

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

**Program:** Water Monitoring

**Document Type:** Report

**\*Document Date:** 2/25/2015

**\*Security:** Public

**\*Project Name:** 2015 Metals Project

**\*Project Type:** Special Projects

**\*Report Type:** Work Plan

**HUC Code:** No Selection

**Site #:** \_\_\_\_\_

**Route Name:** \_\_\_\_\_

**Document Control #** B-019-OWQ-WAP-TGM-15-W-R0

**Analysis Set #** \_\_\_\_\_

**County:** No Selection

**Cross Reference ID:** \_\_\_\_\_

**Comments:** Sampling and Analysis Work Plan for the Analysis of Dissolved  
Metals on Selected Streams in Indiana

**Redaction Reference ID:** \_\_\_\_\_



## **Sampling and Analysis Work Plan for the Analysis of Dissolved Metals on Selected Streams in Indiana**

WATERSHED ASSESSMENT and PLANNING BRANCH (WAPB)  
Indiana Department of Environmental Management (IDEM)  
Office of Water Quality  
100 North Senate Avenue  
MC65-40-2 Shadeland  
Indianapolis, Indiana 46204-2251

February 25, 2015

B-019-OWQ-WAP-TGM-15-W-R0

***This page is intended to be blank***

## SIGNATURE PAGE

### Sampling and Analysis Work Plan for the 2015 Dissolved Metals Project

Indiana Department of Environmental Management  
Office of Water Quality  
Watershed Assessment & Planning Branch  
Indianapolis, Indiana

B-019-OWQ-WAP-TGM-15-W-R0

#### Reviews and Approvals

  
\_\_\_\_\_  
Timothy Bowren, Project Quality Assurance Officer, Technical and Logistical Services Section

Date 2-25-2015

  
\_\_\_\_\_  
Cyndi Wagner, Chief, Targeted Monitoring Section

Date 2-25-15

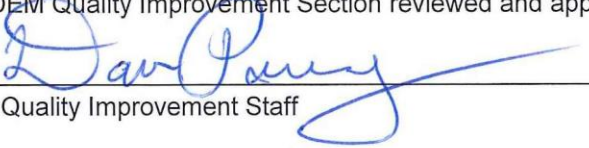
  
\_\_\_\_\_  
Chuck Bell, Section Chief, WAPB Quality Assurance Manager, Technical and Logistical Services Section

Date 2-25-2015

  
\_\_\_\_\_  
Marylou Renshaw, Branch Chief, Quality Assurance Coordinator, Watershed Assessment and Planning Branch

Date 2-26-2015

The IDEM Quality Improvement Section reviewed and approves this Sampling and Analysis Workplan.

  
\_\_\_\_\_  
IDEM Quality Improvement Staff

Date 3/4/15

## **Work Plan Organization**

This Sampling and Analysis Work Plan is an extension of the already existing Watershed Assessment and Planning Branch's October 2004 "Quality Assurance Project Plan (QAPP) for Indiana Surface Water Quality Monitoring and Total Maximum Daily Load (TMDL) Program" and serves as a link to the existing QAPP as well as an independent QAPP for the project. As per the United States Environmental Protection Agency (USEPA) 2006 QAPP guidance (USEPA 2006a), this Work Plan establishes criteria and specifications pertaining to a specific water quality monitoring project that are usually described in the following four sections as QAPP elements:

### **Section A. Project Management/Planning**

- Project History
- Project Objectives
- Data Quality Objectives (DQOs)

### **Section B. Measurement/Data Acquisition**

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

### **Section C. Assessment/Oversight**

- External and Internal Checks
- Audits
- Peer Reviews
- Data Quality Assessments (DQAs)
- Quality Assurance/ Quality Control (QA/QC) Review Reports

### **Section D. Data Validation and Usability.**

- Data Handling and associated QA/QC activities
- QA/QC Review Reports

## Table of Contents

Signature Page .....	iv
Work Plan Organization .....	v
Section A. Project Management/Planning .....	v
Section B. Measurement/Data Acquisition .....	v
Section C. Assessment/Oversight .....	v
Section D. Data Validation and Usability .....	v
Table of Contents .....	vi
List of Figures .....	vii
List of Tables .....	vii
List of Attachments .....	vii
List of Acronyms .....	viii
Definitions: .....	ix
I. Project Management/Planning .....	1
Project Objective .....	1
Project/Task Organization and Schedule: .....	1
Background and Project/Task Description: .....	1
Data Quality Objectives (DQOs): .....	2
Training and Staffing Requirements: .....	5
II. Measurement/Data Acquisition .....	7
Sampling Process Design/ Methods, Sample Handling and Custody .....	7
Sampling Methods and Sample Handling .....	7
Analytical Methods: .....	7
Quality Control and Custody Requirements: .....	8
Water Chemistry Data .....	9
III. ASSESSMENT/OVERSIGHT: .....	9
Data Quality Assessment Levels .....	9
IV. DATA VALIDATION AND USABILITY: .....	9
Quality Assurance/Data Qualifiers and Flags: .....	9
Data Usability: .....	9
Laboratory and Estimated Cost: .....	9
Reference Manuals and Personnel Safety: .....	10
REFERENCES: .....	11
DISTRIBUTION LIST: .....	13
Attachment 1. IDEM Site Reconnaissance Form. ....	14
Attachment 2: Blank Stream Sampling Field Data Sheet .....	15
Attachment 3: Chain-of-custody Form .....	16
Attachment 4: Sample Analysis Request form. ....	17

## List of Figures

Figure 1. 2015 Dissolved Metals Project Sampling Area.....	6
--	---

## List of Tables

Table 1. AUIDs and Associated Sampling Sites.....	2
Table 2. Sampling Locations for 2015 Dissolved Metals Project.....	3
Table 3. Parameters, Preservatives and Holding Times.....	4
Table 4. Field Parameters Test Methods.....	8

## List of Attachments

Attachment 1: IDEM Site Reconnaissance Form .....	14
Attachment 2: Blank Stream Sampling Field Data Sheet .....	15
Attachment 3: Chain-of-Custody Form .....	16
Attachment 4: Sample Analysis Request Form .....	17

## List of Acronyms

AAC:	Acute Aquatic Criterion
AIMS:	Assessment Information Management System
AUID	Assessment Unit Identification
CAC:	Chronic Aquatic Criteria
CALM:	Consolidated Assessment Listing Methodology
CCC:	Criterion Continuous Concentration
CFR:	Code of Federal Regulations
CPR:	Cardio-Pulmonary Resuscitation
CRQL:	Contract Required Quantification Limit
DO:	Dissolved Oxygen
DQA:	Data Quality Assessment
DQO:	Data Quality Objectives
EPA:	Environmental Protection Agency
GPS:	Global Positioning System
HUC:	Hydrologic Unit Code
IAC:	Indiana Administrative Code
IDEM:	Indiana Department of Environmental Management
MDL:	Method Detection Limit
µS/cm	Micro Siemens per Centimeter
mg/L:	Milligram per liter
mL:	Milliliter
MS/MSD:	Matrix Spike/Matrix Spike Duplicate
OWQ:	Office of Water Quality
PFD:	Personal Floatation Device
PPE:	Personal Protective Equipment
QA/QC:	Quality Assurance/Quality Control
QAC:	Quality Assurance Coordinator
QAM:	Quality Assurance Manager
QAO:	Quality Assurance Officer
QAPP:	Quality Assurance Project Plan
RL:	Reporting Limit
RPD:	Relative Percent Difference
S.U.:	Standard Units
SM:	Standard Method
SOP:	Standard Operating Procedures
TMDL:	Total Maximum Daily Load
U.S.:	United States
USDA:	United States Department of Agriculture
WAPB:	Watershed Assessment and Planning Branch



## Definitions:

Targeted site

A sampling site intentionally selected based on specific monitoring objectives or decisions to be made.

Grab samples

A grab sample consists of a discrete sample collected at a particular site at a particular time.

## I. Project Management/Planning

### Project Objective

The objective of the 2015 Dissolved Metals Project is to provide information that will enable a reassessment of selected sites from the Indiana 2010 303d list of impaired water bodies.

### Project/Task Organization and Schedule:

Monthly sampling for this project will begin in February 2015 and end when 3 samples have been collected from each sampling site. Samples collected will be analyzed for total and dissolved metals, hardness and the field parameters DO, % Saturation, Temperature, pH, Conductivity, and Turbidity.

Timeframes for sampling activities include:

- **Site reconnaissance** will be completed in January 2015. Reconnaissance activities will be conducted in the office and through physical site visits.
- **Monthly sampling** for total and dissolved metals, hardness and field parameters DO, % Saturation, Temperature, pH, Conductivity, and Turbidity will be collected at all sites beginning in February 2015.

### Background and Project/Task Description:

Indiana placed the 11 Assessment Units (AU) referenced in Table 1 on the preliminary 2010 303d (IDEM 2010) list utilizing dissolved metals values derived from total metals analysis. IDEM legal counsel ruled that derived criteria cannot be used to evaluate surface water violations of Water Quality Standards (WQS); and thus the AUs were not included in the final submitted 2010 303d listings.

EPA challenged the removal of the AUs and added them back to the final list 2010 303d listing. IDEM will collect dissolved metals samples and reassess the 11 referenced AUs to determine their impairment status without using derived criteria.

Table 1. AUIDs and Associated Sampling Sites

AUID	Impairment	Sites Located on AUID		
INB11F5_T1005	Copper	WBU160-0092	WBU160-0102	WBU160-0104
INB11F5_T1005	Zinc			
INW013A_02	Lead	WWU040-0004		
INW0166_01	Zinc	WWU080-0002		
INW0188_03	Lead	WWU100-0001		
INW0225_01	Lead	WWL020-0001		
INW0345_02*	Zinc	WWE040-0001	WWE040-0004	
INW0359_01	Zinc	WWE060-0009	WWE060-0036	
INW0376_T1002	Zinc	WWE080-0006		
INW038B_01	Lead	WWE090-0001		
INW0652_01**	Lead	WEU040-0001		
INW0792_01	Lead	WEM090-0001		

\*This is a new AUID resulting from the re-indexing of INW0342\_T1007.

\*\* This is a new AUID resulting from the re-indexing of INW0643\_M1016.

## Data Quality Objectives (DQOs):

The Data Quality Objective (DQO) process (U.S. EPA 2000) is a planning tool for data collection activities. The DQO for the 2015 Dissolved Metals Project is identified in the following seven steps:

### 1. State the Problem

Fourteen sites on 11 AUs included on the Indiana 2010 303(d) List of Impaired Waters require reassessment. Sampling will be conducted on 14 sites on streams and rivers in Indiana in order to determine if the AUs meet Indiana WQS for dissolved metals.

### 2. Identify the Decision

The main objective of this study is to assess compliance of selected stream segments with Indiana Water Quality Standards for dissolved metals. All sites listed in Table 1 will be sampled for total and dissolved metals, hardness and field parameters DO, % Saturation, Temperature, pH, Conductivity, and Turbidity. Concentrations of dissolved metals will be evaluated for compliance with Indiana WQS criteria using Indiana's 2014 Consolidated Assessment Listing Methodology (CALM pg 21ff) (IDEM 2014).

Table 2. Sampling Locations for 2015 Dissolved Metals Project

Station Name	Station Location	Stream Name	Fixed Station Name	County	Latitude	Longitude
WWE080-0006	CR 66 S/CR 100 E	Turkey Creek		Clay	39.35443	-87.0904
WWU100-0001	Southeastern Pkwy (Old SR 238)	Fall Creek	FC-26	Hamilton	39.95457	-85.8672
WWU080-0002	Mt. Pleasant Rd	Cicero Creek	CIC-17	Hamilton	40.17444	-86.0006
WWE090-0001	SR 67	Eel River	EEL-1	Greene	39.12432	-86.9701
WWE040-0001	CR 875 S	Big Walnut Creek	BWC-4	Putnam	39.53578	-86.9764
WBU160-0092	CR 600 E	Sulphur Creek		Sullivan	39.16794	-87.2968
WBU160-0102	CR 600 N	Sulphur Creek		Sullivan	39.17186	-87.2762
WBU160-0104	SR 48	Sulphur Creek		Sullivan	39.18628	-87.2709
WEM090-0001	SR 256 W of Austin, 2nd B	Muscatatuck River	MU-27	Jackson	38.74222	-85.9003
WEU040-0008	SR 258	East Fork White River		Jackson	38.97296	-85.9293
WWE040-0004	CR 1025 S	Big Walnut Creek		Putnam	39.51289	-86.9598
WWE060-0036	CR 775 E	Mill Creek		Putnam	39.51029	-86.7016
WWL020-0001	SR 43, Spencer	West Fork White River		Owen	39.28	-86.7619
WWU040-0004	SR 13 Bridge at Perkinsville	West Fork White River	WR-279	Madison	40.14222	-85.8628

### 3. Identify the Inputs to the Decision

Surface grab samples of water will be collected at the sampling locations listed in Table 2. The water chemistry samples will be collected one time per month with at least 4 weeks separating sampling events and analyzed by the Indiana State Department of Health (ISDH) Environmental Lab using the analytical methods listed in Table 3.

### 4. Define the Boundaries of the Study

See Figure 1 and Table 2 for the list of sampling locations.

### 5. Develop a Decision Rule

For assessment purposes, dissolved metals criteria will be calculated based upon the hardness concentrations measured at the time of sampling according to equations defined in Table 6.2 of Indiana Administrative Code [327 IAC 2-1-6]. Dissolved metals results will be compared to the calculated WQS standards and evaluated by methodologies as outlined in Indiana's 2014 CALM (IDEM 2014 pg 21ff.) to determine compliance with Indiana WQS. The stream segment will be considered impaired if the dissolved metal concentration exceeds the WQS as defined above.

Table 3. Parameters, Preservatives and Holding Times

<u>Parameter</u>	<u>CAS Number</u>	<u>Method</u>	<u>Total or Dissolved</u>	<u>IDEM Reporting Limit (µg/L)</u>	<u>Lab Reporting Limit (µg/L)</u>	<u>Preservative</u>	<u>Holding Time</u>
Arsenic	7440-38-2	EPA 200.8	Dissolved	2	1.2	pH<2.0 with NO3	6 Months
Arsenic	7440-38-2	EPA 200.8	Total	2	1.2	pH<2.0 with NO3	6 Months
Cadmium	7440-43-9	EPA 200.8	Dissolved	1	1	pH<2.0 with NO3	6 Months
Cadmium	7440-43-9	EPA 200.8	Total	1	1	pH<2.0 with NO3	6 Months
Calcium	7440-70-2	EPA 200.7	Total	20	40	pH<2.0 with NO3	6 Months
Chromium	7440-47-3	EPA 200.8	Dissolved	3	1.2	pH<2.0 with NO3	6 Months
Chromium	7440-47-3	EPA 200.8	Total	3	1.2	pH<2.0 with NO3	6 Months
Copper	7440-50-8	EPA 200.8	Dissolved	2	1	pH<2.0 with NO3	6 Months
Copper	7440-50-8	EPA 200.8	Total	2	1	pH<2.0 with NO3	6 Months
Hardness	E-11778	EPA 130.1	Total	.4 mg/L	1 mg/l	pH<2.0 with NO3	6 Months
Iron	7439-89-6	EPA 200.7	Dissolved	20	8	pH<2.0 with NO3	6 Months
Iron	7439-89-6	EPA 200.7	Total	20	20	pH<2.0 with NO3	6 Months
Lead	7439-92-1	EPA 200.8	Dissolved	2	1	pH<2.0 with NO3	6 Months
Lead	7439-92-1	EPA 200.8	Total	2	1	pH<2.0 with NO3	6 Months
Magnesium	7439-95-4	EPA 200.7	Total	95	100	pH<2.0 with NO3	6 Months
Manganese	7439-96-5	EPA 200.8	Dissolved	0.5	1	pH<2.0 with NO3	6 Months
Manganese	7439-96-5	EPA 200.8	Total	0.5	1	pH<2.0 with NO3	6 Months
Nickel	7440-02-0	EPA 200.8	Dissolved	1	1.4	pH<2.0 with NO3	6 Months
Nickel	7440-02-0	EPA 200.8	Total	1.5	1.4	pH<2.0 with NO3	6 Months
Zinc	7440-66-6	EPA 200.7	Dissolved	6	3	pH<2.0 with NO3	6 Months
Zinc	7440-66-6	EPA 200.7	Total	6	6	pH<2.0 with NO3	6 Months

## 6. Specify Tolerable Limits on Decision Errors

The QA/QC process detects deficiencies in the data collection process as set forth in the Watershed Assessment and Planning Branch (WAPB) QAPP (IDEM 2004) for the Indiana surface water quality monitoring program. Chemists within the WAPB will review the laboratory analytical results according to the WAPB QAPP in order to identify any deficiencies in the data. Any data which are “Rejected” due to analytical problems or errors will not be used for water quality assessment decisions. Any data flagged as “Estimated” will be evaluated for use on a case-by-case basis.

Criteria for acceptance or rejection of results as well as application of data quality flags is presented in the QAPP on pp 130-131.

## **7. Optimize the Design for Obtaining Data**

Sampling locations in this project have been selected based on sites that were sampled previously and are specifically targeted for testing. Sampling locations are located at bridge crossings on the appropriate AU to allow for more efficient collection of the samples.

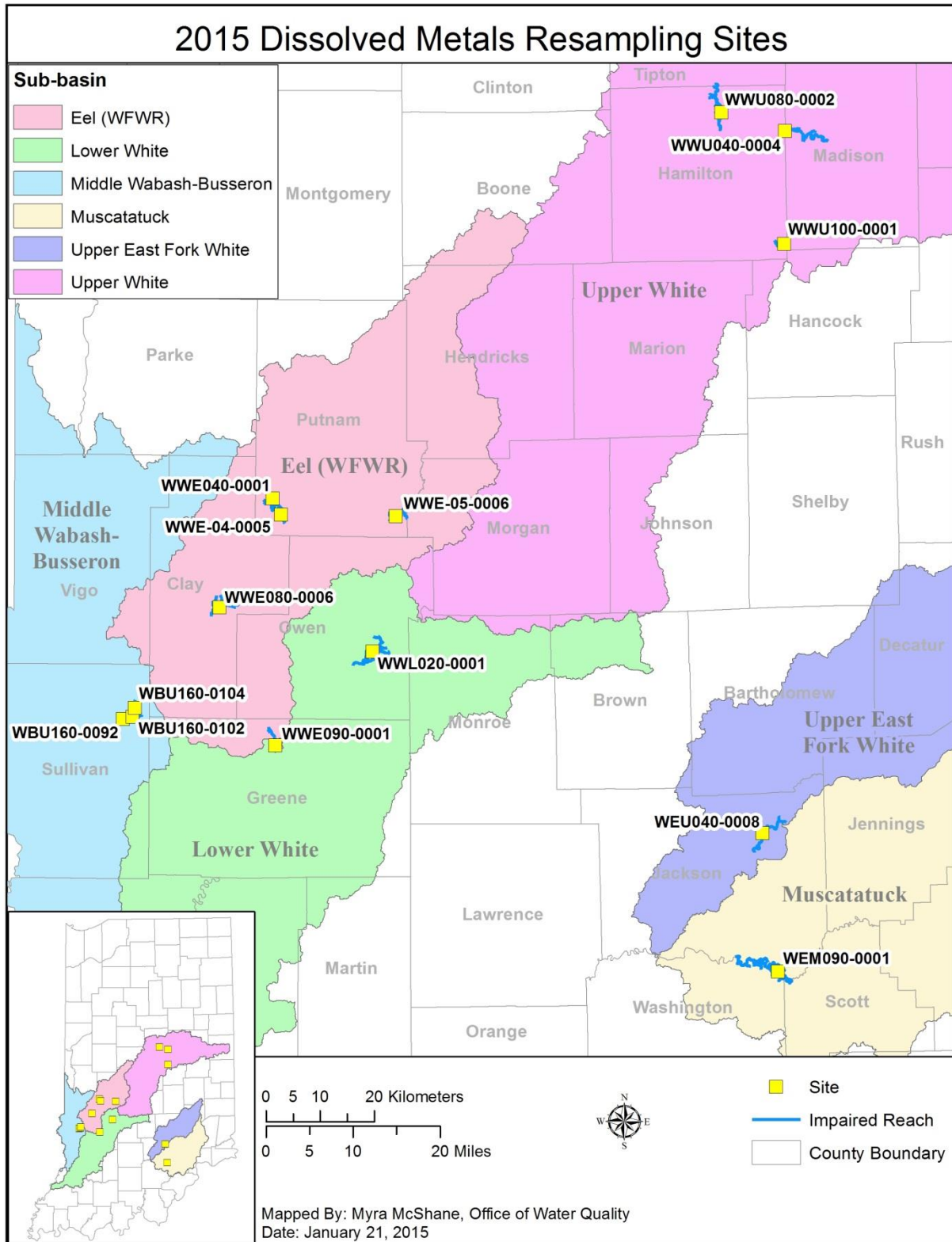
Indiana's 2014 CALM requires at least 3 samples in order to complete an assessment for dissolved metals. Sampling will continue monthly until at least 3 samples have been collected at each sampling site.

## **Training and Staffing Requirements:**

Staff from the Targeted Monitoring Section who will be conducting the field sampling activities are experienced and have been trained in proper sampling techniques. Sampling protocols will follow standard procedures as outlined in the Water Quality Surveys Section Field Procedure Manual (IDEM 2002 pp. 8-14).

Staff from the Technical and Logistical Services Section will assist with laboratory work requests and review laboratory data for adherence to QA/QC requirements specified in analytical test methods, contract requirements, and the WAPB QAPP as well as importing electronic data into the WAPB Assessment Information Management System (AIMSII) database. The Quality Assurance Officer (QAO) will create QA/QC review reports for each laboratory analysis set. Quality Assurance staff will conduct audits of field sampling procedures utilized by WAPB staff to ensure compliance with approved SOPs. Monitoring staff will oversee the entry of the field and laboratory data into AIMSII and perform data QA/QC for accuracy and completeness.

Figure 1. 2015 Dissolved Metals Project Sampling Area



## ***II. Measurement/Data Acquisition***

### **Sampling Process Design/ Methods, Sample Handling and Custody**

#### **Sampling Sites/Sampling Design:**

The site locations proposed in this Project have been selected because they were previously sampled for total metals, and based on those results, placed on the 303(d) List for Impaired Waters by EPA. IDEM will collect dissolved metals samples to reassess them.

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 Site Reconnaissance Form (Attachment 1) and entered into the AIMS II database. Final 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 (GPS), with an accuracy of one to three meters. These coordinates will be entered into the AIMS II database.

Table 2 provides a list of the selected sampling sites with the stream name, AIMS Site Number, County Name, and the latitude and longitude of each site. The map at Figure 1, paired with that table, provides an overview of the various sampling site locations.

### **Sampling Methods and Sample Handling**

#### **Water Chemistry**

One staff will collect grab water chemistry samples and record physical site observations on the stream sampling field data sheet (Attachment 2), during monthly sampling events. There will be a minimum of 4 weeks between consecutive monthly samples. All water chemistry sampling procedures will adhere to the Water Quality Surveys Section Field Procedure Manual Section 2.0 (Field Procedure Manual) (IDEM 2002, pp. 8-14).

#### **Field Parameter Measurements**

The field parameters DO, % Saturation, Temperature, pH, Conductivity, and Turbidity will be measured with a datasonde during each sampling event. Measurement procedures and operation of the datasonde shall be performed according to the manufacturers' manuals (Hydrolab Corporation 2002; YSI 2002) and Sections 2.10–2.13 of the Field Procedure Manual (IDEM 2002, pp. 67-79). 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. All field parameter measurements will be recorded on the IDEM Stream Sampling Field Data Sheet (Attachment 2).

### **Analytical Methods:**

#### **General Chemistry Parameters Measurements:**

The general chemistry parameter hardness will be analyzed at the ISDH Environmental Lab in accordance with pre-approved test methods and allotted time frames. Hardness and its respective test method and quantification limits are identified in Table 3. A chain-of-custody form created by the AIMS II database (Attachment 3) and a sample analysis request form (Attachment 4) will accompany each sample set that is submitted to the lab.



### Field Parameters Measurements:

The field measurements of DO, % Saturation, Temperature, pH, Conductivity, and Turbidity will be collected each time a sample is collected. The field parameters and their respective test methods and sensitivity limits are identified in Table 4.

During each sampling run, field observations from each site and ambient weather conditions at the time of sampling will be noted and documented on stream sampling field data sheets (Attachment 2). Digital photos up-stream and down-stream of the sampling site will be taken, logged, and documented for later references.

Table 4. Field Parameters Test Methods

Parameter	Method	Sensitivity Limit	Units
Dissolved Oxygen (Datasonde optical)	ASTM D888-09(C)	0.01	mg/L
Dissolved Oxygen (Winkler Titration)	SM 4500-OC <sup>1</sup>	0.2	mg/L
Dissolved Oxygen % Saturation (Datasonde optical)	ASTM D888-09(C)	0.01	%
Turbidity (Datasonde)	SM2130B	0.02	NTU
Turbidity (Hach Turbidimeter)	EPA 180.1 <sup>1</sup>	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) <sup>1</sup>	0.1	° C
pH (Datasonde)	EPA 150.2	0.01	SU
pH (field meter)	SM 4500-HB <sup>1</sup>	0.01	SU

<sup>1</sup> Method used for Field Calibration Verification

## Quality Control and Custody Requirements:

Quality assurance protocols will follow part B5 of the WAPB QAPP (IDEM 2004 pg. 119).

### Field Instrument Testing and Calibrations:

The Datasonde will be calibrated immediately prior to each week's sampling (IDEM 2002). Calibration results and drift values will be recorded and stored 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 (Hydrolab Corporation 2002; YSI 2002). The DO component of the calibration procedure will be conducted using the air calibration method (IDEM 2002 pg. 74). The unit will be field checked for accuracy once during the week by comparison with a Winkler DO test (pg. 64), as well as Hach™ turbidity, pH, and temperature meters. Weekly calibration verification results will be recorded on the stream sampling field data sheets (Attachment 2) and entered into the AIMS II database. A Winkler DO test will also be conducted at sites where the DO concentration is 4.0 mg/L or less.

### Field Measurement Data

*In-situ* water chemistry field data will be collected in the field using calibrated or standardized equipment. Calculations may be done in the field or later at the office. Analytical results, which have limited QC

checks, are included in this category. Detection limits have been set for each analysis and are listed in Table 4. Quality control checks (such as duplicate measurements, measurements of a secondary standard, or measurements using a different test method or instrument) which are performed on field or laboratory data are usable for estimating precision, accuracy, and completeness for the project.

## **Water Chemistry Data**

Sample bottles and preservatives used will be certified for purity by the manufacturer. Sample collection for each parameter, preservatives and holding times will adhere to U.S. EPA requirements (USEPA 2007). Field duplicates and matrix spike/matrix spike duplicates (MS/MSD) 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.

## **III. ASSESSMENT/OVERSIGHT:**

Field and laboratory performance and system audits will be performed to ensure good quality data. The field and laboratory performance includes precision measurements by relative percent difference of field and laboratory duplicate, accuracy measurements by percent of recovery of MS/MSD samples analyzed in the laboratory, and completeness measurements by the percent of planned samples that are actually collected, analyzed, reported, and usable for the project.

Field audits will be conducted to ensure that sampling activities adhere to approved SOPs. Audits are systematically conducted by WAPB Quality Assurance staff to include all WAPB personnel that engage in field sampling activities

## **Data Quality Assessment Levels**

The samples and various types of data collected by this program are intended to meet the quality assurance criteria and DQA Levels as described in the WAPB QAPP (IDEM 2004, pp 128-129).

## **IV. DATA VALIDATION AND USABILITY:**

### **Quality Assurance/Data Qualifiers and Flags:**

The various data qualifiers and flags that will be used for quality assurance and validation of the data are found on pages 130-131 of the WAPB QAPP (IDEM 2004).

### **Data Usability:**

The environmental data collected and its usability are qualified and classified into one or more of the four categories: Acceptable Data, Enforcement Capable Results, Estimated Data, and Rejected Data as described on page 130 of the WAPB QAPP (IDEM 2004).

### **Laboratory and Estimated Cost:**

Laboratory analysis and data reporting for this project will comply with the WAPB QAPP (IDEM 2004), Request for Proposals (RFP) 12-48 (IDEM 2012), and the Office of Water Quality Quality Management Plan (IDEM 2012b). Analytical tests on the general chemistry and nutrient parameters outlined in Table 3 will be performed by the ISDH Environmental Lab in Indianapolis, Indiana at no direct cost.

## Reference Manuals and Personnel Safety:

Role	Required Training/Experience	Training References	Training Notes
All Staff that Participate in Field Activities	<p>-Basic First Aid and Cardio-Pulmonary Resuscitation (CPR)</p> <p>-Personal Protective Equipment (PPE) Policy</p> <p>-Personal Flotation Devices (PFD)</p>	<p>-a minimum of 4 hours of in-service training provided by WAPB</p> <p>-IDEM 2008</p> <p>-February 29, 2000 WAPB internal memorandum regarding use of approved PFDs</p>	<p>-Staff lacking 4 hours of in-service training or appropriate certification will be accompanied in the field at all times by WAPB staff that meet Health and Safety Training requirements</p> <p>-Indiana Code [14-8-2-315] requires a high intensity whistle and Safety of Life at Sea certified strobe light when working on co-jurisdictional waters or during hours of darkness</p>
Field Staff Conducting Water Chemistry and/or Bacteriological Sampling	-Follow established policies and procedures as outlined in applicable SOPs.	-IDEM 2002; IDEM 1997; Hydrolab Corporation 2002; YSI 2002	

## REFERENCES:

- Clesceri, L.S., Greenburg, A.E., Eaton, A.D., 1998. SM-Standards Methods for the Examination of Water and Wastewater 20<sup>th</sup> Edition. American Public Health Association.
- Hydrolab Corporation. 2002, revision c. Quanta Water Quality Monitoring System Operating Manual. Loveland, Colorado. Available at [http://www.hachhydromet.com/web/ott\\_hach.nsf/id/pa\\_users\\_manuals\\_e.html](http://www.hachhydromet.com/web/ott_hach.nsf/id/pa_users_manuals_e.html)
- IAC(Indiana Administrative Code), Title 327 Water Pollution Control Division, Article 2. Water Quality Standards. Last updated October 22, 2014. Available at [http://www.in.gov/legislative/iac/iac\\_title?iact=327](http://www.in.gov/legislative/iac/iac_title?iact=327)
- IDEM Internal Memorandum "Use of Personal Flotation Devices (PFDs) by Branch Personnel," dated February 29, 2000. Available on request from the Watershed Assessment and Planning Branch.
- IDEM. 1997. Water Quality Surveys Section Laboratory and Field Hazard Communication Plan Supplement. IDEM 032/02/018/1998, Revised October 1998. Assessment Branch, Indiana Department of Environmental Management, Indianapolis, Indiana
- IDEM. 2002. Water Quality Surveys Section Field Procedure Manual, Assessment Branch, Indiana Department of Environmental Management, Indianapolis, Indiana. IDEM, April 2002. Available on request from the Watershed Assessment and Planning Branch, Office of Water Quality.
- IDEM. 2004. Quality Assurance Project Plan (QAPP) for Indiana Surface Water Quality Monitoring and Total Maximum Daily Load (TMDL) Program, (Rev. 3, Oct. 2004). Assessment Branch, Office of Water Quality, Indiana Department of Environmental Management, Indianapolis, Indiana. Available on request from the Watershed Assessment and Planning Branch, Office of Water Quality.
- IDEM. 2008. IDEM Personal Protective Equipment Policy, revised May 1 2008. A-059-OEA-08-P-R0. Office of External Affairs, Indiana Department of Environmental Management, Indianapolis, Indiana.
- IDEM. 2010. Indiana's 2010 Consolidated Assessment and Listing Methodology (CALM) Revised. Edited by Jody Arthur. Office of Water Quality, Indiana Department of Environmental Management, Indianapolis, Indiana. Available at <http://www.in.gov/idem/nps/3889.htm>
- IDEM. 2010b. IDEM Health and Safety Training Policy, revised October 1 2010. A-030-OEA-10-P-R2. Office of External Affairs, Indiana Department of Environmental Management, Indianapolis, Indiana.


- IDEM. 2010c. IDEM Injury and Illness Resulting from Occupational Exposure Policy, revised October 1 2010. A-034-OEA-10-P-R2. Office of External Affairs, Indiana Department of Environmental Management, Indianapolis, Indiana
- IDEM. 2012. Request for Proposals (RFP) 12-48. Indiana Department of Environmental Management. Office of Water Quality. Indianapolis, IN.
- IDEM. 2012b. IDEM Agency Wide Quality Management Plan. Indiana Department of Environmental Management, Indiana government Center North, 100 N. Senate Ave., Indianapolis, Indiana, 46204. Available at [http://www.in.gov/idem/files/idem\\_qmp\\_2012.pdf](http://www.in.gov/idem/files/idem_qmp_2012.pdf)
- IDEM. 2014. Notice of Comment Period: Indiana Draft 2014 303(d) List of Impaired Waters and Consolidated Assessment and Listing Methodology, Water Quality Assessment Decisions. Pg 21ff. Submitted to U.S. EPA on April 1, 2014. Edited by Jody Arthur. Office of Water Quality, Indiana Department of Environmental Management, Indianapolis, Indiana. Available at [http://www.in.gov/idem/nps/files/ir\\_2014\\_report\\_apndx\\_h\\_calm.pdf](http://www.in.gov/idem/nps/files/ir_2014_report_apndx_h_calm.pdf)
- USEPA, 2000. Guidance for the Data Quality Objectives Process. EPA QA/G-4. EPA/600/R-96/055, August 2000. Report available at <http://www.epa.gov/region6/ga/qadevtools/mod4references/secondaryguidance/g4-final.pdf>
- USEPA. 2007. Code of Federal Regulations (CFR). 40 CFR Part 136, Appendix B Revised March 12, 2007. Available at <http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol24/pdf/CFR-2012-title40-vol24-part136-appB.pdf>
- YSI Incorporated. 2002, revision b. 6-Series Environmental Monitoring Systems Manual, Yellow Springs, Ohio. Available at <http://www.ysi.com/mwg-internal/de5fs23hu73ds/progress?id=fdaTJVUSbg>

## **DISTRIBUTION LIST:**

### **Electronic Distribution Only:**

<b><u>Name</u></b>	<b><u>Organization</u></b>
Cyndi Wagner	IDEM/OWQ/ Watershed Assessment and Planning Branch / Targeted Monitoring Section
Timothy Bowren	IDEM/OWQ/ Watershed Assessment and Planning Branch /Technical and Logistics Section
Chuck Bell	IDEM/OWQ/ Watershed Assessment and Planning Branch /Technical and Logistics Section
Jody Arthur	IDEM/OWQ/ Watershed Assessment and Planning Branch /Technical E7
Marylou Renshaw	IDEM/OWQ/ Watershed Assessment and Planning Branch
Dav Parry or Michael Spinar	IDEM/ Office of Compliance Support/Planning and Assessment/ Quality Improvement Section

## Attachment 1. IDEM Site Reconnaissance Form.

	<b>Site Reconnaissance Form</b>		<b>EPA Site Identifier</b>	<b>Rank</b>
			<b>Recon #:</b> <b>Trip #:</b>	

Site Number:	<input style="width: 90%;" type="text"/>	Stream:	<input style="width: 90%;" type="text"/>	County:	<input style="width: 90%;" type="text"/>
Location Description: <input style="width: 95%;" type="text"/>					

Reconnaissance Data Collected				Landowner/Contact Information		
Recon Date		Crew Members		First Name		Last Name
<input style="width: 90%;" type="text"/>		<input style="width: 90%;" type="text"/>		<input style="width: 90%;" type="text"/>		<input style="width: 90%;" type="text"/>
Avg. Width (m)	Avg. Depth (m)	Max. Depth (m)	Nearest Town			Street Address
<input style="width: 90%;" type="text"/>	<input style="width: 90%;" type="text"/>	<input style="width: 90%;" type="text"/>	<input style="width: 90%;" type="text"/>			<input style="width: 90%;" type="text"/>
Water Present?	Site Wadeable?	Riffle/Run Present?	Road/Public Access Possible?			City
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input style="width: 90%;" type="text"/>
Site Impacted by Livestock?	Collect Sediment?	Gauge Present?		State Zip		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input style="width: 90%;" type="text"/>		
				Telephone		
				<input style="width: 90%;" type="text"/>		
				Pamphlet Distributed?	Please Call in Advance?	Results Requested?
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Rating, Results, Comments, and Planning			
<b>Site Rating By Category (1=easy, 10=difficult)</b>  <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Access Route</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Safety Factor</div> <div style="border: 1px solid black; padding: 2px;">Sampling Effort</div>	<b>Reconnaissance Decision</b>  <div style="border: 1px solid black; padding: 2px;">         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       </div>	<b>Equipment Selected</b>  <div style="border: 1px solid black; height: 100px; width: 90%;"></div>	<b>Circle Equipment Needed</b>  <div style="border: 1px solid black; padding: 2px;">         Backpack          Boat          Tote/barge          Longline          Scanoes          Seine          Weighted Handline          Waders          Gill Net       </div>
<b>Comments</b>			
<b>Sketch of Stream &amp; Access Route – Indicate Flow, Direction, Obstacles, &amp; Land Use (Use Back of Page, if Necessary)</b>			

## Attachment 2: Blank Stream Sampling Field Data Sheet

<b>IDEM Stream Sampling Field Data Sheet</b>															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				Sample Collected		Hydrolab #	Water Depth/Gage Ht (ft)	Water Flow (cfs/sec)	Flow Estimated?	Algae?	Aquatic Life?							
		1	2	3	4	Data	Time													
											<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
Sample Taken?		Allquots				Water Flow Type				Water Appearance				Canopy Closed %						
<input type="checkbox"/> Yes <input type="checkbox"/> No; Frozen		<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Riffle	<input type="checkbox"/> Dry	<input type="checkbox"/> Stagnant	<input type="checkbox"/> Clear	<input type="checkbox"/> Green	<input type="checkbox"/> Sheen	<input type="checkbox"/> 0-20% <input type="checkbox"/> 60-80%								
<input type="checkbox"/> No; Stream Dry <input type="checkbox"/> No; Other		<input type="checkbox"/> 6	<input type="checkbox"/> 8	<input type="checkbox"/> 12	<input type="checkbox"/> 24	<input type="checkbox"/> Pool	<input type="checkbox"/> Run	<input type="checkbox"/> Flood	<input type="checkbox"/> Murky	<input type="checkbox"/> Black	<input type="checkbox"/> Other	<input type="checkbox"/> 20-40% <input type="checkbox"/> 80-100%								
<input type="checkbox"/> No; Owner refused Access		<input type="checkbox"/> 48	<input type="checkbox"/> 72	<input type="checkbox"/> All-Flow		<input type="checkbox"/> Glide	<input type="checkbox"/> Eddy	<input type="checkbox"/> Other	<input type="checkbox"/> Brown	<input type="checkbox"/> Gray (Septic/Sewage)			<input type="checkbox"/> 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 (µmhos/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 > 86
		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
Nr Nutrients: H2SO4	1000P 1000mL Plastic, Narrow Mouth
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: 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, Coming Filter
Gly Glyphosate: Thiosulfate	500PF 500mL Plastic, Coming Filter
Hg Mercury(1631): HCl	60P 60mL Plastic
Cr6 Chromium(VI)(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: Sample Analysis Request form.



Indiana Department of Environmental Management  
 Office of Water Quality  
 Watershed Planning and Assessment Branch  
[www.idem.in.gov](http://www.idem.in.gov)

### Water Sample Analysis Request

Project Name: \_\_\_\_\_ Composite ☐ Grab ☒

OWQ Sample Set	1	IDEM Sample Nos.	
Crew Chief		Lab Sample Nos.	
Collection Date		Lab Delivery Date	

Anions and Physical Parameters			
Parameter	Test Method	Total	Dissolved
Alkalinity (as CaCO <sub>3</sub> )	EPA 310.2	<input checked="" type="checkbox"/> **	<input type="checkbox"/>
Total Solids	SM 2540B	<input checked="" type="checkbox"/> **	
Suspended Solids	SM 2540D	<input checked="" type="checkbox"/> **	
Dissolved Solids	SM 2540C		<input checked="" type="checkbox"/> **
Sulfate	EPA 375.2	<input checked="" type="checkbox"/> **	<input type="checkbox"/> **
Chloride	SM 4500CL-E	<input checked="" type="checkbox"/> **	<input type="checkbox"/>
Hardness (as CaCO <sub>3</sub> )	EPA 130.1	<input checked="" type="checkbox"/> **	<input type="checkbox"/>
Fluoride	380-75WE	<input type="checkbox"/> **	<input type="checkbox"/>
Silica (Reactive)	SM 4500-SiD	<input type="checkbox"/> **	<input type="checkbox"/>

Priority Pollutant Metals Water Parameters			
Parameter	Test Method	Total	Dissolved
Antimony	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Arsenic	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Beryllium	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Cadmium	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Chromium (Hex)	SM 3500Cr-D	<input type="checkbox"/>	<input type="checkbox"/>
Chromium (Total)	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Copper	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Lead	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Mercury	EPA 245.1	<input type="checkbox"/>	<input type="checkbox"/>
Nickel	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Selenium	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Silver	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Thallium	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Zinc	200.7	<input type="checkbox"/>	<input type="checkbox"/>

Cations and Secondary Metals Parameters			
Parameter	Test Method	Total	Dissolved
Aluminum	200.7, 200.8	<input type="checkbox"/>	<input type="checkbox"/>
Barium	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Boron	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Calcium	200.7, 200.8	<input checked="" type="checkbox"/> ***	<input type="checkbox"/>
Calcium (as CaCO <sub>3</sub> )	SM 3500Ca-D	<input type="checkbox"/>	<input type="checkbox"/>
Cobalt	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Iron	200.7	<input type="checkbox"/>	<input type="checkbox"/>
Magnesium	200.7, 200.8	<input checked="" type="checkbox"/> ***	<input type="checkbox"/>
Manganese	200.8	<input type="checkbox"/>	<input type="checkbox"/>
Potassium	SM 3500-K-D	<input type="checkbox"/>	<input type="checkbox"/>
Sodium	200.7	<input type="checkbox"/>	<input type="checkbox"/>
Strontium	200.7	<input type="checkbox"/>	<input type="checkbox"/>

Organic Water Parameters		
Parameter	Test Method	Total
Priority Pollutants: Organochlorine Pesticides and PCBs	EPA 608	<input checked="" type="checkbox"/>
Polynuclear Aromatic Hydrocarbons	EPA 610	<input type="checkbox"/>
Priority Pollutants: VOCs - Purgeable Organics	EPA 624	<input type="checkbox"/>
Priority Pollutants: Base/Neutral Extractables	EPA 625	<input type="checkbox"/>
Priority Pollutants: Acid Extractables	EPA 625	<input type="checkbox"/>
Phenolics, 4AAP	EPA 420.4	<input type="checkbox"/>
Oil and Grease, Total	EPA 1664A	<input type="checkbox"/>
Semi-volatile Organics & Pesticides	EPA 525.2	<input type="checkbox"/>

Nutrient & Organic Water Chemistry Parameters			
Parameter	Test Method	Total	Dissolved
Ammonia Nitrogen	EPA 350.1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CBOD <sub>5</sub>	SM 5210B	<input type="checkbox"/>	
CBOD <sub>u</sub>	SM 5210B	<input type="checkbox"/>	
Total Kjeldahl Nitrogen (TKN)	EPA 351.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Nitrate + Nitrite	EPA 353.1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Dissolved Reactive Phosphorus	SM 4500-P	<input type="checkbox"/>	<input type="checkbox"/>
Total Phosphorus	EPA 365.1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
TOC	SM 5310B	<input checked="" type="checkbox"/>	<input type="checkbox"/>
COD (Low Level)	SM 5220D	<input type="checkbox"/>	<input type="checkbox"/>
Cyanide (Total)	EPA 335.4	<input type="checkbox"/>	<input type="checkbox"/>
Cyanide (Free)	SM 4500CN-F	<input type="checkbox"/> *	<input type="checkbox"/>
Cyanide (Amenable)	SM 4500CN-G	<input type="checkbox"/> *	<input type="checkbox"/>

Bacteriological Water Parameters			
Parameter	Test Method	Total	Dissolved
E. coli (Coli-ert Method)	SM 9223B	<input type="checkbox"/>	

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 if Hardness is calculated

Testing Laboratory:  
 Indiana State Department of Health (ISDH)  
 Environmental Laboratory Division  
 550 W. 16th Street  
 Indianapolis, IN 46202  
 Phone: 317-921-5815 (Ray Beebe) (Rev. 6/2013)

Send reports (Fed. Ex. or UPS) to: David Jordan - IDEM  
 Mail Code 65-40-2 (Shadeland)  
 100 N. Senate Ave.  
 Indianapolis, IN 46204-2251

Deliver reports to: David Jordan - IDEM  
 STE 100  
 2525 North Shadeland Ave.  
 Indianapolis, IN 46219  
 DJordan@idem.in.gov