Comments

3] *CHANNEL MORPHOLOGY* Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel Maximum 20

Comments

4] *BANK EROSION AND RIPARIAN ZONE* Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

L R	EROSION	L R	RIPARIAN WIDTH	L R	FLOOD PLAIN QUALITY	L R	
☐☐	NONE/LITTLE [3]	☐☐	WIDE > 50m [4]	☐☐	FOREST, SWAMP [3]	☐☐	CONSERVATION TILLAGE [1]
☐☐	MODERATE [2]	☐☐	MODERATE 10-50m [3]	☐☐	SHRUB OR OLD FIELD [2]	☐☐	URBAN OR INDUSTRIAL [0]
☐☐	HEAVY/SEVERE [1]	☐☐	NARROW 5-10m [2]	☐☐	RESIDENTIAL, PARK, NEW FIELD [1]	☐☐	MINING/CONSTRUCTION [0]
		☐☐	VERY NARROW [1]	☐☐	FENCED PASTURE [1]		
		☐☐	NONE [0]	☐☐	OPEN PASTURE, ROW CROP [0]		

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10

Comments

5] *POOL/GLIDE AND RIFFLE/RUN QUALITY*

MAXIMUM DEPTH Check ONE (ONLY!)
☐ > 1m [6]
☐ 0.7 - < 1m [4]
☐ 0.4 - < 0.7m [2]
☐ 0.2 - < 0.4m [1]
☐ < 0.2m [0] [metric = 0]

CHANNEL WIDTH Check ONE (Or 2 & average)
☐ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☐ FAST [1]
☐ MODERATE [1]
☐ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]
Indicate for reach – pools and riffles.

Recreation Potential (Check one and comment on back)
☐ Primary Contact
☐ Secondary Contact

Pool/ Current Maximum 12

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average) ☐ NO RIFFLE [metric = 0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
☐ BEST AREAS > 10cm [2]	☐ MAXIMUM > 50cm [2]	☐ STABLE (e.g., Cobble, Boulder) [2]	☐ NONE [2]
☐ BEST AREAS 5 - 10cm [1]	☐ MAXIMUM < 50cm [1]	☐ MOD. STABLE (e.g., Large Gravel) [1]	☐ LOW [1]
☐ BEST AREAS < 5 cm [metric = 0]		☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]	☐ MODERATE [0]
			☐ EXTENSIVE [-1]

Riffle/ Run Maximum 8

Comments

6] *GRADIENT* (ft/mi)

DRAINAGE AREA (mi²)

☐ VERY LOW-LOW [2–4]
☐ MODERATE [6 - 10]
☐ HIGH - VERY HIGH [10 - 6]

%POOL: %GLIDE:
%RUN: %RIFFLE:

Gradient Maximum 10

Entered _____ QC1 _____ QC2 _____ IDEM 02/28/2018

Attachment 6 (continued): IDEM OWQ Biological Qualitative Habitat Evaluation Index (back)

OWQ Biological QHEI (Qualitative Habitat Evaluation Index)

COMMENT

A-CANOPY
- ☐ > 85%-Open
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☐ <10%-Closed

B-AESTHETICS
- ☐ Nuisance algae
- ☐ Invasive macrophytes
- ☐ Excess turbidity
- ☐ Discoloration
- ☐ Foam/Scum
- ☐ Oil sheen
- ☐ Trash/Litter
- ☐ Nuisance odor
- ☐ Sludge deposits
- ☐ CSOs/SSOs/Outfalls

C-RECREATION

Area Depth

Pool: ☐ > 100 ft^2 ☐ > 3 ft

D-MAINTENANCE
- ☐ Public ☐ Private
- ☐ Active ☐ Historic
- Succession: ☐ Young ☐ Old
- ☐ Spray ☐ Islands ☐ Scoured
- Snag : ☐ Removed ☐ Modified
- Leveed: ☐ One sided ☐ Both banks
- ☐ Relocated ☐ Cutoffs
- Bedload: ☐ Moving ☐ Stable
- ☐ Armoured ☐ Slumps
- ☐ Impounded ☐ Desiccated
- ☐ Flood control ☐ Drainage

E-ISSUES
- ☐ WWTP ☐ CSO ☐ NPDES
- ☐ Industry ☐ Urban
- ☐ Hardened ☐ Dirt & Grime
- ☐ Contaminated ☐ Landfill
- BMPs: ☐ Construction ☐ Sediment
- ☐ Logging ☐ Irrigation ☐ Cooling
- Erosion: ☐ Bank ☐ Surface
- ☐ False bank ☐ Manure ☐ Lagoon
- ☐ Wash H_2O ☐ Tile ☐ H_2O Table
- Mine: ☐ Acid ☐ Quarry
- Flow: ☐ Natural ☐ Stagnant
- ☐ Wetland ☐ Park ☐ Golf
- ☐ Lawn ☐ Home
- ☐ Atmospheric deposition
- ☐ Agriculture ☐ Livestock

Looking upstream (> 10m, 3 readings; ≤ 10m, 1 reading in middle) ; Round to the nearest whole percent

	Right	Middle	Left	Total Average
%open	%	%	%	%
	X	X	X	

Stream Drawing:

IDEM 02/28/2018

Attachment 7: IDEM OWQ Chain of Custody Form

IDEM

Indiana Department of Environmental Management

OWQ Chain of Custody Form

Project:
OWQ Sample Set or Trip #:

I Certify that the sample(s) listed below was/were collected by me, or in my presence. Date:____________________________

Signature:____Section:__________________________

Sample Media (☐ Water, ☐ Algae,☐ Fish, ☐ Macro, ☐ Cyanobacteria/Microcystin, ☐ Sediment)

Lab Assigned Number / Event ID	IDEM Control Number	Sample Type	ID	1000 ml P.N.M.	1000 ml G.N.M.	40 ml Vial	120 ml P (Bact)	2000 ml Nalgene	250 ml Nalgene	125 ml Glass	Date and Time Collected		One check per bottle present
											Date	Time	

P = Plastic G = Glass N.M. = Narrow Mouth Bact = Bacteriological Only

M = MS/MSD B = Blank D = Duplicate R = Revisit

Should samples be iced? Y N

Carriers

I certify that I have received the above sample(s).

Signature	Date	Time	Seals Intact		Comments
Relinquished By:			Y	N	
Received By:					
Relinquished By:			Y	N	
Received By:					
Relinquished By:			Y	N	
Received By:					
IDEM Storage Room #					

Lab Custodian

I certify that I have received the above sample(s), which has/have been recorded in the official record book. The same sample(s) will be in the custody of competent laboratory personnel at all times, or locked in a secured area.

Signature:______________________________________ Date:________________ Time:______________

Lab:____ Address:____

Revision Date: 4/27/2016

Attachment 8: IDEM OWQ Water Sample Analysis Request Form

Indiana Department of Environmental Management
Office of Water Quality
Watershed Planning and Assessment Branch
www.idem.IN.gov

Water Sample Analysis Request

Project Name: 2021 Vernon Fork Muscatatuck **Composite ☐ Grab ☒**

OWQ Sample Set	20BLWxxx	IDEM Sample Nos.	
Crew Chief	Tim Beckman	Lab Sample Nos.	AB
Collection Date		Lab Delivery Date	

Anions and Physical Parameters			
Parameter	Test Method	Total	Dissolved
Alkalinity	SM2320B	☒ **	☐
Total Solids	SM2540B	☒ **	
Suspended Solids	SM2540D	☒ **	
Dissolved Solids	SM2540C		☒ **
Sulfate	300.0	☐ **	☒ **
Chloride	300.0	☐ **	☒ **
Hardness (Calculated)	SM-2340B	☒ **	☐
Fluoride	300.0	☐ **	☐

Priority Pollutant Metals Water Parameters			
Parameter	Test Method	Total	Dissolved
Antimony	200.8	☐	☐
Arsenic	200.8	☐	☐
Beryllium	200.8	☐	☐
Cadmium	200.8	☐	☐
Chromium	200.7	☐	☐
Copper	200.8	☐	☐
Lead	200.8	☐	☐
Mercury, Low Level	1631, Rev E.	☐	☐
Nickel	200.8	☐	☐
Selenium	200.8	☐	☐
Silver	200.8	☐	☐
Thallium	200.8	☐	☐
Zinc	200.7	☐	☐

Cations and Secondary Metals Parameters			
Parameter	Test Method	Total	Dissolved
Aluminum	**200.7**, 200.8	☐	☐
Barium	200.8	☐	☐
Boron	200.8	☐	☐
Calcium	**200.7**, 200.8	☒ ***	☐
Cobalt	200.8	☐	☐
Iron	200.7	☐	☐
Magnesium	**200.7**, 200.8	☒ ***	☐
Manganese	200.8	☐	☐
Sodium	200.7	☐	☐
Silica, Total Reactive	200.7	☐	☐
Strontium	200.8	☐	☐

Send reports (Fed. Ex. or UPS) to:
Tim Bowren - IDEM
Bldg. 20, STE 100
2525 North Shadeland Ave.
Indianapolis, IN 46219

Deliver reports to:
Tim Bowren – IDEM
Bldg. 20, STE 100
2525 North Shadeland Ave.
Indianapolis, IN 46219

Organic Water Parameters		
Parameter	Test Method	Total
Priority Pollutants: Oranochlorine Pesticides and PCBs	608	☐
Priority Pollutants: VOCs - Purgeable Organics	624	☐
Priority Pollutants: Base/Neutral Extractables	625	☐
Priority Pollutants: Acid Extractables	625	☐
Phenolics, 4AAP	420.2	☐
Oil and Grease, Total	1664A	☐

Nutrient & Organic Water Chemistry Parameters			
Parameter	Test Method	Total	Dissolved
Ammonia Nitrogen	SM4500NH3-G	☒	☐
$CBOD_5$	SM5210B	☐	
Total Kjeldahl Nitrogen (TKN)	SM4500N(Org)	☒	☐
Nitrate + Nitrite	SM4500NO3-F	☒	☐
Total Phosphorus	SM4500P-E	☒	☐
TOC	SM 5310C	☒	☐
COD	SM5220C	☒	☐
Cyanide (Total)	SM4500CN-E	☐	☐
Cyanide (Free)	SM4500CN-I	☐ *	☐
Cyanide (Amenable)	SM4500CN-G	☐ *	☐
Sulfide, Total	SM4500S2-F	☐	☐

RFP 16-074 Contract Number:	SCM # 19855 PO #0020000771

30 day reporting time required.

Notes:
** **= DO NOT RUN PARAMETER IF SAMPLE IDENTIFIED AS A BLANK ON THE CHAIN OF CUSTODY**
* **= RUN ONLY IF TOTAL CYANIDE IS DETECTED**
*** = *Report Calcium, Magnesium as Total Hardness components*

Testing Laboratory: Test America
Attn: Robin Kintz
Phone: 708.534.5200 2417 Bond Street
University Park, IL 60484

Attachment 9: Test America Chain of Custody Form

TestAmerica Chicago
2417 Bond Street

University Park, IL 60484-3101
phone 708.534.5200 fax 708.534.5211

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc.

Client Contact	**Project Manager:**	**Site Contact:**	**Date:**	COC No:
Your Company Name here	**Tel/Fax:**	**Lab Contact:**	**Carrier:**	_____ of _____ COCs
Address	**Analysis Turnaround Time**			Sampler:
City/State/Zip	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx Phone	TAT if different from Below _____			Walk-in Client:
(xxx) xxx-xxxx FAX	☐ 2 weeks			Lab Sampling:
Project Name:	☐ 1 week			
Site:	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)															Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ Therm ID No.:_____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.11, dated 1/24/2017

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation

STATE OF ILLINOIS

ENVIRONMENTAL PROTECTION AGENCY
NELAP - RECOGNIZED
ENVIRONMENTAL LABORATORY ACCREDITATION

is hereby granted to

Eurofins TestAmerica Chicago
2417 Bond Street
University Park, IL 60484

NELAP ACCREDITED

Accreditation Number #100201

According to the Illinois Administrative Code, Title 35, Subtitle A, Chapter II, Part 186, ACCREDITATION OF LABORATORIES FOR DRINKING WATER, WASTEWATER AND HAZARDOUS WASTES ANALYSIS, the State of Illinois formally recognizes that this laboratory is technically competent to perform the environmental analyses listed on the scope of accreditation detailed below.

The laboratory agrees to perform all analyses listed on this scope of accreditation according to the Part 186 requirements and acknowledges that continued accreditation is dependent on successful ongoing compliance with the applicable requirements of Part 186. Please contact the Illinois EPA Environmental Laboratory Accreditation Program (IL ELAP) to verify the laboratory's scope of accreditation and accreditation status. Accreditation by the State of Illinois is not an endorsement or a guarantee of validity of the data generated by the laboratory.

Primary Accrediting Authority:Illinois

Celeste M. Crowley
Supervisor
Environmental Laboratory Accreditation Program

Certificate No: 1002012020-7
Expiration Date: 4/29/2021
Issued On: 7/30/2020

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

State of Illinois
Environmental Protection Agency

Awards the Certificate of Approval to:

Eurofins TestAmerica Chicago
2417 Bond Street
University Park, IL 60484

The Illinois Environmental Laboratory Accreditation Program encourages all clients and data users to verify the most current scope of accreditation for Eurofins TestAmerica Chicago.

Certificate No.: 1002012020-7

	Primary AB
Field of Testing /Matrix: ***CWA (Non Potable Water)***	
Method EPA 120.1	
Conductivity	IL
Method EPA 160.4	
Residue-volatile	IL
Method EPA 1664A Rev: 1	
Oil & Grease	IL
Method EPA 1664B	
Oil & Grease	IL
Method EPA 180.1 Rev: 2	
Turbidity	IL
Method EPA 200.7 Rev: 4.4	
Aluminum	IL
Antimony	IL
Arsenic	IL
Barium	IL
Beryllium	IL
Boron	IL
Cadmium	IL
Calcium	IL
Chromium	IL
Cobalt	IL
Copper	IL
Iron	IL
Lead	IL
Magnesium	IL
Manganese	IL
Molybdenum	IL
Nickel	IL
Potassium	IL
Selenium	IL
Silica as SiO2	IL
Silver	IL
Sodium	IL
Thallium	IL
Tin	IL
Titanium	IL
Vanadium	IL
Zinc	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***CWA (Non Potable Water)***	
Method EPA 200.8 Rev: 5.4	
Aluminum	IL
Antimony	IL
Arsenic	IL
Barium	IL
Beryllium	IL
Boron	IL
Cadmium	IL
Calcium	IL
Chromium	IL
Cobalt	IL
Copper	IL
Iron	IL
Lead	IL
Magnesium	IL
Manganese	IL
Molybdenum	IL
Nickel	IL
Potassium	IL
Selenium	IL
Silver	IL
Sodium	IL
Thallium	IL
Tin	IL
Titanium	IL
Vanadium	IL
Zinc	IL
Method EPA 218.6 Rev: 3.3	
Chromium VI	IL
Method EPA 245.1 Rev: 3	
Mercury	IL
Method EPA 300.0 Rev: 2.1	
Bromide	IL
Chloride	IL
Fluoride	IL
Nitrate	IL
Nitrate plus Nitrite as N	IL
Nitrite	IL
Orthophosphate as P	IL
Sulfate	IL
Method EPA 335.4 Rev: 1	
Cyanide	IL
Method EPA 350.1 Rev: 2	
Ammonia	IL
Method EPA 351.1	
Total Kjeldahl Nitrogen (TKN)	IL
Method EPA 353.2 Rev: 2	
Nitrate	IL
Nitrate plus Nitrite as N	IL
Method EPA 420.4 Rev: 1	

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***CWA (Non Potable Water)***	
Total phenolics	IL
Method EPA 608	
4,4'-DDD	IL
4,4'-DDE	IL
4,4'-DDT	IL
Aldrin	IL
alpha-BHC (alpha-Hexachlorocyclohexane)	IL
Aroclor-1016 (PCB-1016)	IL
Aroclor-1221 (PCB-1221)	IL
Aroclor-1232 (PCB-1232)	IL
Aroclor-1242 (PCB-1242)	IL
Aroclor-1248 (PCB-1248)	IL
Aroclor-1254 (PCB-1254)	IL
Aroclor-1260 (PCB-1260)	IL
beta-BHC (beta-Hexachlorocyclohexane)	IL
Chlordane (tech.)(N.O.S.)	IL
delta-BHC	IL
Dieldrin	IL
Endosulfan I	IL
Endosulfan II	IL
Endosulfan sulfate	IL
Endrin	IL
Endrin aldehyde	IL
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	IL
Heptachlor	IL
Heptachlor epoxide	IL
Methoxychlor	IL
Toxaphene (Chlorinated camphene)	IL
Method EPA 624	
1,1,1-Trichloroethane	IL
1,1,2,2-Tetrachloroethane	IL
1,1,2-Trichloroethane	IL
1,1-Dichloroethane	IL
1,1-Dichloroethylene	IL
1,2-Dichlorobenzene (o-Dichlorobenzene)	IL
1,2-Dichloroethane (Ethylene dichloride)	IL
1,2-Dichloropropane	IL
1,3-Dichlorobenzene	IL
1,4-Dichlorobenzene	IL
2-Chloroethyl vinyl ether	IL
Acrolein (Propenal)	IL
Acrylonitrile	IL
Benzene	IL
Bromodichloromethane	IL
Bromoform	IL
Carbon tetrachloride	IL
Chlorobenzene	IL
Chlorodibromomethane	IL
Chloroethane (Ethyl chloride)	IL
Chloroform	IL
cis-1,3-Dichloropropene	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***CWA (Non Potable Water)***	
Ethylbenzene	IL
Methyl bromide (Bromomethane)	IL
Methyl chloride (Chloromethane)	IL
Methyl tert-butyl ether (MTBE)	IL
Methylene chloride (Dichloromethane)	IL
Tetrachloroethylene (Perchloroethylene)	IL
Toluene	IL
trans-1,2-Dichloroethylene	IL
trans-1,3-Dichloropropylene	IL
Trichloroethene (Trichloroethylene)	IL
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	IL
Vinyl chloride	IL
Xylene (total)	IL
Method EPA 625	
1,2,4-Trichlorobenzene	IL
1,2-Dichlorobenzene (o-Dichlorobenzene)	IL
1,3-Dichlorobenzene	IL
1,4-Dichlorobenzene	IL
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-methylethyl)ether	IL
2,4,5-Trichlorophenol	IL
2,4,6-Trichlorophenol	IL
2,4-Dichlorophenol	IL
2,4-Dimethylphenol	IL
2,4-Dinitrophenol	IL
2,4-Dinitrotoluene (2,4-DNT)	IL
2,6-Dinitrotoluene (2,6-DNT)	IL
2-Chloronaphthalene	IL
2-Chlorophenol	IL
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	IL
2-Nitrophenol	IL
3,3'-Dichlorobenzidine	IL
4-Bromophenyl phenyl ether	IL
4-Chloro-3-methylphenol	IL
4-Chlorophenyl phenylether	IL
4-Nitrophenol	IL
Acenaphthene	IL
Acenaphthylene	IL
Anthracene	IL
Benzidine	IL
Benzo(a)anthracene	IL
Benzo(a)pyrene	IL
Benzo(b)fluoranthene	IL
Benzo(g,h,i)perylene	IL
Benzo(k)fluoranthene	IL
bis(2-Chloroethoxy)methane	IL
bis(2-Chloroethyl) ether	IL
bis(2-Ethylhexyl) phthalate (DEHP)	IL
Butyl benzyl phthalate	IL
Chrysene	IL
Dibenz(a,h) anthracene	IL
Diethyl phthalate	IL
Dimethyl phthalate	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***CWA (Non Potable Water)***	
Di-n-butyl phthalate	IL
Di-n-octyl phthalate	IL
Fluoranthene	IL
Fluorene	IL
Hexachlorobenzene	IL
Hexachlorobutadiene	IL
Hexachlorocyclopentadiene	IL
Hexachloroethane	IL
Indeno(1,2,3-cd) pyrene	IL
Isophorone	IL
Naphthalene	IL
Nitrobenzene	IL
n-Nitrosodimethylamine	IL
n-Nitrosodi-n-propylamine	IL
n-Nitrosodiphenylamine	IL
Pentachlorophenol	IL
Phenanthrene	IL
Phenol	IL
Pyrene	IL
Method SM 2320 B-1997	
Alkalinity as CaCO3	IL
Method SM 2340 B-1997	
Hardness	IL
Method SM 2510 B-1997	
Conductivity	IL
Method SM 2540 B-1997	
Residue-total	IL
Method SM 2540 C-1997	
Residue-filterable (TDS)	IL
Method SM 2540 D-1997	
Residue-nonfilterable (TSS)	IL
Method SM 2540 E-1997	
Residue-volatile	IL
Method SM 2540 F-1997	
Residue-settleable	IL
Method SM 3500-Cr B-2009	
Chromium VI	IL
Method SM 4500-Cl F-2000	
Total residual chlorine	IL
Method SM 4500-Cl G-2000	
Total residual chlorine	IL
Method SM 4500-Cl^- E-1997 Rev: 21st ED	
Chloride	IL
Method SM 4500-CN^- E-1999	
Cyanide	IL
Method SM 4500-CN^- G-1999	
Available Cyanide	IL
Method SM 4500-F^- C-1997 Rev: 21st ED	

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***CWA (Non Potable Water)***	
Fluoride	IL
Method SM 4500-H+ B-2000	
pH	IL
Method SM 4500-NH3 G Rev: 21st ED	
Ammonia	IL
Total Kjeldahl Nitrogen (TKN)	IL
Method SM 4500-NO_2^- B-2000	
Nitrite	IL
Method SM 4500-NO_3^- F-2000	
Nitrate	IL
Nitrate plus Nitrite as N	IL
Method SM 4500-O G-2001	
Oxygen, dissolved	IL
Method SM 4500-P E-1999	
Orthophosphate as P	IL
Phosphorus	IL
Method SM 4500-$S2^-$ F-2000	
Sulfide	IL
Method SM 4500-SO_4^- E-1997	
Sulfate	IL
Method SM 5210 B-2001	
Biochemical oxygen demand	IL
Carbonaceous BOD, CBOD	IL
Method SM 5220 C-1997 Rev: 21st ED	
Chemical oxygen demand	IL
Method SM 5310 C-2000	
Total organic carbon	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***CWA (Solid & Hazardous Material)***	
Method EPA 120.1	
Conductivity	IL
Method EPA 160.4	
Residue-volatile	IL
Method EPA 1664A Rev: 1	
Oil & Grease	IL
Method EPA 1664B	
Oil & Grease	IL
Method EPA 200.7 Rev: 4.4	
Aluminum	IL
Antimony	IL
Arsenic	IL
Barium	IL
Beryllium	IL
Boron	IL
Cadmium	IL
Calcium	IL
Chromium	IL
Cobalt	IL
Copper	IL
Iron	IL
Lead	IL
Magnesium	IL
Manganese	IL
Molybdenum	IL
Nickel	IL
Potassium	IL
Selenium	IL
Silica as SiO2	IL
Silver	IL
Sodium	IL
Thallium	IL
Tin	IL
Titanium	IL
Vanadium	IL
Zinc	IL
Method EPA 350.1 Rev: 2	
Ammonia	IL
Method EPA 353.2 Rev: 2	
Nitrate	IL
Nitrate plus Nitrite as N	IL
Method EPA 420.4 Rev: 1	
Total phenolics	IL
Method SM 2320 B-1997	
Alkalinity as CaCO3	IL
Method SM 2510 B-1997	
Conductivity	IL
Method SM 4500-Cl^- E-1997 Rev: 21st ED	
Chloride	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***CWA (Solid & Hazardous Material)***	
Method SM 4500-CN^- E-1999	
Cyanide	IL
Method SM 4500-F^- C-1997 Rev: 21st ED	
Fluoride	IL
Method SM 4500-NH3 G Rev: 21st ED	
Ammonia	IL
Total Kjeldahl Nitrogen (TKN)	IL
Method SM 4500-$NO2^-$ B-2000	
Nitrite	IL
Method SM 4500-$NO3^-$ F-2000	
Nitrate	IL
Nitrate plus Nitrite as N	IL
Method SM 4500-P E-1999	
Orthophosphate as P	IL
Phosphorus	IL
Method SM 4500-$S2^-$ F-2000	
Sulfide	IL
Method SM 5210 B-2001	
Biochemical oxygen demand	IL
Carbonaceous BOD, CBOD	IL
Method SM 5220 C-1997 Rev: 21st ED	
Chemical oxygen demand	IL
Method SM 5310 C-2000	
Total organic carbon	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
Method EPA 1311 Rev: 0	
Toxicity Characteristic Leaching Procedure (TCLP)	IL
Method EPA 1312 Rev: 0	
Synthetic Precipitation Leaching Procedure (SPLP)	IL
Method EPA 6010B Rev: 2	
Aluminum	IL
Antimony	IL
Arsenic	IL
Barium	IL
Beryllium	IL
Boron	IL
Cadmium	IL
Calcium	IL
Chromium	IL
Cobalt	IL
Copper	IL
Iron	IL
Lead	IL
Lithium	IL
Magnesium	IL
Manganese	IL
Molybdenum	IL
Nickel	IL
Potassium	IL
Selenium	IL
Silica as SiO2	IL
Silver	IL
Sodium	IL
Strontium	IL
Thallium	IL
Tin	IL
Titanium	IL
Vanadium	IL
Zinc	IL
Method EPA 6010C	
Aluminum	IL
Antimony	IL
Arsenic	IL
Barium	IL
Beryllium	IL
Boron	IL
Cadmium	IL
Calcium	IL
Chromium	IL
Cobalt	IL
Copper	IL
Iron	IL
Lead	IL
Lithium	IL
Magnesium	IL
Manganese	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
Molybdenum	IL
Nickel	IL
Potassium	IL
Selenium	IL
Silica as SiO2	IL
Silver	IL
Sodium	IL
Strontium	IL
Thallium	IL
Tin	IL
Titanium	IL
Vanadium	IL
Zinc	IL
Method EPA 6020A Rev: 1	
Aluminum	IL
Antimony	IL
Arsenic	IL
Barium	IL
Beryllium	IL
Boron	IL
Cadmium	IL
Calcium	IL
Chromium	IL
Cobalt	IL
Copper	IL
Iron	IL
Lead	IL
Magnesium	IL
Manganese	IL
Molybdenum	IL
Nickel	IL
Potassium	IL
Selenium	IL
Silver	IL
Sodium	IL
Thallium	IL
Vanadium	IL
Zinc	IL
Method EPA 7196A Rev: 1	
Chromium VI	IL
Method EPA 7199 Rev: 0	
Chromium VI	IL
Method EPA 7470A Rev: 1	
Mercury	IL
Method EPA 8015B Rev: 2	
Diesel range organics (DRO)	IL
Gasoline range organics (GRO)	IL
Method EPA 8015C	
Diesel range organics (DRO)	IL
Gasoline range organics (GRO)	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
Method EPA 8015D	
Diesel range organics (DRO)	IL
Gasoline range organics (GRO)	IL
Method EPA 8081A Rev: 1	
4,4'-DDD	IL
4,4'-DDE	IL
4,4'-DDT	IL
Alachlor	IL
Aldrin	IL
alpha-BHC (alpha-Hexachlorocyclohexane)	IL
alpha-Chlordane, cis-Chlordane	IL
Atrazine	IL
beta-BHC (beta-Hexachlorocyclohexane)	IL
Chlordane (tech.)(N.O.S.)	IL
delta-BHC	IL
Dieldrin	IL
Endosulfan I	IL
Endosulfan II	IL
Endosulfan sulfate	IL
Endrin	IL
Endrin aldehyde	IL
Endrin ketone	IL
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	IL
gamma-Chlordane	IL
Heptachlor	IL
Heptachlor epoxide	IL
Isodrin	IL
Kepone	IL
Methoxychlor	IL
Simazine	IL
Toxaphene (Chlorinated camphene)	IL
Method EPA 8081B	
4,4'-DDD	IL
4,4'-DDE	IL
4,4'-DDT	IL
Alachlor	IL
Aldrin	IL
alpha-BHC (alpha-Hexachlorocyclohexane)	IL
alpha-Chlordane, cis-Chlordane	IL
Atrazine	IL
beta-BHC (beta-Hexachlorocyclohexane)	IL
Chlordane (tech.)(N.O.S.)	IL
delta-BHC	IL
Dieldrin	IL
Endosulfan I	IL
Endosulfan II	IL
Endosulfan sulfate	IL
Endrin	IL
Endrin aldehyde	IL
Endrin ketone	IL
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
gamma-Chlordane	IL
Heptachlor	IL
Heptachlor epoxide	IL
Isodrin	IL
Kepone	IL
Methoxychlor	IL
Simazine	IL
Toxaphene (Chlorinated camphene)	IL
Method EPA 8082 Rev: 0	
Aroclor-1016 (PCB-1016)	IL
Aroclor-1221 (PCB-1221)	IL
Aroclor-1232 (PCB-1232)	IL
Aroclor-1242 (PCB-1242)	IL
Aroclor-1248 (PCB-1248)	IL
Aroclor-1254 (PCB-1254)	IL
Aroclor-1260 (PCB-1260)	IL
Method EPA 8082A	
Aroclor-1016 (PCB-1016)	IL
Aroclor-1221 (PCB-1221)	IL
Aroclor-1232 (PCB-1232)	IL
Aroclor-1242 (PCB-1242)	IL
Aroclor-1248 (PCB-1248)	IL
Aroclor-1254 (PCB-1254)	IL
Aroclor-1260 (PCB-1260)	IL
Method EPA 8151A	
2,4,5-T	IL
2,4-D	IL
2,4-DB	IL
Dalapon	IL
Dicamba	IL
Dichloroprop (Dichlorprop)	IL
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	IL
Pentachlorophenol	IL
Picloram	IL
Silvex (2,4,5-TP)	IL
Method EPA 8260B	
1,1,1,2-Tetrachloroethane	IL
1,1,1-Trichloroethane	IL
1,1,2,2-Tetrachloroethane	IL
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	IL
1,1,2-Trichloroethane	IL
1,1-Dichloroethane	IL
1,1-Dichloroethylene	IL
1,1-Dichloropropene	IL
1,2,3-Trichlorobenzene	IL
1,2,3-Trichloropropane	IL
1,2,4-Trichlorobenzene	IL
1,2,4-Trimethylbenzene	IL
1,2-Dibromo-3-chloropropane (DBCP)	IL
1,2-Dibromoethane (EDB, Ethylene dibromide)	IL
1,2-Dichlorobenzene (o-Dichlorobenzene)	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
1,2-Dichloroethane (Ethylene dichloride)	IL
1,2-Dichloropropane	IL
1,3,5-Trichlorobenzene	IL
1,3,5-Trimethylbenzene	IL
1,3-Dichlorobenzene	IL
1,3-Dichloropropane	IL
1,4-Dichlorobenzene	IL
1,4-Dioxane (1,4- Diethyleneoxide)	IL
1-Chlorohexane	IL
2,2-Dichloropropane	IL
2-Butanone (Methyl ethyl ketone, MEK)	IL
2-Chloroethyl vinyl ether	IL
2-Chlorotoluene	IL
2-Hexanone	IL
2-Methylnaphthalene	IL
2-Nitropropane	IL
4-Chlorotoluene	IL
4-Isopropyltoluene (p-Cymene,p-Isopropyltoluene)	IL
4-Methyl-2-pentanone (MIBK)	IL
Acetone	IL
Acetonitrile	IL
Acrolein (Propenal)	IL
Acrylonitrile	IL
Allyl chloride (3-Chloropropene)	IL
Benzene	IL
Benzyl chloride	IL
Bromobenzene	IL
Bromochloromethane	IL
Bromodichloromethane	IL
Bromoform	IL
Carbon disulfide	IL
Carbon tetrachloride	IL
Chlorobenzene	IL
Chlorodibromomethane	IL
Chloroethane (Ethyl chloride)	IL
Chloroform	IL
Chloroprene (2-Chloro-1,3-butadiene)	IL
cis-1,2-Dichloroethylene	IL
cis-1,3-Dichloropropene	IL
Dibromomethane (Methylene bromide)	IL
Dichlorodifluoromethane (Freon-12)	IL
Diethyl ether	IL
Di-isopropylether (DIPE) (Isopropyl Ether)	IL
Ethanol	IL
Ethyl acetate	IL
Ethyl methacrylate	IL
Ethylbenzene	IL
Hexachlorobutadiene	IL
Iodomethane (Methyl iodide)	IL
Isobutyl alcohol (2-Methyl-1-propanol)	IL
Isopropyl alcohol (2-Propanol, Isopropanol)	IL
Isopropylbenzene	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
m+p-xylene	IL
Methacrylonitrile	IL
Methyl bromide (Bromomethane)	IL
Methyl chloride (Chloromethane)	IL
Methyl methacrylate	IL
Methyl tert-butyl ether (MTBE)	IL
Methylene chloride (Dichloromethane)	IL
m-Xylene	IL
Naphthalene	IL
n-Butyl alcohol (1-Butanol, n-Butanol)	IL
n-Butylbenzene	IL
n-Propylbenzene	IL
o-Xylene	IL
Pentachloroethane	IL
Propionitrile (Ethyl cyanide)	IL
p-Xylene	IL
sec-Butylbenzene	IL
Styrene	IL
tert-Butyl alcohol	IL
tert-Butylbenzene	IL
Tetrachloroethylene (Perchloroethylene)	IL
Tetrahydrofuran (THF)	IL
Toluene	IL
trans-1,2-Dichloroethylene	IL
trans-1,3-Dichloropropylene	IL
trans-1,4-Dichloro-2-butene	IL
Trichloroethene (Trichloroethylene)	IL
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	IL
Vinyl acetate	IL
Vinyl chloride	IL
Xylene (total)	IL
Method EPA 8270C Rev: 3	
1,2,4,5-Tetrachlorobenzene	IL
1,2,4-Trichlorobenzene	IL
1,2-Dichlorobenzene (o-Dichlorobenzene)	IL
1,2-Diphenylhydrazine	IL
1,3,5-Trinitrobenzene (1,3,5-TNB)	IL
1,3-Dichlorobenzene	IL
1,3-Dinitrobenzene (1,3-DNB)	IL
1,4-Dichlorobenzene	IL
1,4-Dinitrobenzene	IL
1,4-Dioxane (1,4- Diethyleneoxide)	IL
1,4-Naphthoquinone	IL
1,4-Phenylenediamine	IL
1-Chloronaphthalene	IL
1-Methylnaphthalene	IL
1-Naphthylamine	IL
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-methylethyl)ether	IL
2,3,4,6-Tetrachlorophenol	IL
2,4,5-Trichlorophenol	IL
2,4,6-Trichlorophenol	IL
2,4-Dichlorophenol	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
2,4-Dimethylphenol	IL
2,4-Dinitrophenol	IL
2,4-Dinitrotoluene (2,4-DNT)	IL
2,6-Dichlorophenol	IL
2,6-Dinitrotoluene (2,6-DNT)	IL
2-Acetylaminofluorene	IL
2-Chloronaphthalene	IL
2-Chlorophenol	IL
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	IL
2-Methylaniline (o-Toluidine)	IL
2-Methylnaphthalene	IL
2-Methylphenol (o-Cresol)	IL
2-Naphthylamine	IL
2-Nitroaniline	IL
2-Nitrophenol	IL
2-Picoline (2-Methylpyridine)	IL
3,3'-Dichlorobenzidine	IL
3,3'-Dimethylbenzidine	IL
3-Methylcholanthrene	IL
3-Methylphenol (m-Cresol)	IL
3-Nitroaniline	IL
4-Aminobiphenyl	IL
4-Bromophenyl phenyl ether	IL
4-Chloro-3-methylphenol	IL
4-Chloroaniline	IL
4-Chlorophenyl phenylether	IL
4-Dimethyl aminoazobenzene	IL
4-Methylphenol (p-Cresol)	IL
4-Nitroaniline	IL
4-Nitrophenol	IL
4-Nitroquinoline 1-oxide	IL
5-Nitro-o-toluidine	IL
7,12-Dimethylbenz(a) anthracene	IL
a-a-Dimethylphenethylamine	IL
Acenaphthene	IL
Acenaphthylene	IL
Acetophenone	IL
Aniline	IL
Anthracene	IL
Aramite	IL
Benzidine	IL
Benzo(a)anthracene	IL
Benzo(a)pyrene	IL
Benzo(b)fluoranthene	IL
Benzo(g,h,i)perylene	IL
Benzo(k)fluoranthene	IL
Benzoic acid	IL
Benzyl alcohol	IL
bis(2-Chloroethoxy)methane	IL
bis(2-Chloroethyl) ether	IL
bis(2-Ethylhexyl) phthalate (DEHP)	IL
Butyl benzyl phthalate	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
Carbazole	IL
Carbofuran (Furaden)	IL
Chlorobenzilate	IL
Chrysene	IL
Diallate	IL
Dibenz(a,h) anthracene	IL
Dibenz(a,j) acridine	IL
Dibenzofuran	IL
Diethyl phthalate	IL
Dimethoate	IL
Dimethyl phthalate	IL
Di-n-butyl phthalate	IL
Di-n-octyl phthalate	IL
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	IL
Diphenylamine	IL
Ethyl methanesulfonate	IL
Famphur	IL
Fluoranthene	IL
Fluorene	IL
Hexachlorobenzene	IL
Hexachlorobutadiene	IL
Hexachlorocyclopentadiene	IL
Hexachloroethane	IL
Hexachlorophene	IL
Hexachloropropene	IL
Indeno(1,2,3-cd) pyrene	IL
Isodrin	IL
Isophorone	IL
Isosafrole	IL
Kepone	IL
Methapyrilene	IL
Methyl methanesulfonate	IL
Methyl parathion (Parathion, methyl)	IL
Naphthalene	IL
Nitrobenzene	IL
n-Nitrosodiethylamine	IL
n-Nitrosodimethylamine	IL
n-Nitroso-di-n-butylamine	IL
n-Nitrosodi-n-propylamine	IL
n-Nitrosodiphenylamine	IL
n-Nitrosomethylethylamine	IL
n-Nitrosomorpholine	IL
n-Nitrosopiperidine	IL
n-Nitrosopyrrolidine	IL
o,o,o-Triethyl phosphorothioate	IL
Parathion	IL
Pentachlorobenzene	IL
Pentachloronitrobenzene	IL
Pentachlorophenol	IL
Phenacetin	IL
Phenanthrene	IL
Phenol	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
Phorate	IL
p-Phenylenediamine	IL
Pronamide (Kerb)	IL
Pyrene	IL
Pyridine	IL
Safrole	IL
Thionazin (Zinophos)	IL
Method EPA 8270D	
1,2,4,5-Tetrachlorobenzene	IL
1,2,4-Trichlorobenzene	IL
1,2-Dichlorobenzene (o-Dichlorobenzene)	IL
1,2-Diphenylhydrazine	IL
1,3,5-Trinitrobenzene (1,3,5-TNB)	IL
1,3-Dichlorobenzene	IL
1,3-Dinitrobenzene (1,3-DNB)	IL
1,4-Dichlorobenzene	IL
1,4-Dinitrobenzene	IL
1,4-Dioxane (1,4- Diethyleneoxide)	IL
1,4-Naphthoquinone	IL
1,4-Phenylenediamine	IL
1-Chloronaphthalene	IL
1-Methylnaphthalene	IL
1-Naphthylamine	IL
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-methylethyl)ether	IL
2,3,4,6-Tetrachlorophenol	IL
2,4,5-Trichlorophenol	IL
2,4,6-Trichlorophenol	IL
2,4-Dichlorophenol	IL
2,4-Dimethylphenol	IL
2,4-Dinitrophenol	IL
2,4-Dinitrotoluene (2,4-DNT)	IL
2,6-Dichlorophenol	IL
2,6-Dinitrotoluene (2,6-DNT)	IL
2-Acetylaminofluorene	IL
2-Chloronaphthalene	IL
2-Chlorophenol	IL
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	IL
2-Methylaniline (o-Toluidine)	IL
2-Methylnaphthalene	IL
2-Methylphenol (o-Cresol)	IL
2-Naphthylamine	IL
2-Nitroaniline	IL
2-Nitrophenol	IL
2-Picoline (2-Methylpyridine)	IL
3,3'-Dichlorobenzidine	IL
3,3'-Dimethylbenzidine	IL
3-Methylcholanthrene	IL
3-Methylphenol (m-Cresol)	IL
3-Nitroaniline	IL
4-Aminobiphenyl	IL
4-Bromophenyl phenyl ether	IL
4-Chloro-3-methylphenol	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
4-Chloroaniline	IL
4-Chlorophenyl phenylether	IL
4-Dimethyl aminoazobenzene	IL
4-Methylphenol (p-Cresol)	IL
4-Nitroaniline	IL
4-Nitrophenol	IL
4-Nitroquinoline 1-oxide	IL
5-Nitro-o-toluidine	IL
7,12-Dimethylbenz(a) anthracene	IL
a-a-Dimethylphenethylamine	IL
Acenaphthene	IL
Acenaphthylene	IL
Acetophenone	IL
Aniline	IL
Anthracene	IL
Aramite	IL
Benzidine	IL
Benzo(a)anthracene	IL
Benzo(a)pyrene	IL
Benzo(b)fluoranthene	IL
Benzo(g,h,i)perylene	IL
Benzo(k)fluoranthene	IL
Benzoic acid	IL
Benzyl alcohol	IL
bis(2-Chloroethoxy)methane	IL
bis(2-Chloroethyl) ether	IL
bis(2-Ethylhexyl) phthalate (DEHP)	IL
Butyl benzyl phthalate	IL
Carbazole	IL
Carbofuran (Furaden)	IL
Chlorobenzilate	IL
Chrysene	IL
Diallate	IL
Dibenz(a,h) anthracene	IL
Dibenz(a,j) acridine	IL
Dibenzofuran	IL
Diethyl phthalate	IL
Dimethoate	IL
Dimethyl phthalate	IL
Di-n-butyl phthalate	IL
Di-n-octyl phthalate	IL
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	IL
Diphenylamine	IL
Ethyl methanesulfonate	IL
Famphur	IL
Fluoranthene	IL
Fluorene	IL
Hexachlorobenzene	IL
Hexachlorobutadiene	IL
Hexachlorocyclopentadiene	IL
Hexachloroethane	IL
Hexachlorophene	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
Hexachloropropene	IL
Indeno(1,2,3-cd) pyrene	IL
Isodrin	IL
Isophorone	IL
Isosafrole	IL
Kepone	IL
Methapyrilene	IL
Methyl methanesulfonate	IL
Methyl parathion (Parathion, methyl)	IL
Naphthalene	IL
Nitrobenzene	IL
n-Nitrosodiethylamine	IL
n-Nitrosodimethylamine	IL
n-Nitroso-di-n-butylamine	IL
n-Nitrosodi-n-propylamine	IL
n-Nitrosodiphenylamine	IL
n-Nitrosomethylethylamine	IL
n-Nitrosomorpholine	IL
n-Nitrosopiperidine	IL
n-Nitrosopyrrolidine	IL
o,o,o-Triethyl phosphorothioate	IL
Parathion	IL
Pentachlorobenzene	IL
Pentachloronitrobenzene	IL
Pentachlorophenol	IL
Phenacetin	IL
Phenanthrene	IL
Phenol	IL
Phorate	IL
p-Phenylenediamine	IL
Pronamide (Kerb)	IL
Pyrene	IL
Pyridine	IL
Safrole	IL
Thionazin (Zinophos)	IL
Method EPA 9012B	
Cyanide	IL
Method EPA 9014 Rev: 0	
Cyanide	IL
Method EPA 9034 Rev: 0	
Sulfide	IL
Method EPA 9038 Rev: 0	
Sulfate	IL
Method EPA 9040B Rev: 2	
pH	IL
Method EPA 9040C	
pH	IL
Method EPA 9050A Rev: 1	
Conductivity	IL
Method EPA 9056A	

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Non Potable Water)***	
Bromide	IL
Chloride	IL
Fluoride	IL
Nitrate	IL
Nitrite	IL
Orthophosphate as P	IL
Sulfate	IL
Method EPA 9060A	
Total organic carbon	IL
Method EPA 9066 Rev: 0	
Total phenolics	IL
Method EPA 9071B	
Oil & Grease	IL
Method EPA 9095A	
Paint Filter Test	IL
Method EPA 9095B	
Paint Filter Test	IL
Method EPA 9251 Rev: 0	
Chloride	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
Method EPA 1311 Rev: 0	
Toxicity Characteristic Leaching Procedure (TCLP)	IL
Method EPA 1312 Rev: 0	
Synthetic Precipitation Leaching Procedure (SPLP)	IL
Method EPA 6010B Rev: 2	
Aluminum	IL
Antimony	IL
Arsenic	IL
Barium	IL
Beryllium	IL
Boron	IL
Cadmium	IL
Calcium	IL
Chromium	IL
Cobalt	IL
Copper	IL
Iron	IL
Lead	IL
Lithium	IL
Magnesium	IL
Manganese	IL
Molybdenum	IL
Nickel	IL
Potassium	IL
Selenium	IL
Silica as SiO2	IL
Silver	IL
Sodium	IL
Strontium	IL
Thallium	IL
Tin	IL
Titanium	IL
Vanadium	IL
Zinc	IL
Method EPA 6010C	
Aluminum	IL
Antimony	IL
Arsenic	IL
Barium	IL
Beryllium	IL
Boron	IL
Cadmium	IL
Calcium	IL
Chromium	IL
Cobalt	IL
Copper	IL
Iron	IL
Lead	IL
Lithium	IL
Magnesium	IL
Manganese	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
Molybdenum	IL
Nickel	IL
Potassium	IL
Selenium	IL
Silica as SiO2	IL
Silver	IL
Sodium	IL
Strontium	IL
Thallium	IL
Tin	IL
Titanium	IL
Vanadium	IL
Zinc	IL
Method EPA 7196A Rev: 1	
Chromium VI	IL
Method EPA 7471B	
Mercury	IL
Method EPA 8015B Rev: 2	
Diesel range organics (DRO)	IL
Gasoline range organics (GRO)	IL
Method EPA 8015C	
Diesel range organics (DRO)	IL
Gasoline range organics (GRO)	IL
Method EPA 8015D	
Diesel range organics (DRO)	IL
Gasoline range organics (GRO)	IL
Method EPA 8081A Rev: 1	
4,4'-DDD	IL
4,4'-DDE	IL
4,4'-DDT	IL
Alachlor	IL
Aldrin	IL
alpha-BHC (alpha-Hexachlorocyclohexane)	IL
alpha-Chlordane, cis-Chlordane	IL
Atrazine	IL
beta-BHC (beta-Hexachlorocyclohexane)	IL
Chlordane (tech.)(N.O.S.)	IL
delta-BHC	IL
Dieldrin	IL
Endosulfan I	IL
Endosulfan II	IL
Endosulfan sulfate	IL
Endrin	IL
Endrin aldehyde	IL
Endrin ketone	IL
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	IL
gamma-Chlordane	IL
Heptachlor	IL
Heptachlor epoxide	IL
Isodrin	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
Kepone	IL
Methoxychlor	IL
Simazine	IL
Toxaphene (Chlorinated camphene)	IL
Method EPA 8081B	
4,4'-DDD	IL
4,4'-DDE	IL
4,4'-DDT	IL
Alachlor	IL
Aldrin	IL
alpha-BHC (alpha-Hexachlorocyclohexane)	IL
alpha-Chlordane, cis-Chlordane	IL
Atrazine	IL
beta-BHC (beta-Hexachlorocyclohexane)	IL
Chlordane (tech.)(N.O.S.)	IL
delta-BHC	IL
Dieldrin	IL
Endosulfan I	IL
Endosulfan II	IL
Endosulfan sulfate	IL
Endrin	IL
Endrin aldehyde	IL
Endrin ketone	IL
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	IL
gamma-Chlordane	IL
Heptachlor	IL
Heptachlor epoxide	IL
Isodrin	IL
Kepone	IL
Methoxychlor	IL
Simazine	IL
Toxaphene (Chlorinated camphene)	IL
Method EPA 8082 Rev: 0	
Aroclor-1016 (PCB-1016)	IL
Aroclor-1221 (PCB-1221)	IL
Aroclor-1232 (PCB-1232)	IL
Aroclor-1242 (PCB-1242)	IL
Aroclor-1248 (PCB-1248)	IL
Aroclor-1254 (PCB-1254)	IL
Aroclor-1260 (PCB-1260)	IL
Method EPA 8082A	
Aroclor-1016 (PCB-1016)	IL
Aroclor-1221 (PCB-1221)	IL
Aroclor-1232 (PCB-1232)	IL
Aroclor-1242 (PCB-1242)	IL
Aroclor-1248 (PCB-1248)	IL
Aroclor-1254 (PCB-1254)	IL
Aroclor-1260 (PCB-1260)	IL
Method EPA 8151A	
2,4,5-T	IL
2,4-D	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
2,4-DB	IL
Dalapon	IL
Dicamba	IL
Dichloroprop (Dichlorprop)	IL
Pentachlorophenol	IL
Picloram	IL
Silvex (2,4,5-TP)	IL
Method EPA 8260B	
1,1,1,2-Tetrachloroethane	IL
1,1,1-Trichloroethane	IL
1,1,2,2-Tetrachloroethane	IL
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	IL
1,1,2-Trichloroethane	IL
1,1-Dichloroethane	IL
1,1-Dichloroethylene	IL
1,1-Dichloropropene	IL
1,2,3-Trichlorobenzene	IL
1,2,3-Trichloropropane	IL
1,2,4-Trichlorobenzene	IL
1,2,4-Trimethylbenzene	IL
1,2-Dibromo-3-chloropropane (DBCP)	IL
1,2-Dibromoethane (EDB, Ethylene dibromide)	IL
1,2-Dichlorobenzene (o-Dichlorobenzene)	IL
1,2-Dichloroethane (Ethylene dichloride)	IL
1,2-Dichloropropane	IL
1,3,5-Trichlorobenzene	IL
1,3,5-Trimethylbenzene	IL
1,3-Dichlorobenzene	IL
1,3-Dichloropropane	IL
1,4-Dichlorobenzene	IL
1,4-Dioxane (1,4- Diethyleneoxide)	IL
1-Chlorohexane	IL
2,2-Dichloropropane	IL
2-Butanone (Methyl ethyl ketone, MEK)	IL
2-Chloroethyl vinyl ether	IL
2-Chlorotoluene	IL
2-Hexanone	IL
2-Methylnaphthalene	IL
2-Nitropropane	IL
4-Chlorotoluene	IL
4-Isopropyltoluene (p-Cymene,p-Isopropyltoluene)	IL
4-Methyl-2-pentanone (MIBK)	IL
Acetone	IL
Acetonitrile	IL
Acrolein (Propenal)	IL
Acrylonitrile	IL
Allyl chloride (3-Chloropropene)	IL
Benzene	IL
Benzyl chloride	IL
Bromobenzene	IL
Bromochloromethane	IL
Bromodichloromethane	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
Bromoform	IL
Carbon disulfide	IL
Carbon tetrachloride	IL
Chlorobenzene	IL
Chlorodibromomethane	IL
Chloroethane (Ethyl chloride)	IL
Chloroform	IL
Chloroprene (2-Chloro-1,3-butadiene)	IL
cis-1,2-Dichloroethylene	IL
cis-1,3-Dichloropropene	IL
Dibromomethane (Methylene bromide)	IL
Dichlorodifluoromethane (Freon-12)	IL
Diethyl ether	IL
Di-isopropylether (DIPE) (Isopropyl Ether)	IL
Ethanol	IL
Ethyl acetate	IL
Ethyl methacrylate	IL
Ethylbenzene	IL
Hexachlorobutadiene	IL
Iodomethane (Methyl iodide)	IL
Isobutyl alcohol (2-Methyl-1-propanol)	IL
Isopropyl alcohol (2-Propanol, Isopropanol)	IL
Isopropylbenzene	IL
m+p-xylene	IL
Methacrylonitrile	IL
Methyl bromide (Bromomethane)	IL
Methyl chloride (Chloromethane)	IL
Methyl methacrylate	IL
Methyl tert-butyl ether (MTBE)	IL
Methylene chloride (Dichloromethane)	IL
m-Xylene	IL
Naphthalene	IL
n-Butyl alcohol (1-Butanol, n-Butanol)	IL
n-Butylbenzene	IL
n-Propylbenzene	IL
o-Xylene	IL
Pentachloroethane	IL
Propionitrile (Ethyl cyanide)	IL
p-Xylene	IL
sec-Butylbenzene	IL
Styrene	IL
tert-Butyl alcohol	IL
tert-Butylbenzene	IL
Tetrachloroethylene (Perchloroethylene)	IL
Tetrahydrofuran (THF)	IL
Toluene	IL
trans-1,2-Dichloroethylene	IL
trans-1,3-Dichloropropylene	IL
trans-1,4-Dichloro-2-butene	IL
Trichloroethene (Trichloroethylene)	IL
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	IL
Vinyl acetate	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
Vinyl chloride	IL
Xylene (total)	IL
Method EPA 8270C Rev: 3	
1,2,4,5-Tetrachlorobenzene	IL
1,2,4-Trichlorobenzene	IL
1,2-Dichlorobenzene (o-Dichlorobenzene)	IL
1,2-Diphenylhydrazine	IL
1,3,5-Trinitrobenzene (1,3,5-TNB)	IL
1,3-Dichlorobenzene	IL
1,3-Dinitrobenzene (1,3-DNB)	IL
1,4-Dichlorobenzene	IL
1,4-Dinitrobenzene	IL
1,4-Dioxane (1,4- Diethyleneoxide)	IL
1,4-Naphthoquinone	IL
1,4-Phenylenediamine	IL
1-Chloronaphthalene	IL
1-Methylnaphthalene	IL
1-Naphthylamine	IL
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-methylethyl)ether	IL
2,3,4,6-Tetrachlorophenol	IL
2,4,5-Trichlorophenol	IL
2,4,6-Trichlorophenol	IL
2,4-Dichlorophenol	IL
2,4-Dimethylphenol	IL
2,4-Dinitrophenol	IL
2,4-Dinitrotoluene (2,4-DNT)	IL
2,6-Dichlorophenol	IL
2,6-Dinitrotoluene (2,6-DNT)	IL
2-Acetylaminofluorene	IL
2-Chloronaphthalene	IL
2-Chlorophenol	IL
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	IL
2-Methylaniline (o-Toluidine)	IL
2-Methylnaphthalene	IL
2-Methylphenol (o-Cresol)	IL
2-Naphthylamine	IL
2-Nitroaniline	IL
2-Nitrophenol	IL
2-Picoline (2-Methylpyridine)	IL
3,3'-Dichlorobenzidine	IL
3,3'-Dimethylbenzidine	IL
3-Methylcholanthrene	IL
3-Methylphenol (m-Cresol)	IL
3-Nitroaniline	IL
4-Aminobiphenyl	IL
4-Bromophenyl phenyl ether	IL
4-Chloro-3-methylphenol	IL
4-Chloroaniline	IL
4-Chlorophenyl phenylether	IL
4-Dimethyl aminoazobenzene	IL
4-Methylphenol (p-Cresol)	IL
4-Nitroaniline	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
4-Nitrophenol	IL
4-Nitroquinoline 1-oxide	IL
5-Nitro-o-toluidine	IL
7,12-Dimethylbenz(a) anthracene	IL
a-a-Dimethylphenethylamine	IL
Acenaphthene	IL
Acenaphthylene	IL
Acetophenone	IL
Aniline	IL
Anthracene	IL
Aramite	IL
Benzidine	IL
Benzo(a)anthracene	IL
Benzo(a)pyrene	IL
Benzo(b)fluoranthene	IL
Benzo(g,h,i)perylene	IL
Benzo(k)fluoranthene	IL
Benzoic acid	IL
Benzyl alcohol	IL
bis(2-Chloroethoxy)methane	IL
bis(2-Chloroethyl) ether	IL
bis(2-Ethylhexyl) phthalate (DEHP)	IL
Butyl benzyl phthalate	IL
Carbazole	IL
Carbofuran (Furaden)	IL
Chlorobenzilate	IL
Chrysene	IL
Diallate	IL
Dibenz(a,h) anthracene	IL
Dibenz(a,j) acridine	IL
Dibenzofuran	IL
Diethyl phthalate	IL
Dimethoate	IL
Dimethyl phthalate	IL
Di-n-butyl phthalate	IL
Di-n-octyl phthalate	IL
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	IL
Diphenylamine	IL
Ethyl methanesulfonate	IL
Famphur	IL
Fluoranthene	IL
Fluorene	IL
Hexachlorobenzene	IL
Hexachlorobutadiene	IL
Hexachlorocyclopentadiene	IL
Hexachloroethane	IL
Hexachlorophene	IL
Hexachloropropene	IL
Indeno(1,2,3-cd) pyrene	IL
Isodrin	IL
Isophorone	IL
Isosafrole	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
Kepone	IL
Methapyrilene	IL
Methyl methanesulfonate	IL
Methyl parathion (Parathion, methyl)	IL
Naphthalene	IL
Nitrobenzene	IL
n-Nitrosodiethylamine	IL
n-Nitrosodimethylamine	IL
n-Nitroso-di-n-butylamine	IL
n-Nitrosodi-n-propylamine	IL
n-Nitrosodiphenylamine	IL
n-Nitrosomethylethylamine	IL
n-Nitrosomorpholine	IL
n-Nitrosopiperidine	IL
n-Nitrosopyrrolidine	IL
o,o,o-Triethyl phosphorothioate	IL
Parathion	IL
Pentachlorobenzene	IL
Pentachloronitrobenzene	IL
Pentachlorophenol	IL
Phenacetin	IL
Phenanthrene	IL
Phenol	IL
Phorate	IL
p-Phenylenediamine	IL
Pronamide (Kerb)	IL
Pyrene	IL
Pyridine	IL
Safrole	IL
Thionazin (Zinophos)	IL
Method EPA 8270D	
1,2,4,5-Tetrachlorobenzene	IL
1,2,4-Trichlorobenzene	IL
1,2-Dichlorobenzene (o-Dichlorobenzene)	IL
1,2-Diphenylhydrazine	IL
1,3,5-Trinitrobenzene (1,3,5-TNB)	IL
1,3-Dichlorobenzene	IL
1,3-Dinitrobenzene (1,3-DNB)	IL
1,4-Dichlorobenzene	IL
1,4-Dinitrobenzene	IL
1,4-Dioxane (1,4- Diethyleneoxide)	IL
1,4-Naphthoquinone	IL
1,4-Phenylenediamine	IL
1-Chloronaphthalene	IL
1-Methylnaphthalene	IL
1-Naphthylamine	IL
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-methylethyl)ether	IL
2,3,4,6-Tetrachlorophenol	IL
2,4,5-Trichlorophenol	IL
2,4,6-Trichlorophenol	IL
2,4-Dichlorophenol	IL
2,4-Dimethylphenol	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
2,4-Dinitrophenol	IL
2,4-Dinitrotoluene (2,4-DNT)	IL
2,6-Dichlorophenol	IL
2,6-Dinitrotoluene (2,6-DNT)	IL
2-Acetylaminofluorene	IL
2-Chloronaphthalene	IL
2-Chlorophenol	IL
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	IL
2-Methylaniline (o-Toluidine)	IL
2-Methylnaphthalene	IL
2-Methylphenol (o-Cresol)	IL
2-Naphthylamine	IL
2-Nitroaniline	IL
2-Nitrophenol	IL
2-Picoline (2-Methylpyridine)	IL
3,3'-Dichlorobenzidine	IL
3,3'-Dimethylbenzidine	IL
3-Methylcholanthrene	IL
3-Methylphenol (m-Cresol)	IL
3-Nitroaniline	IL
4-Aminobiphenyl	IL
4-Bromophenyl phenyl ether	IL
4-Chloro-3-methylphenol	IL
4-Chloroaniline	IL
4-Chlorophenyl phenylether	IL
4-Dimethyl aminoazobenzene	IL
4-Methylphenol (p-Cresol)	IL
4-Nitroaniline	IL
4-Nitrophenol	IL
4-Nitroquinoline 1-oxide	IL
5-Nitro-o-toluidine	IL
7,12-Dimethylbenz(a) anthracene	IL
a-a-Dimethylphenethylamine	IL
Acenaphthene	IL
Acenaphthylene	IL
Acetophenone	IL
Aniline	IL
Anthracene	IL
Aramite	IL
Benzidine	IL
Benzo(a)anthracene	IL
Benzo(a)pyrene	IL
Benzo(b)fluoranthene	IL
Benzo(g,h,i)perylene	IL
Benzo(k)fluoranthene	IL
Benzoic acid	IL
Benzyl alcohol	IL
bis(2-Chloroethoxy)methane	IL
bis(2-Chloroethyl) ether	IL
bis(2-Ethylhexyl) phthalate (DEHP)	IL
Butyl benzyl phthalate	IL
Carbazole	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
Carbofuran (Furaden)	IL
Chlorobenzilate	IL
Chrysene	IL
Diallate	IL
Dibenz(a,h) anthracene	IL
Dibenz(a,j) acridine	IL
Dibenzofuran	IL
Diethyl phthalate	IL
Dimethoate	IL
Dimethyl phthalate	IL
Di-n-butyl phthalate	IL
Di-n-octyl phthalate	IL
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	IL
Diphenylamine	IL
Ethyl methanesulfonate	IL
Famphur	IL
Fluoranthene	IL
Fluorene	IL
Hexachlorobenzene	IL
Hexachlorobutadiene	IL
Hexachlorocyclopentadiene	IL
Hexachloroethane	IL
Hexachlorophene	IL
Hexachloropropene	IL
Indeno(1,2,3-cd) pyrene	IL
Isodrin	IL
Isophorone	IL
Isosafrole	IL
Kepone	IL
Methapyrilene	IL
Methyl methanesulfonate	IL
Methyl parathion (Parathion, methyl)	IL
Naphthalene	IL
Nitrobenzene	IL
n-Nitrosodiethylamine	IL
n-Nitrosodimethylamine	IL
n-Nitroso-di-n-butylamine	IL
n-Nitrosodi-n-propylamine	IL
n-Nitrosodiphenylamine	IL
n-Nitrosomethylethylamine	IL
n-Nitrosomorpholine	IL
n-Nitrosopiperidine	IL
n-Nitrosopyrrolidine	IL
o,o,o-Triethyl phosphorothioate	IL
Parathion	IL
Pentachlorobenzene	IL
Pentachloronitrobenzene	IL
Pentachlorophenol	IL
Phenacetin	IL
Phenanthrene	IL
Phenol	IL
Phorate	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***RCRA (Solid & Hazardous Material)***	
p-Phenylenediamine	IL
Pronamide (Kerb)	IL
Pyrene	IL
Pyridine	IL
Safrole	IL
Thionazin (Zinophos)	IL
Method EPA 9012B	
Cyanide	IL
Method EPA 9014 Rev: 0	
Cyanide	IL
Method EPA 9034 Rev: 0	
Sulfide	IL
Method EPA 9045C Rev: 3	
pH	IL
Method EPA 9045D	
pH	IL
Method EPA 9050A Rev: 1	
Conductivity	IL
Method EPA 9056A	
Bromide	IL
Chloride	IL
Fluoride	IL
Nitrate	IL
Nitrite	IL
Orthophosphate as P	IL
Sulfate	IL
Method EPA 9060A	
Total organic carbon	IL
Method EPA 9066 Rev: 0	
Total phenolics	IL
Method EPA 9071B	
Oil & Grease	IL
Method EPA 9095A	
Paint Filter Test	IL
Method EPA 9095B	
Paint Filter Test	IL
Method EPA 9251 Rev: 0	
Chloride	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***SDWA (Potable Water)***	
Method EPA 180.1	
Turbidity	IL
Method EPA 200.7 Rev: 4.4	
Aluminum	IL
Arsenic	IL
Barium	IL
Beryllium	IL
Cadmium	IL
Calcium	IL
Chromium	IL
Copper	IL
Iron	IL
Magnesium	IL
Manganese	IL
Nickel	IL
Silica as SiO2	IL
Silver	IL
Sodium	IL
Zinc	IL
Method EPA 200.8 Rev: 5.4	
Aluminum	IL
Antimony	IL
Arsenic	IL
Barium	IL
Beryllium	IL
Cadmium	IL
Chromium	IL
Copper	IL
Lead	IL
Manganese	IL
Molybdenum	IL
Nickel	IL
Selenium	IL
Silver	IL
Thallium	IL
Zinc	IL
Method EPA 245.1 Rev: 3	
Mercury	IL
Method EPA 300.0 Rev: 2.1	
Chloride	IL
Fluoride	IL
Nitrate	IL
Nitrite	IL
Orthophosphate as P	IL
Sulfate	IL
Method EPA 335.4 Rev: 1	
Cyanide	IL
Method EPA 353.2 Rev: 2	
Nitrate	IL
Nitrate plus Nitrite as N	IL

Attachment 10: Eurofins TestAmerica Chicago Laboratory Accreditation (cont.)

Certificate No.: 1002012020-7	Primary AB
Field of Testing /Matrix: ***SDWA (Potable Water)***	
Method SM 2320 B-1997 Rev: 20th ED	
Alkalinity as CaCO3	IL
Method SM 2340 B-1997 Rev: 20th ED	
Hardness	IL
Method SM 2510 B-1997 Rev: 20th ED	
Conductivity	IL
Method SM 2540 C-1997 Rev: 20th ED	
Total dissolved solids	IL
Method SM 4500-Cl F-1993 Rev: 20th ED	
Chlorine	IL
Method SM 4500-CN^- E-1997 Rev: 20th ED	
Cyanide	IL
Method SM 4500-F^- C-1997 Rev: 20th ED	
Fluoride	IL
Method SM 4500-H+ B-1996 Rev: 20th ED	
pH	IL
Method SM 4500-$NO2^-$ B-1993 Rev: 20th ED	
Nitrite	IL
Method SM 4500-$NO3^-$ F-1997 Rev: 20th ED	
Nitrate	IL
Method SM 4500-P E-1997 Rev: 20th ED	
Orthophosphate as P	IL
Method SM 4500-$SO4^-$ E-1997 Rev: 20th ED	
Sulfate	IL
Method SM 5310 B Rev: 21st ED	
Dissolved organic carbon (DOC)	IL
Total organic carbon	IL
Method SM 5310 C Rev: 20th ED	
Dissolved organic carbon (DOC)	IL
Total organic carbon	IL

End of Scope of Accreditation