	***Water Chemistry Field Sampling Procedures*** B-015-OWQ-WAP-XXX-20-T-R0 **Technical Standard Operating Procedure (TSOP)** **Office:** Office of Water Quality **Branch:** Watershed Assessment and Planning Branch **Section:** All Sections **Last Revised:** N/A **Revision Cycle:** Every 4 years **Originally Effective:** March 31, 2020

Purpose (of the TSOP)

This technical standard operating procedure (TSOP) outlines surface water chemistry sample collection, sample delivery, and cleanup.

This TSOP should be used by:

This TSOP applies to agency staff in the Office of Water Quality (OWQ), Watershed Assessment and Planning Branch (WAPB) responsible for collecting surface water chemistry samples from rivers and streams as part of IDEM's ambient water quality monitoring program.

Authorizing Signatures

I approve and authorize this technical standard operating procedure:

Todd Davis, Environmental Manager
OWQ WAPB Probabilistic Monitoring Section
Date: 6/11/2020

Tim Beckman, Environmental Manager
OWQ WAPB Targeted Monitoring Section
Date: 6/11/2020

Stacey Sobat, Section Chief
OWQ WAPB Probabilistic Monitoring Section
Date: 6/11/2020

Kristen Arnold, Section Chief
OWQ WAPB Technical and Logistical Services Section
Date: 6/11/2020

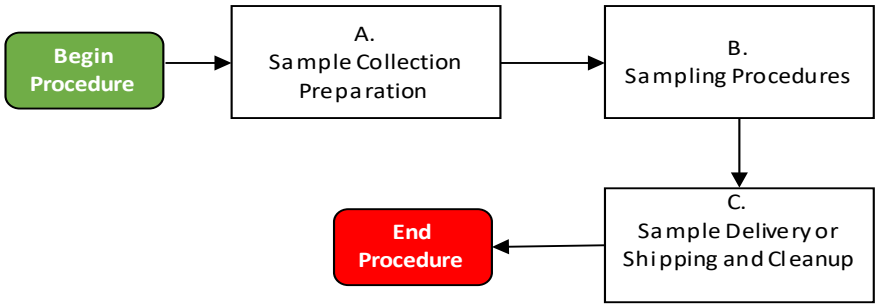
Marylou Renshaw, Branch Chief
OWQ Watershed Assessment and Planning Branch
Date: 6/11/2020

This technical standard operating procedure is consistent with agency requirements.

Quality Assurance Staff
Office of Program Support
Date: 12 Jun 2020

Table of Contents

1.0. Overview Flowchart



2.0. Procedure

2.1. Procedural Flowchart:

Procedural Flowcharts are in Section 2.2, followed by a step-by-step description.

2.2. Procedural Steps:

A. Sample Collection Preparation

Step 1. Schedule a trip in AIMS. (See AIMS II User Guide – Schedule Trips).

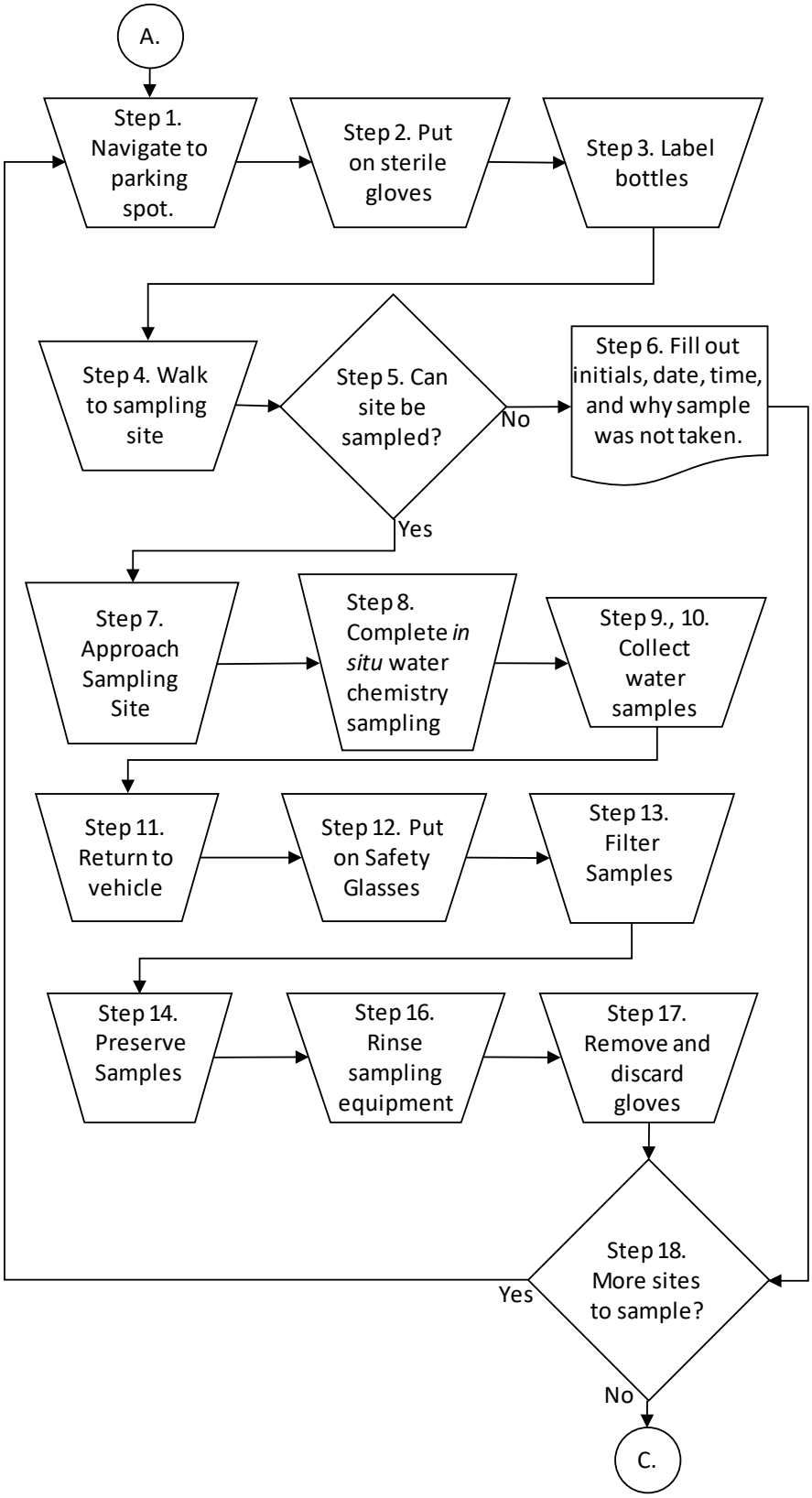
Step 2. Print out field data sheets (Appendices 2 or 3 - fixed station) and OWQ Chain of Custody (CoC) (Appendix 4) form for the trip in AIMS. (See AIMS II User Guide – Printing Data Sheets).

Step 3. Print out Water Sample Analysis Request Form (Appendix 5) and Sample Collection Request From (Appendix 6 - for nonfixed station routes only). Complete and sign the sample collection request form and obtain the required signature of the QA officer and the respective section chief. When complete, scan and save the form to the appropriate shared drive project folder. Deliver the signed Sample Analysis Request Form to the lab with the samples and CoC form.
Templates for sample analysis request forms and collection request forms can be found at this location: S:\IGCN\OWQ\WSP\OWM\FORMS.

Step 4. Reserve a vehicle via the online portal.

Step 5. Gather and load necessary equipment into vehicle (See Appendix 11).

B. Sample Collection



Step 1. Using a combination of aerial maps, topographic maps, smart phone with Google Maps, and a handheld global positioning system (GPS) unit, navigate to the designated parking spot as described on the Site Reconnaissance Form (Appendix 1), or site description for a fixed station.

Step 2. Put on sterile gloves before handling sample bottles.

Step 3. Label sample bottles with Assessment Information Management System (AIMS) sample number, or site ID number for a fixed station using a permanent marker. If necessary, label containers by parameter abbreviation (e.g., Met – Metals, Diss. Met – Dissolved Metals, GC – General Chemistry, Nx – Nutrients, CN – Cyanide, FB – Field Blank, etc.) to save space. Label containers on the cap and bottle, if possible. See Appendix 7 Water Chem Bottle Labels for additional labeling parameters.

Step 4. The crew chief and field crew proceed to the sampling site using the handheld GPS unit, and the Site Reconnaissance Form (Appendix 1), if necessary. The crew must bring the clipboard containing field data sheet(s), backpacks, and any other equipment required to complete the sampling.

Step 5. Determine whether the site can be sampled. In order to be sampled, water must be present and not frozen. If the site can be sampled, proceed to B. Step 7. If the site cannot be sampled (eg. high flow event – See Health and Safety Warnings), proceed to B. Step 6.

Step 6. If the site cannot be sampled, on the Stream Sampling Field Data Sheet (Appendix 2) fill out the “Sample Collectors”, “Date”, and “Time”, and check the appropriate “No,…” box under “Sample Taken?”; or on the Fixed Station Route Field Data Sheet (Appendix 3), fill in the “Date” and “Time” on the corresponding site ID row. Proceed to B. Step 18.

Note: The southwest and northwest corners of Indiana are in the Central time zone. When collecting samples in this time zone, please remember to document the time using the Eastern Time zone equivalent. Please record the time in military format, hh:mm, when a.m. and p.m. options are not available on forms.

Step 7. If sampling in stream, approach the collection spot site by entering downstream of the actual sampling point, to prevent excessive stream bed sediments in the sample. Perform B. Step

10. If sampling from a bridge, approach the downstream side of the bridge and perform B. Step 9.

Step 8. If the site can be sampled, deploy a multiparameter data sonde in the water at the site. The sensors of the data sonde should be submerged. Read the parameter values (DO, %sat, conductivity, water temp, and pH) from the handheld display, after the readings have stabilized. Record the *in*-situ water chemistry parameters and the information on the appropriate sheet (Stream Sampling Field Data Sheet or Fixed Station Route Field Data Sheet). See the manufacturer's manual for data sonde operating instructions (Xylem 2018, Xylem 2017). In addition to data sonde readings, a water sample is collected for turbidity in a turbidimeter vial. Measure the turbidity with the HACH turbidimeter 2100P (see Appendix 10). Finally, fill in the weather codes, and record the time and date.

Step 9. Collect Water Samples from a Bridge

a. Attach rope to sampling device.

b. Insert collection bottle(s) into sampling device (See Figure 1).

Figure 1. Bridge Sampling Device

c. Remove caps from the bottles and place caps in a Ziploc bag. Secure the bag.

d. Retrieve sample from downstream side of bridge just below the surface.

e. Replace sampling bottle caps and remove bottles. Place full bottles in carrying tote.

f. Insert remaining sample collection bottles into sampling device.

g. Repeat B. Step 9. b. through g. until all samples have been collected and proceed to B. Step 11.

Step 10. Collect Water Samples in Stream.

a. Remove the bottle caps and place in a Ziploc bag or immerse the caps in ambient water while filling bottles by hand.

b. While facing upstream, first rinse sample bottles by inserting the bottles directly into the stream just below the surface. Then, collect the water sample by inserting the bottles directly into the stream just below the surface making sure to fill the bottles up to one inch below the opening. Use of a pole sampling device (See Figure 2.) may be required depending on the flow rate and depth of the water. If required, dip the end of the pole in the water to be sampled to rinse it before adding a sample bottle.

Figure 2. Pole Sampling Device

c. Replace the sample bottles caps. Place full bottles in a carrying tote.

d. Repeat B. Steps 10. a. through d. until all bottles are filled.

Step 11. Return to vehicle with sample bottles and all equipment taken to the sampling site.

Step 12. Put on safety glasses and a new pair of gloves.

Step 13. Filter samples, if necessary. Testing parameters requiring filtration include dissolved metals, dissolved reactive phosphorus, and dissolved organic carbon.

a. Retrieve a 0.45 µm capsule filter and a 2-foot section of tubing.

b. Feed tubing through a peristaltic pump. One end of the tubing should go in the sacrificial bottle containing sample and the output end will eventually go into a new, unused, and labeled bottle.

c. Turn on pump. Pump approximately the first 25 mL of sample on the ground, due to possible particulates from the filter. Then, quickly place the output end of the tubing into the new, unused bottle and fill until nearly full.

d. Immediately preserve filtered sample, if necessary (see B. Step 14.)

e. Discard the used capsule filter and tubing section in an appropriate container.

f. Repeat B. Step 13 a. through B. Step 13 f. if more samples require filtering.

Step 14. Preserve all samples according to the sample preservation requirements (see Table 1.) and properly dispose of preservative vials. Preservative vials usually contain enough preservative for a 1 L sample container. However, if a water sample is very high in suspended solids or other conditions exist, add more preservative to bring the pH <2 for nutrient and metals preservation.
Note: Fresh gloves should be worn at all times when handling samples or sampling equipment. Rinse outside of bottles with deionized water and place bottles in a cooler on ice for the duration of sampling and transportation.

Table 1. Sample Preservation Requirements

Sample Type	**Preservation Required**
General Chemistry (G.C.)	Ice only or dry ice for dissolved reactive phosphorus
Nutrient (Nx)	Preserve with 2 mL of 50% sulfuric acid
Metals (Met)	Preserve with 5 mL of conc. nitric acid
Cyanide (CN)	Preserve with sodium hydroxide crystals or 2 mL of 10 N NaOH

Note: One field calibration check is needed per scheduled trip to check the validity of the multiparameter data sonde results. It is usually done at the same time as B. Step 14.

Step 15. Performing Field Calibration Check and Recording Data on Stream Sampling Field Data Sheet:

a. Take a D.O. reading with field dissolved oxygen meter (see appendix 8.) and record D.O. result in Field Calibrations section on Field Sheet

b. Take pH and temperature measurements of water collected at the site with a combination pH and temperature meter (see appendix 9.) and record readings in Field Calibrations section on Field Sheet.

c. Take a turbidity reading (see appendix 10.) using a predetermined standard and record the result in Field Calibrations section on Field Sheet.

Step 16. Rinse sampling equipment with deionized water, including sampling device and rope, if also immersed during sample collection.

Step 17. Remove and discard gloves.

Step 18. If more sites are available to sample and time allows, locate next site and repeat B. Steps 1. through B. Step 18. If no more sites or time are available, proceed to C.

C. Sample Delivery, Shipping, and Cleanup

Step 1. Deliver or ship samples to lab? If delivering samples to the lab proceed to C. Step 2. If shipping samples to lab proceed to C. Step 9.

Step 2. Will the samples be delivered to the Indiana State Department of Health (ISDH) lab? If yes, proceed to C. Step 3. If no, proceed to C. Step 9.

Step 3. Retrieve flat cart from ISDH Central Accessioning room and load sampler coolers from vehicle onto cart. Bring cart with sample coolers into Central Accessioning room.

Step 4. Unload samples onto countertop ensuring all are labeled properly.

a. Put on gloves before handling sample containers.

b. Setup the containers from left to right starting with the number at the top of the chain of custody and proceeding down the list.

c. Keep containers of the same sample type (e.g., metals, nutrients, pesticides) in the same row. Each sample type is placed in a different row.

Step 5. Allow the receiving agent time to verify the containers' labels match list on the IDEM OWQ CoC form (Appendix 4) in addition to checking the CoC form for other issues.

Note: If any corrections to the CoC form are made, a line is used to cross out errors followed by the initials of the sample collector and the current date. An explanation may be needed as to why something was crossed out. (e.g., Frozen – sample not collected).

Step 6. Ensure all field sheets and CoC forms are properly completed.

Step 7. Sign samples over to the receiver on the CoC form. Ensure your name is printed legibly in an appropriate spot on the CoC form. In addition to the CoC form, give the Water Sample Analysis Request Form to the receiving agent at this time. Proceed to C. Step 9.

Step 8. Secure a photocopy of the signed CoC form.

Step 9. Return to station.

Step 10. Upon arrival to the office:

a. Unload all equipment from vehicle.

b. Remove all trash from vehicle and clean the interior.

c. Wipe down the interior with a damp cloth, if it is dusty or dirty.

d. Wash all equipment and allow to air dry. Empty and clean all used coolers immediately upon return.

e. Place clean and dried sampling rope into Ziploc bags and put other clean equipment back on its respective equipment room shelf.

f. Report any equipment or vehicle problems to supervisor and to person in charge of that specific equipment.

Step 11. When packaging samples for delivery:

a. Make sure breakable containers are wrapped appropriately in bubble wrap.

b. Containers should be sealed so liquid does not get in or out.

c. There should be enough ice packs to keep all samples cooled to <6°C.

d. Make sure the CoC and request for analysis forms are sent with the samples.

2.3. Related Technical Issues:

A. Health and Safety Warnings:

- Safety issues are the responsibility of all crew members. However, any questions in the field should be directed to the crew chief. The crew chief is responsible for the completion of all work listed in the TSOP, the health and safety aspects of the sampling event, and successful interactions with landowners and members of the public.
    - Sampling will be postponed or cancelled, if the stream flow is dangerous for staff to get a sample from the center of the stream, any hazardous weather condition exists, or unexpected physical barriers prevent access to the site. Flow is considered dangerous at flood stages, so staff will use best professional judgement following or during a high water event.
- All field staff are required to complete Basic First Aid and Cardio-Pulmonary Resuscitation (CPR) training.
    - Being around surface water increases some risks including drowning and electric shock. Therefore, CPR is vital in case a crew member stops breathing.
- According to the memorandum “Change in status of Water Assessment Branch staff in accordance with the Agency training policy”, dated November 29, 2010, OWQ Watershed Assessment

and Planning Branch staff are exempt from initial and annual training requirements set forth in Section 6.0 of the IDEM Health and Safety Training Policy (IDEM 2010). The memorandum also states “as an alternative to the training requirements of the policy, the Branch will conduct in-service training at a minimum of four (4) hours per year on topics directly related to duties performed by staff.” New hires or those changing job responsibilities without the minimum four hour training must be accompanied in the field by a staff member who has met the requirements of the branch health and safety training.

- Sampling on surface waters requires safety consciousness of staff members and the use of specialized equipment such as life vests to prevent drowning and waders enabling the wearer to stay to dry. Thus, staff will comply with the IDEM Personal Protective Equipment (PPE) Policy (IDEM 2008). If an injury or illness arises in the field, staff will follow the IDEM Injury and/or Illness Resulting from Occupational Exposure Policy (IDEM 2016).

B. Cautions:
   - Some of the chemical analytes for which testing is performed have short holding times (e.g., dissolved reactive phosphorus) and should be delivered to the laboratory quickly in order to provide plenty of time for analysis.
   - Be cognizant of the % battery life left on the multiparameter data sondes’ handheld displays.

C. Interferences:
   - Most samples should arrive at the lab at or below 6 °C unless warmer samples are delivered within an hour or two of collection time. Ensure there is enough ice surrounding all bottles to cool the samples if required.

D. Calibration:
   - For information regarding the calibration of the YSI multi-parameter data sondes please refer to the Calibration of YSI Multi-parameter Data Sondes B-014-OWQ-WAP-XXX-19-T-R0 TSOP.
   - Collecting Field Calibration Verification Data: See 2.2B Step 13.

E. Troubleshooting:
   - For information regarding troubleshooting the YSI multi-parameter data sondes please refer to the Calibration of YSI Multi-parameter Data Sondes B-014-OWQ-WAP-XXX-19-T-R0 TSOP.

3.0. Roles

3.1. Responsibilities

A. Survey crew chief
   1. Preparing for sample collection
   2. Collecting field water samples for chemical analysis
   3. Successful interactions with landowners and members of the public.
   4. Cleanup, paperwork, data entry into AIMS II database, and sample delivery or shipping

B. Field crew.
   1. Operating data sonde
   2. Recording data
   3. Filtering samples

3.2. Training requirements:

A. Training on this TSOP
   1. Survey crew chief
   2. Field crew

B. Safety Training – four hours per year
   1. Survey crew chief
   2. Field crew

4.0. List forms, equipment, and/or software to be used

4.1. Forms

A. Site Reconnaissance Form
B. Stream Sampling Field Data Sheet
C. Fixed Station Route Field Data Sheet
D. OWQ Chain of Custody Form
E. Water Collection Request Form (nonfixed station routes)
F. Water Sample Analysis Request Form
G. Water Chemistry Bottle Labels Guide (nonfixed station samples)
H. Operation of Oakton pH 6 Acorn Series Meter
I. Use of Hach Portable Turbidimeter

4.2. Equipment

See Appendix 11.

4.3. Software

A. AIMS II database

5.0. Records Management

Note: Records listed below are stored in either AIMS II database or the Virtual File Cabinet. Please see the AIMS II User Guide and Virtual File Cabinet guide for more information on uploading and indexing.

5.1. Site Reconnaissance Form

A. The original hard copy is kept in the site folder identified by site name.
B. Information recorded on the Site Reconnaissance Form is scanned and uploaded into the AIMS database as a .pdf attachment.
C. The original hard copy is retained until it is scanned and uploaded to AIMS. Note: Older site reconnaissance may be found in the Virtual File Cabinet (VFC).

5.2. Stream Sampling Field Data Sheet

A. The original hard copy is kept in the site folder, and stored in a file cabinet at the IDEM Shadeland office.
B. Information recorded on the Stream Sampling Field Data Sheet is entered into the AIMS database.
C. The original hard copy is retained until it is scanned and uploaded to AIMS or VFC.

5.3. Fixed Station Route Data Sheet

A. The original hard copy is kept in the site folder and stored in a file cabinet at the IDEM Shadeland office.
B. Information recorded on the Fixed Station Route Data Sheet is entered into the AIMS database.
C. The Fixed Station Route Data Sheets are scanned and stored as attachments in AIMS.
D. The original hard copy is retained until it is scanned and uploaded to AIMS or VFC.

5.4. Chain of Custody Form

A. Original hard copies are kept in the site folder and stored in a file cabinet at the IDEM Shadeland office.
B. The CoC forms are scanned and stored as attachments in AIMS.
C. Original hard copies are retained until scanned and uploaded to VFC.

5.5. Sample Collection Request Form
   A. Original hard copies are retained in site folder until scanned and uploaded to VFC.

5.6. AIMS Database
   A. http://aims.idem.in.gov/AIMS/Pages/Login/

6.0. Definitions

6.1. "AA or AB number" – A number assigned to each individual watershed sampling event conducted by Indiana Department of Environmental Management (IDEM) field crews. This number is used to identify the sampling event in the Assessment Information Management System (AIMS) database.

6.2. "Ambient" – Surrounding environmental conditions.

6.3. "Assessment Information Management System database (AIMS database)" – IDEM database containing information related to water chemistry; aquatic habitat; macroinvertebrate, fish, and algae communities; fish tissue analyses; sediments; and *E. coli* bacteria data collected by agency staff from watershed sampling events.

6.4. "Carboy" – A large container, generally of five gallon capacity, used to store water.

6.5. "Deionized water" – Water that has had its mineral ions removed.

6.6. "Indiana Department of Environmental Management (IDEM)" – An agency of Indiana State Government whose mission is to implement federal and state regulations to protect human health and the environment while allowing the environmentally sound operations of industrial, agricultural, commercial, and government activities vital to a prosperous economy.

6.7. "Indiana State Department of Health (ISDH)" – An agency of Indiana State Government responsible for the analysis of the environmental sample.

6.8. "Safety Data Sheet (SDS)" – A sheet containing data regarding the properties of a particular substance or product. It is intended to provide workers and emergency personnel with procedures for handling or working with that substance or product in a safe manner.

6.9. **"**Site Folder" – A folder for a specific site that contains all pertinent paperwork concerning the site. Site reconnaissance forms, field data sheets, chain of custody forms, etc. are all stored in this folder which is located in a file cabinet in the WAPB library at the IDEM Shadeland office.

6.10. "Technical standard operating procedure (TSOP)" – A standard operating procedure that involves environmental data generation, manipulation, or compilation of an analytical process.

7.0. Quality Assurance / Quality Control

7.1. A field blank should be collected for each sample event. The AIMS database automatically assigns field blanks for each scheduled project.

A. A trip blank may be collected in the Surveys laboratory prior to the sample event using ultrapure water.

B. The field blank serves both as a trip blank and preservative blank. It is usually collected at one of the first sampling sites. A carboy filled with ultrapure water is used to fill the field blank container, and it is preserved accordingly.

C. A trip blank indicates whether contamination was introduced into the samples during handling and transport.

D. A preservative blank indicates whether contamination was introduced into the samples by the preservative.

7.2. A field duplicate is collected at a minimum rate of one duplicate for every twenty samples collected. The AIMS database automatically assigns field duplicates for each scheduled project and at the frequency designated by the project leader.

A. All original and duplicate samples should be collected at the same time and side by side if possible for each parameter to be tested.

7.3. A Matrix Spike/Matrix Spike Duplicate (MS/MSD) sample is collected for lab analysis at the same frequency as the field duplicate and should follow the duplicate sampling protocol, if more than one sample bottle is collected for a parameter.

A. For some sampling projects, a MS/MSD is not designated on the CoC. In this case, the laboratory will pick a sample for MS/MSD for each analysis based on their own criteria.

7.4. Data is manually entered from the stream sampling field data sheets and the fixed station route datasheets into the AIMS II database. This data

goes through at least two rounds of QC checks for accuracy by different people. After each check, the person initials and dates the form in the appropriate place. If errors are found on the QC 2 check, a third round of QC check is needed and so on.

8.0. References

8.1 IC 14-8-2-27. Boundary Waters

8.2 IDEM. 2008. Personal Protective Equipment Policy, A-059-OEA-08-P-R0, May 1 2008. Indiana Department of Environmental Management, Office of External Affairs, Indianapolis, Indiana. Web address as of February 13, 2017: https://extranet.idem.in.gov/standards/docs/policies/oea/Personal_Protective_Equipment_Policy.pdf

8.3 IDEM. 2010. Health and Safety Training Policy, A-030-OEA-10-P-R2, revised October, 1 2010. Indiana Department of Environmental Management, Office of External Affairs, Indianapolis, Indiana. Web address as of February 13, 2017: https://extranet.idem.in.gov/standards/docs/policies/oea/A-30-OEA-10-P-R2.pdf

8.4 IDEM. 2016. Injury and/or Illness Resulting from Occupational Exposure Policy, A-034-AW-16-P-R3, revised February 12, 2016. Indiana Department of Environmental Management, Office of External Affairs, Indianapolis, Indiana. Web address as of February 13, 2017: https://extranet.idem.in.gov/standards/docs/policies/aw/A-034-AW-16-P-R3.pdf

8.5 IDEM. 2002. Water Quality Surveys Section Field Procedure Manual. IDEM 32/02/055/2002. Surveys Section, Assessment Branch, Office of Water Quality, Indiana Department of Environmental Management, Indianapolis, Indiana.

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

8.7 IDEM. 2020. Calibration of YSI Multiparameter Data Sondes, B-014-OWQ-WAP-XXX-20-T-R0, effective January 31, 2020. Indiana Department of Environmental Management, Office of Water Quality, Indianapolis, Indiana.

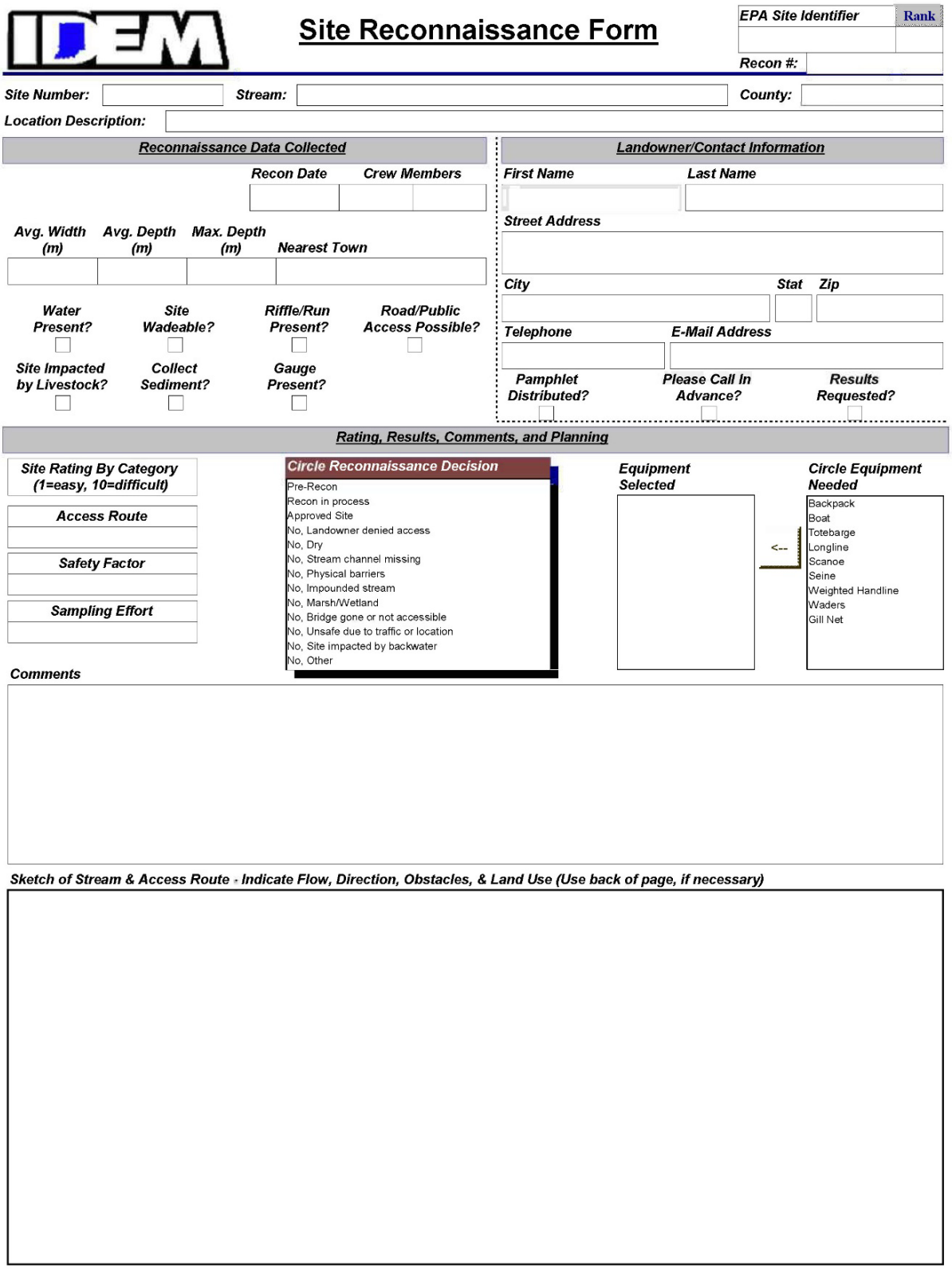
8.8 YSI ProDSS User Manual English, ITEM# 626973-01REF, Revision F, Xylem, August 2018.

8.9 ProDSS Calibration Guide, W89, Xylem, January 2017.

8.10 EXO Handheld Operation Guide, E117 Mini-Manual Revision A, Xylem, July 2016.

9.0. Appendices

Appendix 1 Blank Site Reconnaissance Form



IDEM

Site Reconnaissance Form

EPA Site Identifier | Rank

Recon #:

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 | Stat | 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

Circle 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)

Appendix 2 Blank Stream Sampling Field Data Sheet

IDEM 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 (cfs/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 ☐ All-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
CrS	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

Appendix 3 Example Fixed Station Route Field Data Sheet

West Route Field Data - January 2017

Collector: David Arnold **Analysis Set:** 17FSW009

ID	Sample #	FSite	Site	Date	Time	DO	% Sat	pH	Temp	Cond	Turb	Weather
76	AB27831	SC-57	WSU020-0003	01/04/2017	10:10 AM	10.85	83.3	8.24	4.03	600	46	3021
77	AB27832	WB-303	WLV030-0003	01/04/2017	11:30 AM	12.12	87.8	8.32	1.95	645	40	32731
78	AB27833	PC-21	WLV040-0003	01/04/2017	11:50 AM	11.84	86.9	8.11	2.51	358	59	32731
79	AB27834	WB-284	WLV080-0003	01/04/2017	12:10 PM	12.25	88	8.36	1.65	651	47	32741
80	AB27835	SC-39	WSU050-0002	01/04/2017	01:00 PM	12.08	89.8	8.34	2.95	606	92	3031
81	AB27836	RC-46	WLV160-0001	01/04/2017	01:45 PM	12.24	91.2	8.43	3.04	562	82	32721
82	AB27837	SC-25	WSU050-0005	01/04/2017	02:10 PM	12.35	91.8	8.43	2.98	598	109	32721
83	AB27838	WB-256	WLV140-0001	01/04/2017	02:30 PM	12.48	90.8	8.41	2.15	636	43	32741
84	AB27839	V-0.8	WVE100-0001	01/04/2017	02:45 PM	12.71	93.7	8.54	2.61	663	34	32731
85	AB27840	SC-2	WSU060-0004	01/05/2017	02:15 PM	11.26	85.1	8.11	2.1	530	51	42721
86	AB27841	WB-240	WLV-16-0001	01/05/2017	02:30 PM	12.51	90.6	8.21	1	561	155	42741
87	AB27842	RC-5	WLV190-0012	01/05/2017	01:45 PM	13.45	92.4	8.48	0	548	48	42911
87D	AB27848	RC-5	WLV190-0012	01/05/2017	01:45 PM							92711
88	AB27843	WB-230	WLV200-0001	01/05/2017	01:15 PM	12.46	89.2	8.45	1.54	631	57	92711
89	AB27844	WB-172	WBU-13-0001	01/05/2017	11:50 AM	12.41	90	8.38	2.03	630	46	92741
90	AB27845	EEL-38	WWE080-0001	01/05/2017	10:50 AM	12.08	94.5	8.42	2.23	517	34	42721
91	AB27846	BWC-4	WWE040-0001	01/05/2017	10:15 AM	13.4	104	8.32	4.51	350	33	42711
92B	AB27847	BLANK	BLANK	01/05/2017	01:15 PM							12711

Field Calibrations:

Sample #	Type	Meter #	Value	Units
AB27831	DO		12.0	mg/L
AB27831	TUR	2	505.0	NTU
AB27831	Temp	39	2.6	°C
AB27831	pH	39	8.5	SU

Calibration Type
pH
DO
Turbidity

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		

Preservatives/Bottle Lots:

Group: Preservative	Preservative Lot #	Bottle Lot #
GC: Ice	N/A	319-1000
Nx: H2SO4	SA-4349040	319-1000
Metals: HNO3	NA-5159180	319-1000

Groups: Preservatives

GC	General Chemistry: Ice
Nx	Nutrients: H2SO4
Metals	Metals: HNO3
CN	Cyanide: NaOH
O&G	Oil & Grease: H2SO4
Toxics	Toxics: Ice
Ecoli	Bacteriology: Ice
VOA	Volatile Organics: HCl & Thiosulfate
Pest	Pesticides: Ice
Phen	Phenols: H2SO4
Sed	Sediment: Ice
Gly	Glyphosate: Thiosulfate
Hg	Mercury(1631): HCl
Cr6	ChromiumVI(1636): NaOH
MeHg	Methyl Mercury(1630): HCl

Data Entered By: _____ QC1: _____
QC2: _____

12/4/2017 15:20:38 PM Fixed Station Route Datasheet, Page 1 of 3

Appendix 4 Blank 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

Appendix 5 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: 2019 Probabilistic Monitoring **Composite ☐ Grab ☒**

OWQ Sample Set	19WQW	IDEM Sample Nos.	
Crew Chief	Todd Davis	Lab Sample Nos.	
Collection Date	Jun. 25, 2019	Lab Delivery Date	

Anions and Physical Parameters			
Parameter	Test Method	Total	Dissolved
Alkalinity	310.2	☒ **	☐
Total Solids	SM2540B	☒ **	
Suspended Solids	SM2540D	☒ **	
Dissolved Solids	SM2540C		☒ **
Sulfate	300.0	☐ **	☒ **
Chloride	300.0	☐ **	☒
Hardness (Calculated)	SM-2340B	☒ **	☐
Fluoride	SM4500-F-C	☐ **	☐

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	☐	☐

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	420.4	☐
Oil and Grease, Total	1664A	☐

Nutrient & Organic Water Chemistry Parameters			
Parameter	Test Method	Total	Dissolved
Ammonia Nitrogen	SM4500NH3-G	☒	☐
CBODs	SM5210B	☐	
Total Kjeldahl Nitrogen (TKN)	SM4500N(Org)	☒	☐
Nitrate + Nitrite	353.2	☒	☐
Total Phosphorus	365.1	☒	☐
TOC	SM 5310C	☒	☐
COD	410.4	☒	☐
Cyanide (Total)	335.4	☒	☐
Cyanide (Free)	SM4500CN-I	☒ *	☐
Cyanide (Amenable)	SM4500CN-G	☐ *	☐
Sulfide, Total	376.2	☐	☐

RFP 16-74 Contract Number:	018620 (Pace-Indy) PO # 0020000887-4 (Pace-Indy)

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*

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

Testing Laboratory:
Phone: 317-228-3136

Pace Analytical Services, Inc.
Attn: Sue Brotherton
7726 Moller Road
Indianapolis, IN 46268

Appendix 6 Water Sample Collection Request Form

SAMPLE COLLECTION REQUEST **IDEM/OWQ** **Watershed Assessment & Planning Branch**	Sample Set Number	Date
	IDEM Sample Numbers	
	Crew Chief:	
	Requested by:	
	Nos. assigned by: **AIMSII**	

Site Information

Facility or Site Name		Facility Permit Number **N/A**	
Street Address	City	County	State **IN**

Requestor Information

Program Area Office Branch Section	☒ *OWQ/ WAPB* ☐ *OWQ/ Compliance Branch*	☐ *Enforcement/ Water Division* ☐ *Other*

Sampling Event Information

Sampler Name(s)		Sampler Phone Number.
Reason For Sampling and Goal of Sampling Event (Describe what you want to verify) (Choose one)	☐ **Watershed Monitoring Program** ☐ Fixed Station Monitoring Program ☐ NPDES Compliance ☒ Special Project	☐ TMDL Project ☐ Lakes Project ☐ Fish Consumption Advisory ☐ Watershed Characterization
Purpose of Sampling DQO level (Choose one) (i.e. enforcement, screening, etc.)	☐ 1. Screening, no QC checks. ☐ 2. Field/Lab, estimated precision and accuracy.	☒ 3. **Laboratory, precision and accuracy, no raw data.** ☐ 4. CLP data package
Parameters (Choose all that apply)	☐ Metals ☐ Cyanide ☐ Dissolved trace metals ☐ General water quality ☒ Nutrients ☐ $CBOD_5$	☐ Volatile organics ☐ Semi-volatile organics ☐ Pesticides ☐ Bacteria – *E. coli*
Matrices to be sampled (Choose all that apply)	☒ **Water** ☐ Sediment, sludge, soil	☐ Fish/ biological
Projected Sampling Date(s)	Estimated lab arrival date	Transport means ☒ **Staff** ☐ UPS/ Fed. Ex/ Bus

Laboratory Information

Name: Pace Analytical Services	Turnaround time	Number of Samples	Estimated cost
PO Number: SCM #018620 (Pace-Indy) PO #20000887-4 (Pace-Indy)	**30 Days**		$ @ Ea.

Authorizing Signatures

All: Gatekeeper _____ Section Chief _____ OMBA _____	$25,001 up: Assistant Commissioner OWQ _____ $40,000 up: Deputy Commissioner, OMBA _____
$15,001 up: Branch Chief _____	

Questions: Call Tim Bowren, 308-3181

6ce01.c tlb 09-30-2019

Appendix 7 Water Chem Bottle Labels

Water Chem Bottle Labels

	General Chemistry	Nutrients*	Metals	Cyanide	Waste Bottle	Dissolved Metals
Normal:	Unpreserved AB07954 7/9/2012 14:30 037	H_2SO_4 AB07954 7/9/2012 14:30 037	HNO_3 AB07954 7/9/2012 14:30 037	NaOH AB07954 7/9/2012 14:30 037	X 037	HNO_3 AB07954 7/9/2012 14:30 037
Duplicate:	General Chemistry	Nutrients	Metals	Cyanide	Waste Bottle	Dissolved Metals
	Unpreserved AB07954 7/9/2012 14:30 Dup of 037	H_2SO_4 AB07954 7/9/2012 14:30 Dup of 037	HNO_3 AB07954 7/9/2012 14:30 Dup of 037	NaOH AB07954 7/9/2012 14:30 Dup of 037	X Dup of 037	HNO_3 AB07954 7/9/2012 14:30 Dup of 037
Blank: (fill with Millipore)	No GC	Nutrients	Metals	Cyanide	Waste Bottle	Dissolved Metals
		H_2SO_4 AB07954 7/9/2012 14:30 Field Blank	HNO_3 AB07954 7/9/2012 14:30 Field Blank	NaOH AB07954 7/9/2012 14:30 Field Blank	X Field Blank	HNO_3 AB07954 7/9/2012 14:30 Field Blank
MS/MSD:	General Chemistry	Nutrients	Metals	Cyanide	Waste Bottle	Dissolved Metals
	Unpreserved AB07954 7/9/2012 14:30 037 MS/MSD	H_2SO_4 AB07954 7/9/2012 14:30 037 MS/MSD	HNO_3 AB07954 7/9/2012 14:30 037 MS/MSD	NaOH AB07954 7/9/2012 14:30 037 MS/MSD	X 037	HNO_3 AB07954 7/9/2012 14:30 037 MS/MSD
	2 bottles with identical labels	2 bottles with identical labels	1 bottle	1 bottle	1 bottle	1 bottle

*Glass bottle for nutrients

Appendix 8 YSI DO200 unit Procedure Quick Steps Guide

1. Press the power button to turn on unit.
2. Wait for self-diagnostic test to complete. Note: “ovEr” message may appear on display. This is normal.
3. When temperature displays in the lower right of the display, unit is ready for operation.
4. Immerse the probe in water. If possible do not allow probe to touch any solid object in the water
5. If taking D.O. reading in stagnant water, swirl probe to overcome oxygen consumption by the probe.
6. When reading has stabilized, record reading in ppm (hit the Mode button if display is not reading in ppm)
7. Turn off to save battery after reading is taken.

Appendix 9. Calibration and Operation of Oakton pH 6 Acorn Series Meter

Each pH meter case should contain pH buffer 7.00 and 10.00 su.

1. Connect the pH electrode to the meter
2. Take plastic tip off of pH sensor end. Inspect bulb to make sure it is clean. If the bulb has dried out, it will have to be rehydrated before calibration. Rehydrate the bulb by immersing in tap water for 30 minutes.
3. Immerse probe tip into pH buffer 7.00 calibration standard and allow reading to stabilize.
4. Press CAL key.
5. Press HOLD/ENTER key to confirm value.
6. Repeat with the slope pH buffer 10.0 calibration standard (or 4.00 for acid waters).

Appendix 10. Instructions for Use of Hach Portable Turbidimeter Model 2100 P

1. Collect a well-mixed and representative sample into a sample vial and fill to the line.
2. Wipe the cell with a soft, lint free cloth to remove water spots and fingerprints. Apply a thin film of silicon oil on outside of vial, if necessary
3. Press: I/O. The instrument will turn on. Place the instrument on a flat, sturdy surface. Do not hold the instrument while making measurements.
4. Put the sample cell in the instrument cell compartment so the diamond or orientation mark aligns with the raised orientation mark in front of the cell compartment. Close the cover.
5. Press: Read. The display will show “----NTU” then the turbidity in Neophelometric Turbidity Units (NTU). Record the turbidity after the lamp symbol turns off.

Appendix 11. Equipment and Supply Checklist for Sampling Trip

1. One YSI Multiparameter data sonde with a handheld display unit and one sampling tube
2. Several equipment bags, Ziploc bags, rubber bands, extra sample device tubing, trash bags, and tape
3. One pH meter
4. One turbidimeter (if needed)
5. One D.O. meter and probe
6. Two boxes of new, nontalc gloves
7. One bottle of sanitizing gel
8. One eyewash bottle filled with DI water
9. Carboy(s) with Millipore rinse water and extension tubes
10. Coolers containing labeled sample bottles. Always wear gloves when handling sample bottles
11. Two small red coolers, one for blanks and extra reagents, and one for data sonde storage, if needed
12. Extra cooler full of ice from equipment room ice machine
13. One large Ziploc bag, containing marking pens and bottle labels
14. Waders and life jackets
15. One set of USGS gage keys (if needed)
16. Required preservatives for sampling event
17. Safety Glasses
18. Two sampling devices*
19. Two sections of nylon rope, bagged separately for sampling device*
20. Two clean, metal or plastic stream buckets with rope for field measurements*
21. Two sampling equipment storage containers (totes)
22. Clipboard and pen for recording data and permanent marker for labeling bottles
23. Trimble Handheld GPS (required for some programs)
24. First aid kit (stored in vehicles)
25. Peristaltic pump, filter capsules, filter tubing (if sample filtration is necessary)

*indicates nonwadeable or bridge sampling sites only