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2022 Watershed Characterization Work Plan for Black Creek Watershed (Hydrologic Unit Code 0512020206)

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Work Plan Organization

This work plan is an extension of the existing Indiana Department of Environmental Management (IDEM) Watershed Assessment and Planning Branch (WAPB), March 2017 Quality Assurance Project Plan (QAPP) for Indiana Surface Water Programs (Surface Water QAPP) (IDEM 2017a) and October 2020 QAPP for Biological Community and Habitat Measurements (IDEM 2020a); 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

- Title and Approval
- Table of Contents
- Distribution List
- Project Organization
- Problem Definition and Background
- Project Description
- Quality Objectives and Criteria Measurement Data
- Special Training Needs or Certification
- Documents and Records

Group B. Data Generation and Acquisition

- Sampling Process Design (Experimental Design)
- Sampling Methods
- Sample Handling and Custody
- Analytical Methods
- Quality Control
- Instrument or Equipment Testing, Inspection, and Maintenance
- Instrument or Equipment Calibration and Frequency
- Inspection and Acceptance of Supplies and Consumables
- Nondirect Measurements
- Data Management

Group C. Assessment and Oversight

- Assessments and Response Actions
- Reports to Management

Group D. Data Validation and Usability

- Data Review, Verification, and Validation
- Verification and Validation Methods
- Reconciliation with User Requirements

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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 a 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.
15-minute pick	A component of the multihabitat macroinvertebrate sampling method, used to maximize taxonomic diversity while in the field. The 1-minute kick sample and 50-meter sweep sample collected at a site are first combined and elutriated. Macroinvertebrates are then manually removed from the resulting sample for 15 minutes.
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.
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	An 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 Black Creek watershed (10-digit Hydrologic Unit Code (HUC) 0512020206) (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, Total Maximum Daily Load (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 303(d) list for 2020 submitted to the U.S. EPA (IDEM 2020b) identifies 70.35 miles of impaired streams in the Black Creek watershed. The total number of miles per each impairment in the Black Creek watershed is reported in the following ways:

- Category 5(a): Impaired Biotic Community (IBC), 0.87 mile
- Category 5(a): *Escherichia coli (E. coli)*, 69.48 miles

Multiple IDEM programs and projects have collected assessment data in this watershed.

A.2. Project Organization and Schedule

The main project objective is to provide a comprehensive assessment of the Black Creek watershed streams' capability to support aquatic life and recreational uses. Sampling will begin in November 2021 and end in October 2022. 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 were completed in February and March 2021. Reconnaissance activities were conducted in the office and through physical site visits.
2. Monthly water chemistry sampling will occur 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, monthly sampling will occur only at the pour point sites of each 12-digit HUC (six sites). The first sampling event will occur in November 2021 and the study concludes in October 2022.
3. Biological sampling activities will begin in the summer of 2022 and end no later than October 18, 2022. Conduct fish and macroinvertebrate community sampling at all watershed sites via the observation, counting, and collection techniques described in section B.2. Sampling Methods and Sample Handling. Also assess habitat quality at all watershed sites. Providing specific dates for fish and macroinvertebrate community collection is not possible, 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 2022. In addition, collect five *E. coli* samples from each site at equally spaced intervals over a 30-day period during the recreational season of April to October 2022 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 TMDL program will utilize the Black Creek watershed data set and share the data set 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. This study will use the data 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

The DQO process (U.S. EPA 2006) is a tool for planning data collection activities. The process provides a basis for balancing decision uncertainty with available resources. U.S. EPA recommends the DQO process 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. The following seven sections document the results of the DQO seven step process for the watershed characterization monitoring of the Black Creek watershed.

1. State the Problem
   Indiana Administrative Code requires Indiana 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 Black Creek watershed provides a full characterization of 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 Black Creek watershed.

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

3. Identify Information Inputs
   Collect grab samples at the surface water sampling locations for *E. coli* and the parameters listed in Table 5. Conduct field measurements listed in Table 6 at each site during each sampling event. Visual field observations will include weather conditions, stream conditions, and percent stream canopy at each sampling location. Analyze all samples collected for bacteriological samples for *E. coli* using SM9223B Idexx Colilert Enzyme Substrate Standard Method per *E. coli* Field Sampling and Analysis (IDEM 2019a). Collect surface water chemistry samples monthly and Pace Analytical Services will process and analyze using the analytical methods listed in Table 5. Collect a fish and a macroinvertebrate community sample once at each site, and perform a corresponding habitat evaluation.

4. Define the Boundaries of the Study
   The Black Creek watershed covers 132.33 square miles in Greene, Sullivan, and Knox counties. The watershed is approximately 44% Agriculture, 29% Forest, 13% Hay or Pasture, 8% Developed Land (combined types), 5% Open Water, 1% Wetlands, and less than 1% Shrub or Scrub. (Figure 1)

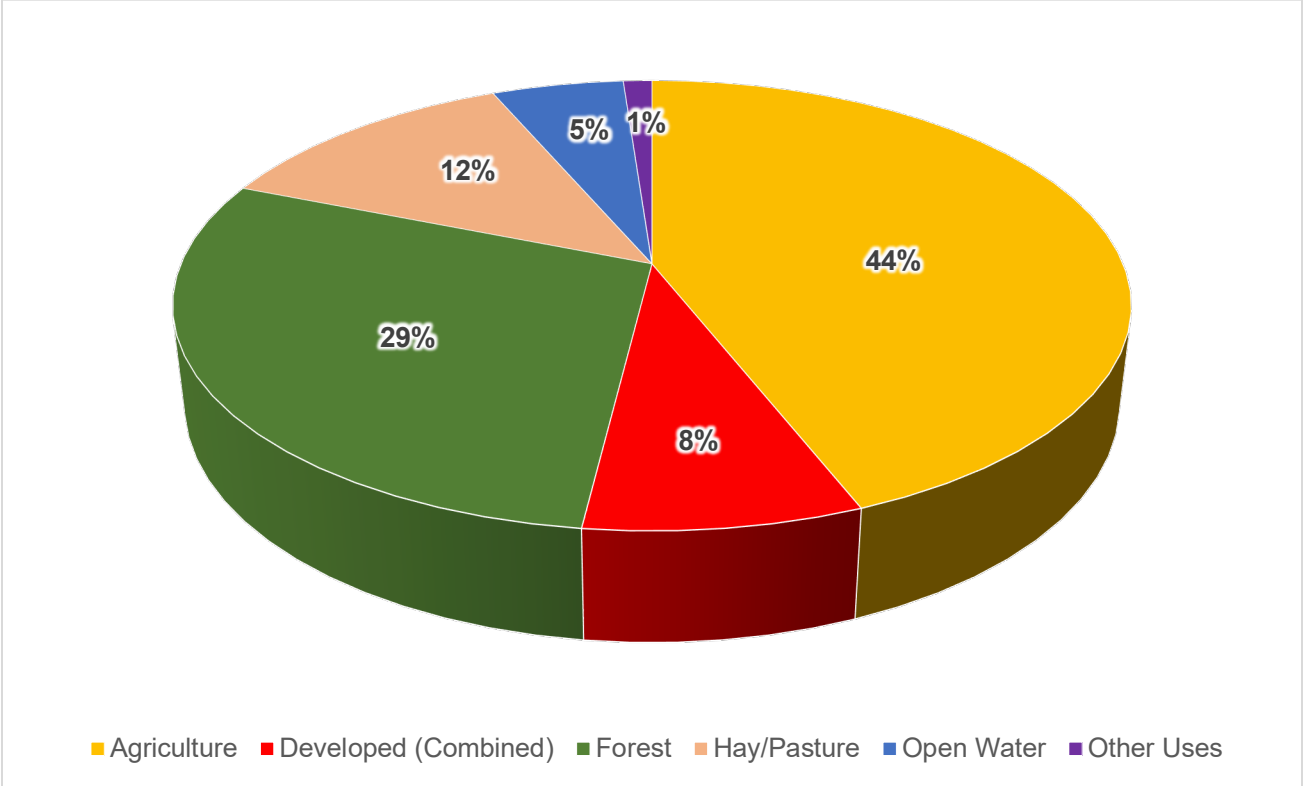
   Table 3 lists the sampling locations for, and Figure 2 provides a spatial representation of the 2022 Black Creek watershed characterization study.

   Site reconnaissance activities were completed in February and March 2021. Sampling activities will begin in November 2021 and will conclude in October 2022. Sample water chemistry monthly during the recreational season, defined as April through October in [327 IAC 2-1-6]. Conduct biological sampling activities in the summer of 2022 and end no later than October 18, 2022. Conduct bacteriological sampling activities from April through October of 2022.

   Do not conduct sampling activities 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, possibly postpone sample collections for biological communities at a particular site for one to four weeks. A high-water event resulting in scouring of the stream substrate or instream cover creating nonrepresentative samples may cause a postponement.

Figure 1. Black Creek Watershed Land Use



[4] Data collected and calculated from USDA National Agricultural Statistics Service 2020 Cropland Data Layer

5. Develop the Analytical Approach
   Collect samples for physical, chemical, bacteriological parameters, and biological communities. Analyze samples 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). Analyze samples for nutrient and general chemistry parameters at Pace Analytical Services. Table 5 lists the nutrient and general chemistry parameters and respective test methods. Measure field parameters of DO, pH, water temperature, specific conductance, and DO percent saturation with a data sonde. Measure turbidity with a Hach™ turbidity kit.

6. Specify Performance or Acceptance Criteria
   Utilizing a comprehensive checklist of informational sources, evaluation of historical information, and a thorough watershed presurvey minimizes sampling design error. Surface Water QAPP (IDEM 2017a) Section B.1.5.3 describes the sampling design which is 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. Place more confidence in the conclusions drawn on the stressors and sources affecting the water quality by minimizing both sampling design error and measurement error for physical and biological parameters.

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, 2015, 2017a, 2018a, 2019a, 2019b, 2019c, 2019d, 2020a, 2020d).

The Quality Assurance and Quality Control (QA/QC) process detects deficiencies in the data collection as set forth in the Surface Water QAPP (IDEM 2017a) and QAPP for Biological Community and Habitat Measurement (Biological and Habitat QAPP) (2020a). The QAPPs require all contract laboratories to adhere to rigorous standards during sample analyses and to provide good quality usable data. Verify laboratory accreditation (Attachment 10) before awarding the lab contract and before beginning the project. Review laboratory performance studies annually in October. Chemists within the WAPB review the laboratory analytical results for quality assurance. Compare lab QA/QC for each data set against acceptance limits specified in the 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. Validate the data based on the QA/QC review. Do not use any data which is "Rejected" due to analytical problems or errors for water quality assessment decisions. Use any data flagged as "Estimated" on a case-by-case basis and note in the QA/QC report. The Surface Water QAPP, Table D3-1: Data Qualifiers and Flags (IDEM 2017a p 184) and Biological and Habitat QAPP (IDEM 2020a pp 32–36) present criteria for acceptance or rejection of results as well as application of data quality flags. The Surface Water QAPP Table A7-1: Precision and Accuracy Goals for Data Acceptability by Matrix; and Table B2.1.1.8-2 Field Parameters (IDEM 2017a, pp 61–63 and p 117) provide precision and accuracy goals with acceptance limits for applicable analytical methods.

Conduct further investigation in response to consistent "Rejected" data to determine the source of error. Subject field techniques, used during sample collection and preparation along with laboratory procedures, to evaluation by both the WAPB QA manager and project manager to troubleshoot error introduced throughout the entire data collection process. Implement corrective actions upon determination of the source of error per the Surface Water QAPP (IDEM 2017a) and Biological Community and Habitat QAPP (IDEM 2020a).

Evaluate sites as supporting or nonsupporting following the decision-making processes described in Indiana's 2022 Consolidated Assessment Listing Methodology (CALM) and based upon the water quality criteria shown in Table 1.

Base recreational use attainment decisions 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. Evaluate the fish assemblage data at each site using the appropriate Index of Biotic Integrity (IBI) (Simon and Dufour, 2005). Also evaluate macroinvertebrate multihabitat (MHAB)

samples using a statewide IBI developed for lowest practical taxonomic level identifications.

Indiana narrative biological criteria [327 IAC 2-1-3] states "(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 which: (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 IBI score of less than 36 (on a scale of 0-60 for fish and 0-60 for macroinvertebrate communities), which is considered "Poor" or "Very Poor" (IDEM 2020c).

In addition, evaluate data for several nutrient parameters with the benchmarks listed below (IDEM 2020c). Assuming a minimum of three sampling events, if two or more of the conditions below are met on the same date, classify the waterbody 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

Report assessment of each site sampled to U.S. EPA in the 2024 update of Indiana's Integrated Water Monitoring and Assessment Report (Integrated Report). Use site-specific data 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 2020c, pp G-49, G-50).

Table 1. Water Quality Criteria [327 IAC 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)	Calculate based on pH and Temperature	Calculate CAC
Nitrate+Nitrite-Nitrogen	≤10 mg/L	Human Health point of drinking water intake
Sulfate	Calculate 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 which exceed 9.0 due to photosynthetic activity	Single reading
Temperature	Varies monthly	1% annual; maximum limits
Chloride	Calculate based on hardness and sulfate values	Calculate CAC
Dissolved solids	750 mg/L	Public water supply

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

7. Develop the Plan for Obtaining Data
   Use the Modified Geometric Design (OHEPA 1999, 2012) site selection process in Attachment 1 to obtain the necessary spatial representation of the entire study area. Site selection within the watershed is 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	- Assessment Information Management System (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. - Query data from AIMS II to determine results not meeting Water Quality Criteria.	- IDEM 2017a, 2017b, 2020a - 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 Standard Operating Procedure (SOP) documents for field operations.	- Complete field data sheets. - Ensure taxonomic accuracy. - Ensure sampling efficiency and representation. - Ensure voucher specimen tracking. - Ensure overall operation of the field crew when remote from central office. - Ensure crew members adherence to safety and field SOP procedures. - 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 1992a, 1992b, 2020d, 2008, 2010a, 2010b, 2015, 2017a, 2018a, 2019b, 2019c, 2019d, 2020a - 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, 2020d, 2008, 2010a, 2010b, 2015, 2017a, 2018a, 2019b, 2019c, 2019d, 2020a - Newhouse 1998a, 1998b - YSI 2018
Field crew chief – water chemistry or bacteriological sampling	- At least one year of experience in sampling methodology	- Complete field data sheets.	- YSI 2017

Role	Required Training or Experience	Responsibilities	Training References
	- Annually review relevant safety procedures. - Annually review relevant SOP documents for field operations.	- Ensure sampling efficiency and representation. - Ensure overall operation of the field crew when remote from central office. - Ensure crew members adherence to safety and field SOP procedures. - 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.	- IDEM 1997, 2020d, 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, 2020d, 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.	- Ensure laboratory staff adherence to safety and SOP procedures. - Assist with identification of fish or macroinvertebrate specimens. - Verify taxonomic accuracy of samples. - Ensure voucher specimen tracking. - Ensure QC calculations on data sheets, check for completeness. - Ensure data are entered into AIMS II correctly.	- IDEM 1992a, 1992b, 2008, 2010a, 2010b, 2017b, 2020a - Newhouse 1998a, 1998b
Laboratory staff – biological community sample processing	- Complete hands-on training for laboratory sample processing methodology prior to laboratory sample processing activities. - Annually review relevant safety procedures and relevant SOP documents for laboratory operations.	- Adhere to safety and SOP procedures. - Follow laboratory supervisor direction while processing samples. - Identify fish or macroinvertebrate specimens.	- IDEM 1992a, 1992b, 2008, 2010a, 2010b, 2017b, 2020a - Newhouse 1998a, 1998b

Role	Required Training or Experience	Responsibilities	Training References
		- Perform necessary calculations on data, enter field sheets.	
Laboratory supervisor – water chemistry or bacteriological sample processing	- Annually review relevant safety procedures. - Annually review relevant SOP documents for field operations.	- Ensure laboratory staff adhere to safety and SOP procedures. - Ensure 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, 2020d, 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, 2020a - U.S. EPA 2006

B. DATA GENERATION AND ACQUISITION

B.1. Sampling Sites and Sampling Design

Sample sites are 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. Site selection within the watershed is 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 site establishment is at the nearest bridge.

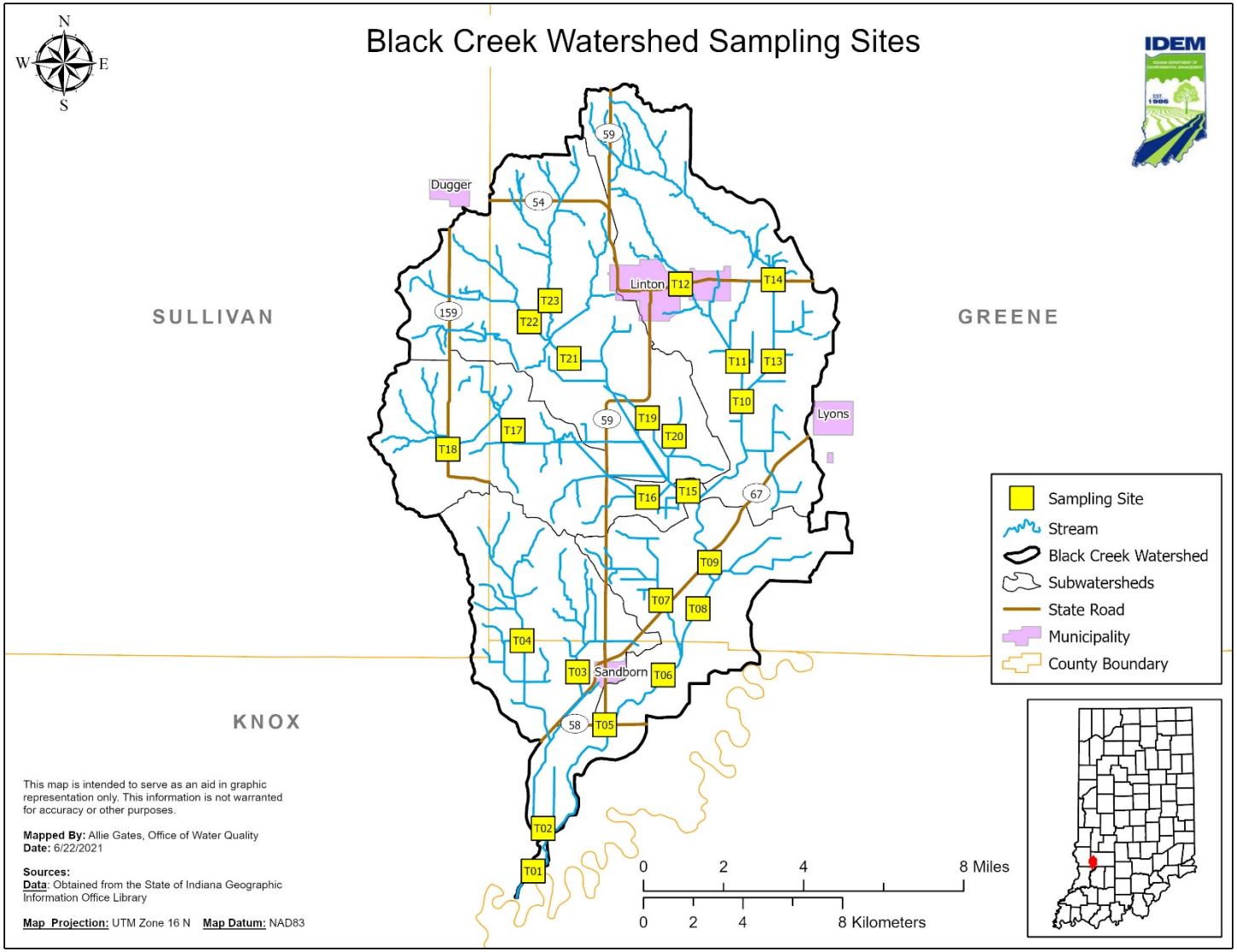
A more complete description of the Modified Geometric Design Steps for Watershed Characterization Studies selection process is included as Attachment 1. Sample sites are

also 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.

Conduct site reconnaissance activities 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. Record all information on the IDEM Office of Water Quality (OWQ) Site Reconnaissance Form (Attachment 2) and enter into the AIMS II database. Determine precise coordinates for each site during the physical site visits or at the beginning of the sampling phase. Use an agency approved handheld Global Positioning System (GPS) unit which can verify horizontal precision within five meters or less (IDEM 2015). Enter the coordinates into the AIMS II database. Also take digital photos upstream and downstream of the site during reconnaissance. Store digital photos on the shared drive upon return to the office in a specific folder for the Black Creek watershed characterization. Label photos 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, Assessment Unit IDs (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. Black Creek Watershed Characterization Sampling Area



[1] Map site numbers refer to Site # from Table 3.

Table 3. Sampling Locations for Watershed Characterization of Black Creek Watershed (HUC 0512020206)

Site #	EPA Site ID	IDEM Station ID	Stream Name	Location	County	Latitude	Longitude	AUID
T01	22T-001	WWL-06-0130	Black Creek	Unnamed Farm Lane	Knox	38.82444148	-87.22	INW0265_03
T02	22T-002	WWL-06-0131	Singer Ditch	Koening Road	Knox	38.839893	-87.21546868	INW0265_T1004
T03	22T-003	WWL-06-0151	Hill Ditch	Grandview Drive	Knox	38.89654541	-87.19967004	INW0265_T1002
T04	22T-004	WWL-06-0133	Singer Ditch	County Line Road	Knox	38.90784299	-87.22546346	INW0265_T1003
T05	22T-005	WWL-06-0134	Black Creek	SR 58	Knox	38.87741682	-87.18709731	INW0264_05
T06	22T-006	WWL-06-0135	Black Creek	Jericho Road	Knox	38.89549331	-87.15997735	INW0264_04
T07	22T-007	WWL-06-0136	Calico Slash Ditch	CR 700 S	Greene	38.92253407	-87.16109673	INW0264_T1002
T08	22T-008	WWL-06-0137	Black Creek	CR 1075 W	Greene	38.91953798	-87.14387213	INW0264_03
T09	22T-009	WWL-06-0138	Black Creek	CR 610 S	Greene	38.93631728	-87.13854423	INW0264_02
T10	22T-010	WWL-06-0152	Beehunter Ditch	CR 200 S	Greene	38.99458512	-87.12373031	INW0262_03
T11	22T-011	WWL-06-0140	Beehunter Ditch	CR 100 S	Greene	39.00910685	-87.1256238	INW0262_04
T12	22T-012	WWL-06-0141	Tributary of Beehunter Ditch	SR 54	Greene	39.03706863	-87.15223033	INW0262_05
T13	22T-013	WWL-06-0142	Buck Creek	CR 100 S	Greene	39.00916225	-87.10911995	INW0262_T1004
T14	22T-014	WWL-06-0143	Buck Creek	Buck Creek Road	Greene	39.03870741	-87.10917318	INW0262_T1003
T15	22T-015	WWL060-0001	Black Creek Ditch	CR 1100 W	Greene	38.96205995	-87.14861459	INW0263_01
T16	22T-016	WWL-06-0144	Brewer Ditch	CR 1200 W	Greene	38.9598278	-87.1674676	INW0263_T1006
T17	22T-017	WWL-06-0145	Tributary of Brewer Ditch	CR 1500 W	Greene	38.98395547	-87.22985642	INW0263_T1007
T18	22T-018	WWL-06-0121	Spencer Creek	SR 159	Sullivan	38.97707144	-87.26010201	INW0263_T1005
T19	22T-019	WWL-06-0146	Black Creek	CR 1200 W	Greene	38.98853836	-87.16750387	INW0261_03
T20	22T-020	WWL-06-0147	Tributary of Black Creek	CR 300 S	Greene	38.98196894	-87.15506457	INW0261_T1006
T21	22T-021	WWL-06-0148	Black Creek	CR 1400 W	Greene	39.01005643	-87.20397	INW0261_03
T22	22T-022	WWL-06-0149	Tributary of Black Creek	CR 1500 W	Greene	39.02325592	-87.22246253	INW0261_T1009
T23	22T-023	WWL-06-0150	Black Creek	CR 50 N	Greene	39.03093628	-87.21286193	INW0261_01

[1]T## gray shading of the Site # denotes these are the selected pour points for this project (6 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 2020d). Preserve samples as specified in Table 4 and follow all applicable holding times.

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
   One team consisting of one or two staff conduct bacteriological sampling. Process samples 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 A.2. Project Organization and Schedule (IDEM 2019a). The expected time frame for bacteriological sampling is April through October of 2022. 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. Wadeability is subject to field staff determination based on available personal protective equipment (PPE), turbidity, and other factors. However, streams waist deep or shallower are generally considered wadeable. Consistently label, cool, and hold at a temperature less than 10ºC all samples during transport. Preserve samples with

0.0008% $Na_2S_2O_3$ for CL_2. While still in the field and at the end of each sampling run, process and analyze water samples 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 of transporting samples to distant contract laboratories within a six-hour holding time. The IDEM mobile *E. coli* laboratory (van) provides a workspace 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. Obtain all supplies from IDEXX Laboratories, Inc., Westbrook, Maine.

3. Fish Community Measurements
   Teams of three to five staff will complete the fish community sampling. Perform sampling using various standardized electrofishing methodologies dependent upon the stream size and site accessibility. Perform fish assemblage assessments 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). Make an attempt 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 for utilization 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).

   Avoid sample collections during high flow or turbid conditions due to 1) low collection rates which result in nonrepresentative samples and 2) safety considerations for the sampling team. Avoid sample collection during late autumn due to the cooling 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).

   Collect fish using dip nets with fiberglass handles and netting of 1/8 inch mesh bag. Sort fish collected in the sampling reach by species into baskets or buckets. Do not retain young-of-the-year fish less than 20 millimeters (mm) total length in the community sample (IDEM 2018a).

   For each field taxonomist (generally the crew leader), retain a complete set of fish vouchers 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), preserve one to two individuals per new species encountered. If the fish specimens can be positively identified and the individuals for preservation are small enough to fit in a 2000 mL jar preserve in 3.7% formaldehyde solution to serve as representative fish vouchers. If, however, the specimens are too large to preserve, take a photo of key characteristics (e.g., fin shape, size, body coloration) for later examination (IDEM 2018a). Also, prior to sampling, randomly select 10% of the sites for a revisit, and preserve or photograph a few representative individuals of all species found at the site to serve as vouchers (IDEM 2020a). Review, prior to field work, taxonomic characteristics of possible species encountered in the basin of interest.

Also preserve fish specimens 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; dead specimens which are taxonomically valuable for undescribed taxa (e.g., Red Shiner or Jade Darter); life history studies; or research projects (IDEM 2018a).

Record data for fish, which are not preserved, on the IDEM OWQ Fish Collection Data Sheet (Attachment 4) consisting of: 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, release specimens within the sampling reach from which they were collected, when possible. Record data for preserved fish specimens following taxonomic identification in the laboratory (IDEM 2018a).

4. Macroinvertebrate Community Measurements
Crews of two to three staff conduct macroinvertebrate community sampling immediately following the fish community sampling event or on a different date. Collect samples 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. Collect, if the stream is wadeable, by disturbing one square meter of stream bottom substrate in a riffle or run habitat and collecting the dislodged macroinvertebrates within a dip net. Also, a 50-meter “sweep” sample of all available habitats. Collect 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. Define the 50-meter length of riparian corridor sampled at each site using a rangefinder or tape measure. If the stream is too deep to wade, use a boat or canoe to only sample the 50-meter zone along the shoreline with the best available habitat. In addition, do not collect a 1-minute kick sample if the stream is too deep to wade and no available shoreline to collect the sample exists. Combine the 1-minute “kick” and 50-meter “sweep” samples in a bucket of water. Elutriate the combined sample through a U.S. Standard Number 35 (500 µm) sieve a minimum of five times to remove all rocks, gravel, sand, and large pieces of organic debris from the sample. Then transfer the

remaining sample 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. Preserve the resulting picked sample in 80% isopropyl alcohol. Return the sample to the laboratory for identification at the lowest practical taxonomic level (usually genus or species level, if possible). Evaluate the sample using the MHAB macroinvertebrate IBI. Before leaving the site, complete (IDEM 2019c) an IDEM OWQ Macroinvertebrate Header Form (Attachment 5) for the sample.

5. Habitat Assessments
   Complete habitat assessments 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 (OHEPA 2006; Rankin 1995). Complete a separate IDEM OWQ Biological Qualitative Habitat Evaluation Index (QHEI) (Attachment 6) 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
   Measure dissolved oxygen (DO), pH, water temperature, specific conductance, and DO percent saturation with a data sonde, during each sampling event regardless of the sample type collected. Perform measurement procedures and operation of the data sonde 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 2020d). Measure turbidity with a Hach™ turbidity kit and write the meter number in the comments under the field parameter measurements. If a Hach™ turbidity kit is not available, record the data sonde measurement for turbidity and note in the comments. During each sampling run, note and document field observations from each site and ambient weather conditions at the time of sampling on IDEM Stream Sampling Field Data Sheets (Attachment 3).

B.3. Analytical Methods

1. Laboratory Procedure for *E. coli* Measurements:
   Process and analyze all waters sampled 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). Table 5 identifies the *E. coli* test method and quantification limit.
2. Nutrient and General Chemistry Parameters Measurements:
   Pace Analytical Services will perform analyses of nutrient and general chemistry parameters, in accordance with preapproved test methods and within the allotted time frames. Table 5 identifies the nutrient and general chemistry parameters, and respective test methods and quantification limits.

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

Parameter	Method	Lab Reporting Limit	Units
E. coli	SM-9223B Enzyme Substrate Test	1.0	*MPN/100 mL
Alkalinity (as $CaCO_3$)	SM2320B	2.0	mg/L
Solids, total residue (TS)	SM 2540B	10.0	mg/L
Solids, nonfilterable residue (TSS)	SM 2540D	2.5	mg/L
Solids, filterable residue (TDS)	SM 2540C	10.0	mg/L
Sulfate	EPA 300.0	0.25	mg/L
Chloride	EPA 300.0	0.25	mg/L
Hardness (as $CaCO_3$)	SM 2340B	1.0	mg/L
Nitrogen, as ammonia	EPA 350.1	0.10	mg/L
Nitrogen, Kjeldahl (TKN)	EPA 351.2	0.50	mg/L
Nitrogen, nitrate-nitrite	EPA 353.2	0.10	mg/L
Phosphorous, total	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	1.0	mg/L
Magnesium	EPA 200.7	1.0	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:
   Take the field measurements of DO, temperature, pH, conductivity, and turbidity each time a sample is collected. Table 6 identifies the field parameters, respective test methods, and sensitivity limits. Locate the data sonde in the center of flow during sampling. The field staff member collecting the sample shall 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 (data sonde optical)	ASTM D888-09(C)	0.01	mg/L
DO (membrane probe)	SM4500-OG[5]	0.03	mg/L
DO % saturation (data sonde optical)	ASTM D888-09(C)	0.01	%
Turbidity (data sonde)	SM2130B	0.02	NTU
Turbidity (Hach turbidimeter)	EPA 180.1[5]	0.01	NTU
Specific conductance (data sonde)	SM 2510B	1.0	µS/cm
Temperature (data sonde)	SM 2550B(2)	0.1	°C
Temperature (field meter)	SM 2550B(2)[5]	0.1	°C
pH (data sonde)	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 B.5. of the Surface Water QAPP (IDEM 2017a, p 170) and part B.5. of the Biological and Habitat QAPP (IDEM 2020a, p 27).

1. Field Instrument Testing and Calibrations
   Calibrate the data sonde prior to each week's sampling (IDEM 2020e). Record, maintain, store, and archive calibration results and drift values in logbooks 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). Field check the unit for accuracy once during the week by comparison with a YSI EcoSense DO200A DO Probe (IDEM 2020d, p 24), Hach™ turbidity, and an Oaktown Series 5 pH meter. Record weekly calibration verification results on the field calibrations portion of the IDEM OWQ Stream Sampling Field Data Sheets (Attachment 3) and enter into the AIMS II database. At field sites where the DO concentration is 4.0 mg/L or less, use the YSI EcoSense DO meter.

2. Field Measurement Data
   Collect in-situ water chemistry field data in the field using calibrated or standardized equipment and record on the IDEM OWQ Stream Sampling Field Data Sheet (Attachment 3). The same staff member will collect and record the data. Perform calculations either in the field or later at the office. Include analytical results, which have limited QC checks, 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 p 176 and Section A7.2 p 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. Archive raw data by analytical batch for easy retrieval and review. Follow chain of custody procedures, including time of collection, time of setup, time of reading the results, and time and method of disposal (IDEM 2020d). The field staff member who collected the samples signs the chain of custody form upon delivery of samples to the laboratory. Thoroughly document any method deviations in the raw data. Test all QA/QC samples according to the following guidelines:

Field Duplicate:	Collect at a frequency of one per batch or at least one for every 20 samples collected (≥ 5%).
Field Blank:	Collect at a frequency of one per batch or at least one for every 20 samples collected (≥ 5%).
Laboratory Blank:	Test at a frequency of one per day.

Positive Control: Test each lot of media for performance using *E. coli* bacterial cultures.

Negative Controls: Test each lot of media for performance using non-*E. coli* and noncoliform bacterial cultures.

4. Water Chemistry Measurement Data
   The manufacturer will certify sample bottles and preservatives for purity. Do not use damaged sample bottles and preservatives, and do not use preservatives past their stated expiration date. Field blanks check the purity of sample bottles and preservatives. Sample collection containers for each parameter, preservative, and holding time (Table 4) will adhere to U.S. EPA requirements. Collect field duplicates and matrix spike/matrix spike duplicates at the rate of one per sample analysis set or one per every 20 samples, whichever is greater. Additionally, take field blank samples 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 collecting the samples signs the COC form upon delivery of samples to the laboratory.

5. Fish Community Measurement Data
   Perform fish community sampling revisits at a rate of 10 percent of the total fish community sites sampled, in this case, three in the watershed (IDEM 2018a). Perform revisit sampling with at least two weeks of recovery between the initial and revisit sampling events. Perform the fish community revisit sampling and habitat assessment with either a partial or complete change in field team members (IDEM 2018a). Use the resulting IBI and QHEI total score between the initial visit and the revisit to evaluate precision, as described in the QAPP for Biological Community and Habitat Measurements (IDEM 2020a). Use the IDEM OWQ COC form (Attachment 7) 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
   Collect duplicate macroinvertebrate field samples at a rate of 10 percent of the total macroinvertebrate community sites sampled, in this case, three in the watershed. Perform the macroinvertebrate community duplicate sample and corresponding habitat assessment by the same team member who performed the original sample, immediately after the initial sample collection. The 50-meter section of stream and riffle area utilized for the duplicate sample are different from those used for the original sample but have features as similar to 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 2020a).

Use the IDEM OWQ COC form (Attachment 7) 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 laboratory custodian uses the OWQ COC form to check in samples prior to long-term storage. The IDEM Probabilistic Monitoring Section laboratory supervisor maintains laboratory identifications and QA/QC of taxonomic work.

C. ASSESSMENT AND OVERSIGHT

C.1. Field and laboratory performance and system audits

Conduct performance and system audits 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 versus the actual number collected, analyzed, reported, and usable for the project (IDEM 2017a, p 58).

Biological and habitat measurements, field performance measurements include:

- Completeness (IDEM 2020a, pp 10-11, 14)
- Examination of fish IBI score differences and the relative percent difference (RPD) for number of fish species at the revisit sites (IDEM 2020a, pp 9-10)
- RPD for number of taxa for macroinvertebrate duplicate samples (IDEM 2020a, p 13)
- RPD between the two total QHEI scores (IDEM 2020a, p 18)

Lab performance measurements include:

- Percent taxonomic difference (PTD) for fish (IDEM 2020a, p 12)
- PTD for macroinvertebrates (IDEM 2020a, pp 15-16)
- Percent difference in enumeration (PDE) and percent sorting efficiency (PSE) for macroinvertebrates (IDEM 2020a, pp 14-16)

Regionally recognized non-IDEM freshwater fish taxonomists may verify fish taxonomic identifications made by IDEM staff in the laboratory. Send ten percent of macroinvertebrate samples, the initial samples taken at sites where duplicate samples were collected, to Rhithron Associates, Inc. (Missoula, MT) for verification by an outside taxonomist (IDEM 2019c). For macroinvertebrate verifications by an external lab, the lab's taxonomists must maintain Society for Freshwater Science taxonomic certifications. Genus level taxonomic certifications are required for (1) Eastern General Arthropods; (2) Eastern Ephemeroptera, Plecoptera, and Trichoptera; (3) Chironomidae; and (4) Oligochaeta.

Require contract laboratories to have NELAC audits at the beginning of a laboratory contract and at least once a year during the contract. In addition, IDEM QA staff annually

review performance studies conducted by the contract laboratories. The audit includes any or all 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).

IDEM WAPB staff conduct field audits every other year to ensure sampling activities adhere to approved SOPs. WAPB staff will systematically conduct audits to include all WAPB personnel engaging in field sampling activities. Staff trained in the associated sampling SOPs and in the processes related to conducting an audit evaluate WAPB field staff involved with sample collection and preparation. Staff will produce an evaluation report documenting each audit for review by those field staff audited as well as WAPB management. Communicate corrective actions to field staff who implement the corrective actions as a result of the audit process (IDEM 2017a, pp 176–177; IDEM 2020a, p 31).

The QA officer submits quality assurance reports upon completion of a dataset's data validation 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, p 179).

C.2. Data Quality Assessment Levels

The samples and various types of data collected by this program are intended to meet the quality assurance criteria and rated DQA Level 3, as described in the Surface Water QAPP (IDEM 2017a, pp 182–183) and the Biological and Habitat QAPP (IDEM 2020a, pp 34–35).

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. the QA officer submits quality assurance reports upon completion of a dataset's data validation to the program manager or WAPB branch chief. This is done to ensure investigation and correction of problems arising during the sampling and analysis phases of the project (IDEM 2017a, p 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 are met.

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

Use various data qualifiers and flags for quality assurance and validation of the data found in the Surface Water QAPP (IDEM 2017a pp 184-185) and the Biological and Habitat QAPP (IDEM 2020a pp 33-34).

D.2. Data Usability

Qualify the environmental data's collection and usability per each lab or field result obtained and classify into one or more of the four categories: Acceptable Data, Enforcement Capable Results, Estimated Data, and Rejected Data as described in the Surface Water QAPP (IDEM 2017a p 184) and in the Biological and Habitat QAPP (IDEM 2020a pp 35-36).

D.3. Information, Data, and Reports

Record data collected in 2021-2022 in the AIMS II database and present in two compilation summaries. The first summary is a general compilation of the watershed field and water chemistry data prepared for use in the 2024 Indiana Integrated Report. The second summary is in database report format containing biological results and habitat evaluations, produced for inclusion in the Integrated Report as well as individual site folders. Maintain all site folders at the WAPB facility. All data and reports are 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.,). Upload the work plan into the virtual file cabinet. Store all field sheets in the AIMS II database. Upload results to U.S. EPA's Water Quality Portal via the Water Quality Exchange (formerly Storet), which allows 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 complies with the Surface Water QAPP (IDEM 2017a); Request for Proposals 22-68153 (IDEM 2021); the IDEM QMP (IDEM 2018b); and Pace-Indy contract PO # 0020000887-5. Pace Analytical Services in Indianapolis, Indiana will perform analytical tests on general chemistry and nutrient parameters outlined in Table 5 with a total estimated cost of $61,150. IDEXX Laboratories, Inc., Westbrook, Maine supplies the bacteriological sampling supplies, with a total estimated cost of $1,400. IDEM staff will test and analyze bacteriological samples. IDEM staff will collect and analyze all fish and macroinvertebrate samples. Rhithron Associates, Inc. in Missoula, Montana (IDEM 2020a) will verify ten percent of macroinvertebrate samples with a total estimated cost of $690. The anticipated total budget for laboratory costs for the project is $63,240.

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 participating 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)	- WAP,200B staff meeting Health and Safety Training requirements will accompany staff lacking 4 hours of in-service training or appropriate certification in the field at all times.
	- 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 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.

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.

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.*

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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 feature class) 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 ☐ No; Stream Dry ☐ No; Other ☐ No; Owner refused Access	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 12 ☐ 24 ☐ 48 ☐ 72 ☐ All-Flow	☐ Riffle ☐ Dry ☐ Stagnant ☐ Pool ☐ Run ☐ Flood ☐ Glide ☐ Eddy ☐ Other	☐ Clear ☐ Green ☐ Sheen ☐ Murky ☐ Black ☐ Other ☐ Brown ☐ Gray (Septic/Sewage)	☐ 0-20% ☐ 60-80% ☐ 20-40% ☐ 80-100% ☐ 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 > 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
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
EcoII	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
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

MAINTENANCE
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ 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
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ☐ LOW [2]
- ☐ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☐ GOOD [5]
- ☐ FAIR [3]
- ☐ POOR [1]

CHANNELIZATION
- ☐ NONE [6]
- ☐ RECOVERED [4]
- ☐ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ☐ LOW [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, ROWCROP [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
- ☐ BEST AREAS > 10cm [2]
- ☐ BEST AREAS 5 - 10cm [1]
- ☐ BEST AREAS < 5cm [metric = 0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ☐ MAXIMUM < 50cm [1]

RIFFLE/RUN SUBSTRATE
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ☐ 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

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 Should samples be iced? Y N

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

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: 2022 Black Creek **Composite ☐ Grab ☒**

OWQ Sample Set	21BLWxxx	IDEM Sample Nos.	
Crew Chief	Ross Carlson	Lab Sample Nos.	
Collection Date	Nov. 15-17, 2021	Lab Delivery Date	

Anions and Physical Parameters

Parameter	Test Method	Total	Dissolved
Alkalinity (as $CaCO_3$)	310.2	☒ **	☐
Total Solids	SM2540B	☒ **	
Suspended Solids	SM2540D	☒ **	
Dissolved Solids	SM2540C		☒ **
Sulfate (as SO_4)	300.0	☒ **	☐ **
Chloride (as Cl)	300.0	☒ **	☐ **
Hardness (Calculated)	SM-2340B	☒ **	☐ **
Fluoride (as F)	SM4500-F-C	☐ **	☐ **

Priority Pollutant Metals Water Parameters

Parameter	Test Method	Total	Dissolved
Antimony (as Sb)	200.8	☐	☐
Arsenic (as As)	200.8	☐	☐
Beryllium (as Be)	200.8	☐	☐
Cadmium (as Cd)	200.8	☐	☐
Chromium (as Cr)	200.8	☐	☐
Copper (as Cu)	200.8	☐	☐
Lead (as Pb)	200.8	☐	☐
Mercury, Low Level	1631, Rev E.	☐	☐
Nickel (as Ni)	200.8	☐	☐
Selenium (as Se)	200.8	☐	☐
Silver (as Ag)	200.8	☐	☐
Thallium (as Tl)	200.8	☐	☐
Zinc (as Zn)	200.8	☐	☐

Cations and Secondary Metals Parameters

Parameter	Test Method	Total	Dissolved
Aluminum (as Al)	**200.8**	☐	☐
Barium (as Ba)	200.8	☐	☐
Boron (as B)	200.8	☐	☐
Calcium (as Ca)	**200.7**	☒ ***	☐
Cobalt (as Co)	200.8	☐	☐
Iron (as Fe)	200.7	☐	☐
Magnesium (as Mg)	**200.7**	☒ ***	☐
Manganese (as Mn)	200.8	☐	☐
Sodium (as Na)	200.7	☐	☐
Silica, Total Reactive (as SiO_2)	200.7	☐	☐
Strontium (as Sr)	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	☒	☐
$CBOD_5$	SM5210B	☐	
Total Kjeldahl Nitrogen (TKN)	SM4500N(Org)	☒	☐
Nitrogen, Nitrate + Nitrite as N	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 # 0020000887-5 (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 components of Total Hardness (Calculated)*

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: Pace Analytical Services, Inc.
Attn: Olivia Deck
Phone: 317-228-3102 7726 Moller Road
Indianapolis, IN 46268

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation

State of Kansas

Department of Health and Environment

CERTIFICATE

This is to certify that Certification No.: E-10177

Pace Analytical Services, Inc - Indianapolis IN

7726 Moller Road
Indianapolis, IN 46268-4163

has been accredited in accordance with K.S.A. 65-1,109a under the standards adopted in K.A.R. 28-15-36 for performing environmental analyses for the parameters listed on the most current scope of accreditation. Continuous accreditation depends on successful, ongoing participation in the program. Clients are urged to verify with this agency the laboratory's certification status for particular methods and analytes.

Effective Date: 5/1/2021

Expiration Date: 4/30/2022

Director
Office of Laboratory Services

Certification Section Chief
Office of Laboratory Services

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

Division of Environment
Kansas Health and Environmental Laboratories
Environmental Laboratory Improvement Program
6810 SE Dwight Street
Topeka, KS 66620-0001

Kansas Department of Health and Environment

Phone: 785-296-3811
Fax: 785-559-5207
KDHE.ELIPO@KS.GOV
www.kdheks.gov/envlab

Lee A. Norman, M.D., Secretary

Laura Kelly, Governor

The Kansas Department of Health and Environment encourages all clients and data users to verify the most current scope of accreditation for certification number E-10177

The analytes tested and the corresponding matrix and method which a laboratory is authorized to perform at any given time will be those indicated in the most recently issued scope of accreditation. The most recent scope of accreditation supersedes all previously issued scopes of accreditation. It is the certified laboratory's responsibility to review this document for any discrepancies. This scope of accreditation will be recalled in the event that your laboratory's certification is revoked.

Accreditation Start: 5/1/2021 Accreditation End: 4/30/2022

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number: E-10177** Page 1 of 26

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***CWA (Non Potable Water)***	
Method ASTM D516-11	
Sulfate	KS
Method EPA 120.1	
Conductivity	KS
Method EPA 1631E	
Mercury	KS
Method EPA 1664A	
Oil & Grease	KS
Method EPA 180.1	
Turbidity	KS
Method EPA 200.7	
Aluminum	KS
Antimony	KS
Arsenic	KS
Barium	KS
Beryllium	KS
Boron	KS
Cadmium	KS
Calcium	KS
Chromium	KS
Cobalt	KS
Copper	KS
Iron	KS
Lead	KS
Magnesium	KS
Manganese	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***CWA (Non Potable Water)***	
Molybdenum	KS
Nickel	KS
Potassium	KS
Selenium	KS
Silver	KS
Sodium	KS
Strontium	KS
Thallium	KS
Tin	KS
Titanium	KS
Vanadium	KS
Zinc	KS
Method EPA 200.8	
Aluminum	KS
Antimony	KS
Arsenic	KS
Barium	KS
Beryllium	KS
Boron	KS
Cadmium	KS
Chromium	KS
Cobalt	KS
Copper	KS
Lead	KS
Manganese	KS
Molybdenum	KS
Nickel	KS
Selenium	KS
Silver	KS
Thallium	KS
Tin	KS
Titanium	KS
Vanadium	KS
Zinc	KS
Method EPA 245.1	
Mercury	KS
Method EPA 300.0	
Bromide	KS
Chloride	KS
Fluoride	KS
Nitrate	KS
Nitrate-nitrite	KS
Nitrite	KS
Sulfate	KS
Method EPA 335.4	
Amenable cyanide	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***CWA (Non Potable Water)***	
Cyanide	KS
Method EPA 350.1	
Ammonia as N	KS
Method EPA 351.2	
Total Kjeldahl Nitrogen (TKN)	KS
Method EPA 351.2 minus EPA 350.1	
Organic nitrogen	KS
Method EPA 353.2	
Nitrate	KS
Nitrate-nitrite	KS
Nitrite	KS
Method EPA 365.1	
Phosphorus	KS
Method EPA 410.4	
Chemical oxygen demand	KS
Method EPA 420.4	
Total phenolics	KS
Method EPA 6010B	
Arsenic	KS
Cadmium	KS
Copper	KS
Lead	KS
Molybdenum	KS
Nickel	KS
Selenium	KS
Strontium	KS
Total chromium	KS
Zinc	KS
Method EPA 6020	
Arsenic	KS
Cadmium	KS
Copper	KS
Lead	KS
Nickel	KS
Selenium	KS
Total chromium	KS
Zinc	KS
Method EPA 608.3 GC-ECD	
4,4'-DDD	KS
4,4'-DDE	KS
4,4'-DDT	KS
Aldrin	KS
alpha-BHC (alpha-Hexachlorocyclohexane)	KS
Aroclor-1016 (PCB-1016)	KS
Aroclor-1221 (PCB-1221)	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***CWA (Non Potable Water)***	
Aroclor-1232 (PCB-1232)	KS
Aroclor-1242 (PCB-1242)	KS
Aroclor-1248 (PCB-1248)	KS
Aroclor-1254 (PCB-1254)	KS
Aroclor-1260 (PCB-1260)	KS
beta-BHC (beta-Hexachlorocyclohexane)	KS
Chlordane (tech.)(N.O.S.)	KS
delta-BHC	KS
Dieldrin	KS
Endosulfan I	KS
Endosulfan II	KS
Endosulfan sulfate	KS
Endrin	KS
Endrin aldehyde	KS
gamma-BHC (Lindane, gamma-HexachlorocyclohexanE)	KS
Heptachlor	KS
Heptachlor epoxide	KS
Methoxychlor	KS
Toxaphene (Chlorinated camphene)	KS
Method EPA 624.1	
1,1,1-Trichloroethane	KS
1,1,2,2-Tetrachloroethane	KS
1,1,2-Trichloroethane	KS
1,1-Dichloroethane	KS
1,1-Dichloroethylene	KS
1,2-Dichlorobenzene (o-Dichlorobenzene)	KS
1,2-Dichloroethane (Ethylene dichloride)	KS
1,2-Dichloropropane	KS
1,3-Dichlorobenzene	KS
1,4-Dichlorobenzene	KS
2-Chloroethyl vinyl ether	KS
Acrolein (Propenal)	KS
Acrylonitrile	KS
Benzene	KS
Bromodichloromethane	KS
Bromoform	KS
Carbon tetrachloride	KS
Chlorobenzene	KS
Chlorodibromomethane	KS
Chloroethane (Ethyl chloride)	KS
Chloroform	KS
cis-1,3-Dichloropropene	KS
Ethylbenzene	KS
Methyl bromide (Bromomethane)	KS
Methyl chloride (Chloromethane)	KS
Methylene chloride (Dichloromethane)	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***CWA (Non Potable Water)***	
Naphthalene	KS
Tetrachloroethylene (Perchloroethylene)	KS
Toluene	KS
trans-1,2-Dichloroethylene	KS
trans-1,3-Dichloropropylene	KS
Trichloroethene (Trichloroethylene)	KS
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	KS
Vinyl chloride	KS
Xylene (total)	KS
Method EPA 625.1	
1,2,4-Trichlorobenzene	KS
1,2-Dichlorobenzene (o-Dichlorobenzene)	KS
1,3-Dichlorobenzene	KS
1,4-Dichlorobenzene	KS
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-methylethyl)ether	KS
2,4,6-Trichlorophenol	KS
2,4-Dichlorophenol	KS
2,4-Dimethylphenol	KS
2,4-Dinitrophenol	KS
2,4-Dinitrotoluene (2,4-DNT)	KS
2,6-Dinitrotoluene (2,6-DNT)	KS
2-Chloronaphthalene	KS
2-Chlorophenol	KS
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	KS
2-Nitrophenol	KS
3,3'-Dichlorobenzidine	KS
4-Bromophenyl phenyl ether	KS
4-Chloro-3-methylphenol	KS
4-Chlorophenyl phenylether	KS
4-Nitrophenol	KS
Acenaphthene	KS
Acenaphthylene	KS
Anthracene	KS
Benzidine	KS
Benzo(a)anthracene	KS
Benzo(a)pyrene	KS
Benzo(b)fluoranthene	KS
Benzo(g,h,i)perylene	KS
Benzo(k)fluoranthene	KS
bis(2-Chloroethoxy)methane	KS
bis(2-Chloroethyl) ether	KS
Butyl benzyl phthalate	KS
Chrysene	KS
Di(2-ethylhexyl) phthalate (bis(2-Ethylhexyl)phthalate, DEHP)	KS
Dibenz(a,h) anthracene	KS
Diethyl phthalate	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***CWA (Non Potable Water)***	
Dimethyl phthalate	KS
Di-n-butyl phthalate	KS
Di-n-octyl phthalate	KS
Fluoranthene	KS
Fluorene	KS
Hexachlorobenzene	KS
Hexachlorobutadiene	KS
Hexachloroethane	KS
Indeno(1,2,3-cd) pyrene	KS
Isophorone	KS
Naphthalene	KS
Nitrobenzene	KS
n-Nitrosodimethylamine	KS
n-Nitrosodi-n-propylamine	KS
n-Nitrosodiphenylamine	KS
Pentachlorophenol	KS
Phenanthrene	KS
Phenol	KS
Pyrene	KS
Method EPA 7470A	
Mercury	KS
Method EPA 7471A	
Mercury	KS
Method EPA 8015D	
Propylene glycol	KS
Method EPA 8260C	
1,1,2-Trichloro-1,2,2-trifluoroethane	KS
1,3,5-Trichlorobenzene	KS
Method EPA 8270C	
1-Methylnaphthalene	KS
Carbazole	KS
Method OIA 1677-09	
Available Cyanide	KS
Free cyanide	KS
Method SM 2310 B-2011	
Acidity, as CaCO3	KS
Method SM 2320 B-2011	
Alkalinity as CaCO3	KS
Method SM 2340 B-2011	
Hardness	KS
Method SM 2510 B-2011	
Conductivity	KS
Method SM 2540 B-2011	
Residue-total	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN — **Primary AB**

Program/Matrix: ***CWA (Non Potable Water)***

Method SM 2540 C-2011	
Residue-filterable (TDS)	KS
Method SM 2540 D-2011	
Residue-nonfilterable (TSS)	KS
Method SM 2540 F-2011	
Residue-settleable	KS
Method SM 3500-Cr B-2011	
Chromium VI	KS
Method SM 4500-Cl G-2011	
Total residual chlorine	KS
Method SM 4500-Cl⁻ E-2011	
Chloride	KS
Method SM 4500-CN⁻ C-2011	
Cyanide	KS
Method SM 4500-CN⁻ E-2011	
Cyanide	KS
Method SM 4500-CN⁻ G-2011	
Amenable cyanide	KS
Method SM 4500-F⁻ C-2011	
Fluoride	KS
Method SM 4500-H+ B-2011	
pH	KS
Method SM 4500-NH3 G-2011	
Ammonia as N	KS
Method SM 4500-P E-2011	
Orthophosphate as P	KS
Method SM 4500-S2⁻ D-2011	
Sulfide	KS
Method SM 5210 B-2011	
Biochemical oxygen demand	KS
Carbonaceous BOD, CBOD	KS
Method SM 5310 C-2011	
Total organic carbon	KS
Method SM 5540 C-2011	
Surfactants - MBAS	KS
Method TKN-NH3-CAL	
Organic nitrogen	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Non Potable Water)***	
Method EPA 1010A	
Ignitability	KS
Method EPA 1311	
Toxicity Characteristic Leaching Procedure (TCLP)	KS
Method EPA 1312	
Synthetic Precipitation Leaching Procedure (SPLP)	KS
Method EPA 6010B	
Aluminum	KS
Antimony	KS
Arsenic	KS
Barium	KS
Beryllium	KS
Boron	KS
Cadmium	KS
Calcium	KS
Chromium	KS
Cobalt	KS
Copper	KS
Iron	KS
Lead	KS
Lithium	KS
Magnesium	KS
Manganese	KS
Molybdenum	KS
Nickel	KS
Potassium	KS
Selenium	KS
Silicon	KS
Silver	KS
Sodium	KS
Strontium	KS
Thallium	KS
Tin	KS
Titanium	KS
Vanadium	KS
Zinc	KS
Method EPA 6020	
Aluminum	KS
Antimony	KS
Arsenic	KS
Barium	KS
Beryllium	KS
Cadmium	KS
Chromium	KS
Cobalt	KS
Copper	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Non Potable Water)***	
Lead	KS
Manganese	KS
Molybdenum	KS
Nickel	KS
Selenium	KS
Silver	KS
Thallium	KS
Thorium	KS
Uranium	KS
Vanadium	KS
Zinc	KS
Method EPA 7196A	
Chromium VI	KS
Method EPA 7470A	
Mercury	KS
Method EPA 7471A	
Mercury	KS
Method EPA 8011	
1,2-Dibromo-3-chloropropane (DBCP)	KS
1,2-Dibromoethane (EDB, Ethylene dibromide)	KS
Method EPA 8015D	
Diesel range organics (DRO)	KS
Ethanol	KS
Ethylene glycol	KS
Gasoline range organics (GRO)	KS
Isobutyl alcohol (2-Methyl-1-propanol)	KS
Isopropyl alcohol (2-Propanol, Isopropanol)	KS
Methanol	KS
n-Butyl alcohol (1-Butanol, n-Butanol)	KS
n-Propanol (1-Propanol)	KS
Propylene glycol	KS
Method EPA 8081B	
4,4'-DDD	KS
4,4'-DDE	KS
4,4'-DDT	KS
Aldrin	KS
alpha-BHC (alpha-Hexachlorocyclohexane)	KS
alpha-Chlordane, cis-Chlordane	KS
beta-BHC (beta-Hexachlorocyclohexane)	KS
Chlordane (tech.)(N.O.S.)	KS
delta-BHC	KS
Dieldrin	KS
Endosulfan I	KS
Endosulfan II	KS
Endosulfan sulfate	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Non Potable Water)***	
Endrin	KS
Endrin aldehyde	KS
Endrin ketone	KS
gamma-BHC (Lindane, gamma-HexachlorocyclohexanE)	KS
gamma-Chlordane	KS
Heptachlor	KS
Heptachlor epoxide	KS
Methoxychlor	KS
Toxaphene (Chlorinated camphene)	KS
Method EPA 8082A	
Aroclor-1016 (PCB-1016)	KS
Aroclor-1221 (PCB-1221)	KS
Aroclor-1232 (PCB-1232)	KS
Aroclor-1242 (PCB-1242)	KS
Aroclor-1248 (PCB-1248)	KS
Aroclor-1254 (PCB-1254)	KS
Aroclor-1260 (PCB-1260)	KS
Method EPA 8141B	
Atrazine	KS
Azinphos-methyl (Guthion)	KS
Chlorpyrifos	KS
Chlorpyrifos-methyl	KS
Demeton-o	KS
Demeton-s	KS
Diazinon	KS
Dichlorovos (DDVP, Dichlorvos)	KS
Dimethoate	KS
Disulfoton	KS
Famphur	KS
Malathion	KS
Merphos	KS
Methyl parathion (Parathion, methyl)	KS
Naled	KS
Parathion, ethyl	KS
Phorate	KS
Ronnel	KS
Simazine	KS
Terbufos	KS
Tetrachlorvinphos (Stirophos, Gardona) E-isomer	KS
Method EPA 8151A	
2,4,5-T	KS
2,4-D	KS
2,4-DB	KS
3,5-Dichlorobenzoic acid	KS
Acifluorfen	KS
Bentazon	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Non Potable Water)***	
Dalapon	KS
DCPA di acid degradate	KS
Dicamba	KS
Dichloroprop (Dichlorprop)	KS
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	KS
MCPA	KS
MCPP	KS
Pentachlorophenol	KS
Picloram	KS
Silvex (2,4,5-TP)	KS
Method EPA 8260C	
1,1,1,2-Tetrachloroethane	KS
1,1,1-Trichloroethane	KS
1,1,2,2-Tetrachloroethane	KS
1,1,2-Trichloro-1,2,2-trifluoroethane	KS
1,1,2-Trichloroethane	KS
1,1-Dichloroethane	KS
1,1-Dichloroethylene	KS
1,1-Dichloropropene	KS
1,2,3-Trichlorobenzene	KS
1,2,3-Trichloropropane	KS
1,2,4-Trichlorobenzene	KS
1,2,4-Trimethylbenzene	KS
1,2-Dibromo-3-chloropropane (DBCP)	KS
1,2-Dibromoethane (EDB, Ethylene dibromide)	KS
1,2-Dichlorobenzene (o-Dichlorobenzene)	KS
1,2-Dichloroethane (Ethylene dichloride)	KS
1,2-Dichloropropane	KS
1,3,5-Trichlorobenzene	KS
1,3,5-Trimethylbenzene	KS
1,3-Dichlorobenzene	KS
1,3-Dichloropropane	KS
1,4-Dichlorobenzene	KS
1,4-Dioxane (1,4- Diethyleneoxide)	KS
1-Methylnaphthalene	KS
2,2-Dichloropropane	KS
2-Butanone (Methyl ethyl ketone, MEK)	KS
2-Chloroethyl vinyl ether	KS
2-Chlorotoluene	KS
2-Hexanone	KS
2-Methylnaphthalene	KS
4-Chlorotoluene	KS
4-Isopropyltoluene (p-Cymene,p-Isopropyltoluene)	KS
4-Methyl-2-pentanone (MIBK)	KS
Acetone	KS
Acetonitrile	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Non Potable Water)***	
Acrolein (Propenal)	KS
Acrylonitrile	KS
Allyl chloride (3-Chloropropene)	KS
Benzene	KS
Bromobenzene	KS
Bromochloromethane	KS
Bromodichloromethane	KS
Bromoform	KS
Carbon disulfide	KS
Carbon tetrachloride	KS
Chlorobenzene	KS
Chlorodibromomethane	KS
Chloroethane (Ethyl chloride)	KS
Chloroform	KS
Chloroprene (2-Chloro-1,3-butadiene)	KS
cis-1,2-Dichloroethylene	KS
cis-1,3-Dichloropropene	KS
Cyclohexane	KS
Dibromomethane (Methylene bromide)	KS
Dichlorodifluoromethane (Freon-12)	KS
Diethyl ether	KS
Ethyl acetate	KS
Ethyl methacrylate	KS
Ethylbenzene	KS
Hexachlorobutadiene	KS
Iodomethane (Methyl iodide)	KS
Isobutyl alcohol (2-Methyl-1-propanol)	KS
Isopropylbenzene	KS
Methacrylonitrile	KS
Methyl acetate	KS
Methyl bromide (Bromomethane)	KS
Methyl chloride (Chloromethane)	KS
Methyl methacrylate	KS
Methyl tert-butyl ether (MTBE)	KS
Methylcyclohexane	KS
Methylene chloride (Dichloromethane)	KS
m-Xylene	KS
Naphthalene	KS
n-Butyl alcohol (1-Butanol, n-Butanol)	KS
n-Butylbenzene	KS
n-Hexane	KS
n-Propylbenzene	KS
o-Xylene	KS
Propionitrile (Ethyl cyanide)	KS
p-Xylene	KS
sec-Butylbenzene	KS
Styrene	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Non Potable Water)***	
tert-Butyl alcohol	KS
tert-Butylbenzene	KS
Tetrachloroethylene (Perchloroethylene)	KS
Tetrahydrofuran (THF)	KS
Toluene	KS
trans-1,2-Dichloroethylene	KS
trans-1,3-Dichloropropylene	KS
trans-1,4-Dichloro-2-butene	KS
Trichloroethene (Trichloroethylene)	KS
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	KS
Vinyl acetate	KS
Vinyl chloride	KS
Xylene (total)	KS
Method EPA 8270C	
1,2,4,5-Tetrachlorobenzene	KS
1,2,4-Trichlorobenzene	KS
1,2-Dichlorobenzene (o-Dichlorobenzene)	KS
1,2-Diphenylhydrazine	KS
1,3,5-Trinitrobenzene (1,3,5-TNB)	KS
1,3-Dichlorobenzene	KS
1,3-Dinitrobenzene (1,3-DNB)	KS
1,4-Dichlorobenzene	KS
1,4-Naphthoquinone	KS
1,4-Phenylenediamine	KS
1-Methylnaphthalene	KS
1-Naphthylamine	KS
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-methylethyl)ether	KS
2,3,4,6-Tetrachlorophenol	KS
2,4,5-Trichlorophenol	KS
2,4,6-Trichlorophenol	KS
2,4-Dichlorophenol	KS
2,4-Dimethylphenol	KS
2,4-Dinitrophenol	KS
2,4-Dinitrotoluene (2,4-DNT)	KS
2,6-Dichlorophenol	KS
2,6-Dinitrotoluene (2,6-DNT)	KS
2-Acetylaminofluorene	KS
2-Chloronaphthalene	KS
2-Chlorophenol	KS
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	KS
2-Methylaniline (o-Toluidine)	KS
2-Methylaniline (o-Toluidine)	KS
2-Methylnaphthalene	KS
2-Methylphenol (o-Cresol)	KS
2-Naphthylamine	KS
2-Nitroaniline	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Non Potable Water)***	
2-Nitrophenol	KS
2-Picoline (2-Methylpyridine)	KS
3,3'-Dichlorobenzidine	KS
3,3'-Dimethylbenzidine	KS
3-Methylcholanthrene	KS
3-Methylphenol (m-Cresol)	KS
3-Nitroaniline	KS
4-Aminobiphenyl	KS
4-Bromophenyl phenyl ether	KS
4-Chloro-3-methylphenol	KS
4-Chloroaniline	KS
4-Chlorophenyl phenylether	KS
4-Dimethyl aminoazobenzene	KS
4-Methylphenol (p-Cresol)	KS
4-Nitroaniline	KS
4-Nitrophenol	KS
4-Nitroquinoline 1-oxide	KS
5-Nitro-o-toluidine	KS
7,12-Dimethylbenz(a) anthracene	KS
a-a-Dimethylphenethylamine	KS
Acenaphthene	KS
Acenaphthylene	KS
Acetophenone	KS
Aniline	KS
Anthracene	KS
Aramite	KS
Atrazine	KS
Benzaldehyde	KS
Benzidine	KS
Benzo(a)anthracene	KS
Benzo(a)pyrene	KS
Benzo(b)fluoranthene	KS
Benzo(g,h,i)perylene	KS
Benzo(k)fluoranthene	KS
Benzoic acid	KS
Benzyl alcohol	KS
Biphenyl	KS
bis(2-Chloroethoxy)methane	KS
bis(2-Chloroethyl) ether	KS
Butyl benzyl phthalate	KS
Caprolactam	KS
Carbazole	KS
Chlorobenzilate	KS
Chrysene	KS
Di(2-ethylhexyl) phthalate (bis(2-Ethylhexyl)phthalate, DEHP)	KS
Diallate	KS
Dibenz(a,h) anthracene	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Non Potable Water)***	
Dibenzofuran	KS
Diethyl phthalate	KS
Dimethoate	KS
Dimethyl phthalate	KS
Di-n-butyl phthalate	KS
Di-n-octyl phthalate	KS
Diphenylamine	KS
Disulfoton	KS
Ethyl methanesulfonate	KS
Famphur	KS
Fluoranthene	KS
Fluorene	KS
Hexachlorobenzene	KS
Hexachlorobutadiene	KS
Hexachlorocyclopentadiene	KS
Hexachloroethane	KS
Hexachlorophene	KS
Hexachloropropene	KS
Indeno(1,2,3-cd) pyrene	KS
Isodrin	KS
Isophorone	KS
Isosafrole	KS
Kepone	KS
Methapyrilene	KS
Methyl methanesulfonate	KS
Methyl parathion (Parathion, methyl)	KS
Naphthalene	KS
Nitrobenzene	KS
n-Nitrosodiethylamine	KS
n-Nitrosodimethylamine	KS
n-Nitroso-di-n-butylamine	KS
n-Nitrosodi-n-propylamine	KS
n-Nitrosodiphenylamine	KS
n-Nitrosomethylethalamine	KS
n-Nitrosomorpholine	KS
n-Nitrosopiperidine	KS
n-Nitrosopyrrolidine	KS
o,o,o-Triethyl phosphorothioate	KS
Parathion, ethyl	KS
Pentachlorobenzene	KS
Pentachloronitrobenzene	KS
Pentachlorophenol	KS
Phenacetin	KS
Phenanthrene	KS
Phenol	KS
Phorate	KS
p-Phenylenediamine	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Non Potable Water)***	
Pronamide (Kerb)	KS
Pyrene	KS
Pyridine	KS
Safrole	KS
Sulfotep (Tetraethyl dithiopyrophosphate)	KS
Thionazin (Zinophos)	KS
Method EPA 8270C SIM	
1-Methylnaphthalene	KS
2-Methylnaphthalene	KS
Acenaphthene	KS
Acenaphthylene	KS
Anthracene	KS
Benzo(a)anthracene	KS
Benzo(a)pyrene	KS
Benzo(b)fluoranthene	KS
Benzo(g,h,i)perylene	KS
Benzo(k)fluoranthene	KS
Chrysene	KS
Dibenz(a,h) anthracene	KS
Fluoranthene	KS
Fluorene	KS
Indeno(1,2,3-cd) pyrene	KS
Naphthalene	KS
Phenanthrene	KS
Pyrene	KS
Method EPA 9012A	
Amenable cyanide	KS
Cyanide	KS
Method EPA 9038	
Sulfate	KS
Method EPA 9056A	
Bromide	KS
Chloride	KS
Fluoride	KS
Iodide	KS
Nitrate	KS
Nitrite	KS
Sulfate	KS
Method EPA 9066	
Total phenolics	KS
Method EPA 9095B	
Paint Filter Test	KS
Method EPA RSK-175 (GC/FID)	
Ethane	KS
Ethene	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177** Page 17 of 26

Pace Analytical Services, Inc - Indianapolis IN **Primary AB**

Program/Matrix: ***RCRA (Non Potable Water)***

Methane KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***	
Method EPA 1010A	
Ignitability	KS
Method EPA 1311	
Toxicity Characteristic Leaching Procedure (TCLP)	KS
Method EPA 1312	
Synthetic Precipitation Leaching Procedure (SPLP)	KS
Method EPA 6010B	
Aluminum	KS
Antimony	KS
Arsenic	KS
Barium	KS
Beryllium	KS
Boron	KS
Cadmium	KS
Calcium	KS
Chromium	KS
Cobalt	KS
Copper	KS
Iron	KS
Lead	KS
Magnesium	KS
Manganese	KS
Molybdenum	KS
Nickel	KS
Potassium	KS
Selenium	KS
Silver	KS
Sodium	KS
Strontium	KS
Thallium	KS
Tin	KS
Titanium	KS
Vanadium	KS
Zinc	KS
Method EPA 6020	
Aluminum	KS
Antimony	KS
Arsenic	KS
Barium	KS
Beryllium	KS
Cadmium	KS
Chromium	KS
Cobalt	KS
Copper	KS
Lead	KS
Manganese	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***	
Nickel	KS
Selenium	KS
Silver	KS
Thallium	KS
Vanadium	KS
Zinc	KS
Method EPA 7196A	
Chromium VI	KS
Method EPA 7470A	
Mercury	KS
Method EPA 7471A	
Mercury	KS
Method EPA 8015D	
Diesel range organics (DRO)	KS
Ethanol	KS
Ethylene glycol	KS
Gasoline range organics (GRO)	KS
Isobutyl alcohol (2-Methyl-1-propanol)	KS
Isopropyl alcohol (2-Propanol, Isopropanol)	KS
Methanol	KS
n-Butyl alcohol (1-Butanol, n-Butanol)	KS
n-Propanol (1-Propanol)	KS
Propylene glycol	KS
Method EPA 8081B	
4,4'-DDD	KS
4,4'-DDE	KS
4,4'-DDT	KS
Aldrin	KS
alpha-BHC (alpha-Hexachlorocyclohexane)	KS
alpha-Chlordane, cis-Chlordane	KS
beta-BHC (beta-Hexachlorocyclohexane)	KS
Chlordane (tech.)(N.O.S.)	KS
delta-BHC	KS
Dieldrin	KS
Endosulfan I	KS
Endosulfan II	KS
Endosulfan sulfate	KS
Endrin	KS
Endrin aldehyde	KS
Endrin ketone	KS
gamma-BHC (Lindane, gamma-HexachlorocyclohexanE)	KS
gamma-Chlordane	KS
Heptachlor	KS
Heptachlor epoxide	KS
Methoxychlor	KS
Toxaphene (Chlorinated camphene)	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***	
Method EPA 8082A	
Aroclor-1016 (PCB-1016)	KS
Aroclor-1221 (PCB-1221)	KS
Aroclor-1232 (PCB-1232)	KS
Aroclor-1242 (PCB-1242)	KS
Aroclor-1248 (PCB-1248)	KS
Aroclor-1254 (PCB-1254)	KS
Aroclor-1260 (PCB-1260)	KS
Method EPA 8141B	
Atrazine	KS
Azinphos-methyl (Guthion)	KS
Chlorpyrifos	KS
Chlorpyrifos-methyl	KS
Demeton-o	KS
Demeton-s	KS
Diazinon	KS
Dichlorovos (DDVP, Dichlorvos)	KS
Dimethoate	KS
Disulfoton	KS
Famphur	KS
Malathion	KS
Merphos	KS
Methyl parathion (Parathion, methyl)	KS
Naled	KS
Parathion, ethyl	KS
Phorate	KS
Ronnel	KS
Simazine	KS
Terbufos	KS
Tetrachlorvinphos (Stirophos, Gardona) E-isomer	KS
Method EPA 8151A	
2,4,5-T	KS
2,4-D	KS
2,4-DB	KS
3,5-Dichlorobenzoic acid	KS
Acifluorfen	KS
Bentazon	KS
Dalapon	KS
DCPA di acid degradate	KS
Dicamba	KS
Dichloroprop (Dichlorprop)	KS
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	KS
MCPA	KS
MCPP	KS
Pentachlorophenol	KS
Picloram	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***	
Silvex (2,4,5-TP)	KS
Method EPA 8260C	
1,1,1,2-Tetrachloroethane	KS
1,1,1-Trichloroethane	KS
1,1,2,2-Tetrachloroethane	KS
1,1,2-Trichloro-1,2,2-trifluoroethane	KS
1,1,2-Trichloroethane	KS
1,1-Dichloroethane	KS
1,1-Dichloroethylene	KS
1,1-Dichloropropene	KS
1,2,3-Trichlorobenzene	KS
1,2,3-Trichloropropane	KS
1,2,4-Trichlorobenzene	KS
1,2,4-Trimethylbenzene	KS
1,2-Dibromo-3-chloropropane (DBCP)	KS
1,2-Dibromoethane (EDB, Ethylene dibromide)	KS
1,2-Dichlorobenzene (o-Dichlorobenzene)	KS
1,2-Dichloroethane (Ethylene dichloride)	KS
1,2-Dichloropropane	KS
1,3,5-Trichlorobenzene	KS
1,3,5-Trimethylbenzene	KS
1,3-Dichlorobenzene	KS
1,3-Dichloropropane	KS
1,4-Dichlorobenzene	KS
1,4-Dioxane (1,4- Diethyleneoxide)	KS
1-Methylnaphthalene	KS
2,2-Dichloropropane	KS
2-Butanone (Methyl ethyl ketone, MEK)	KS
2-Chloroethyl vinyl ether	KS
2-Chlorotoluene	KS
2-Hexanone	KS
2-Methylnaphthalene	KS
4-Chlorotoluene	KS
4-Isopropyltoluene (p-Cymene,p-Isopropyltoluene)	KS
4-Methyl-2-pentanone (MIBK)	KS
Acetone	KS
Acetonitrile	KS
Acrolein (Propenal)	KS
Acrylonitrile	KS
Allyl chloride (3-Chloropropene)	KS
Benzene	KS
Bromobenzene	KS
Bromochloromethane	KS
Bromodichloromethane	KS
Bromoform	KS
Carbon disulfide	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***	
Carbon tetrachloride	KS
Chlorobenzene	KS
Chlorodibromomethane	KS
Chloroethane (Ethyl chloride)	KS
Chloroform	KS
cis-1,2-Dichloroethylene	KS
cis-1,3-Dichloropropene	KS
Dibromomethane (Methylene bromide)	KS
Dichlorodifluoromethane (Freon-12)	KS
Diethyl ether	KS
Ethyl acetate	KS
Ethyl methacrylate	KS
Ethylbenzene	KS
Hexachlorobutadiene	KS
Iodomethane (Methyl iodide)	KS
Isopropylbenzene	KS
Methacrylonitrile	KS
Methyl bromide (Bromomethane)	KS
Methyl chloride (Chloromethane)	KS
Methyl methacrylate	KS
Methyl tert-butyl ether (MTBE)	KS
Methylene chloride (Dichloromethane)	KS
m-Xylene	KS
Naphthalene	KS
n-Butyl alcohol (1-Butanol, n-Butanol)	KS
n-Butylbenzene	KS
n-Hexane	KS
n-Propylbenzene	KS
o-Xylene	KS
Propionitrile (Ethyl cyanide)	KS
p-Xylene	KS
sec-Butylbenzene	KS
Styrene	KS
tert-Butyl alcohol	KS
tert-Butylbenzene	KS
Tetrachloroethylene (Perchloroethylene)	KS
Toluene	KS
trans-1,2-Dichloroethylene	KS
trans-1,3-Dichloropropylene	KS
trans-1,4-Dichloro-2-butene	KS
Trichloroethene (Trichloroethylene)	KS
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	KS
Vinyl acetate	KS
Vinyl chloride	KS
Xylene (total)	KS

Method EPA 8270C

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***	
1,2,4,5-Tetrachlorobenzene	KS
1,2,4-Trichlorobenzene	KS
1,2-Dichlorobenzene (o-Dichlorobenzene)	KS
1,2-Diphenylhydrazine	KS
1,3-Dichlorobenzene	KS
1,3-Dinitrobenzene (1,3-DNB)	KS
1,4-Dichlorobenzene	KS
1,4-Naphthoquinone	KS
1,4-Phenylenediamine	KS
1-Methylnaphthalene	KS
1-Naphthylamine	KS
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-methylethyl)ether	KS
2,3,4,6-Tetrachlorophenol	KS
2,4,5-Trichlorophenol	KS
2,4,6-Trichlorophenol	KS
2,4-Dichlorophenol	KS
2,4-Dimethylphenol	KS
2,4-Dinitrophenol	KS
2,4-Dinitrotoluene (2,4-DNT)	KS
2,6-Dichlorophenol	KS
2,6-Dinitrotoluene (2,6-DNT)	KS
2-Acetylaminofluorene	KS
2-Chloronaphthalene	KS
2-Chlorophenol	KS
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	KS
2-Methylaniline (o-Toluidine)	KS
2-Methylaniline (o-Toluidine)	KS
2-Methylnaphthalene	KS
2-Methylphenol (o-Cresol)	KS
2-Naphthylamine	KS
2-Nitroaniline	KS
2-Nitrophenol	KS
2-Picoline (2-Methylpyridine)	KS
3,3'-Dichlorobenzidine	KS
3,3'-Dimethylbenzidine	KS
3-Methylcholanthrene	KS
3-Methylphenol (m-Cresol)	KS
3-Nitroaniline	KS
4-Aminobiphenyl	KS
4-Bromophenyl phenyl ether	KS
4-Chloro-3-methylphenol	KS
4-Chloroaniline	KS
4-Chlorophenyl phenylether	KS
4-Dimethyl aminoazobenzene	KS
4-Methylphenol (p-Cresol)	KS
4-Nitroaniline	KS
4-Nitrophenol	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***	
4-Nitroquinoline 1-oxide	KS
5-Nitro-o-toluidine	KS
7,12-Dimethylbenz(a) anthracene	KS
a-a-Dimethylphenethylamine	KS
Acenaphthene	KS
Acenaphthylene	KS
Acetophenone	KS
Aniline	KS
Anthracene	KS
Aramite	KS
Benzidine	KS
Benzo(a)anthracene	KS
Benzo(a)pyrene	KS
Benzo(b)fluoranthene	KS
Benzo(g,h,i)perylene	KS
Benzo(k)fluoranthene	KS
Benzoic acid	KS
Benzyl alcohol	KS
bis(2-Chloroethoxy)methane	KS
bis(2-Chloroethyl) ether	KS
Butyl benzyl phthalate	KS
Carbazole	KS
Chlorobenzilate	KS
Chrysene	KS
Di(2-ethylhexyl) phthalate (bis(2-Ethylhexyl)phthalate, DEHP)	KS
Diallate	KS
Dibenz(a,h) anthracene	KS
Dibenzofuran	KS
Diethyl phthalate	KS
Dimethoate	KS
Dimethyl phthalate	KS
Di-n-butyl phthalate	KS
Di-n-octyl phthalate	KS
Diphenylamine	KS
Disulfoton	KS
Ethyl methanesulfonate	KS
Famphur	KS
Fluoranthene	KS
Fluorene	KS
Hexachlorobenzene	KS
Hexachlorobutadiene	KS
Hexachlorocyclopentadiene	KS
Hexachloroethane	KS
Hexachlorophene	KS
Hexachloropropene	KS
Indeno(1,2,3-cd) pyrene	KS
Isodrin	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177**

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***	
Isophorone	KS
Isosafrole	KS
Kepone	KS
Methapyrilene	KS
Methyl methanesulfonate	KS
Methyl parathion (Parathion, methyl)	KS
Naphthalene	KS
Nitrobenzene	KS
n-Nitrosodiethylamine	KS
n-Nitrosodimethylamine	KS
n-Nitroso-di-n-butylamine	KS
n-Nitrosodi-n-propylamine	KS
n-Nitrosodiphenylamine	KS
n-Nitrosomethylethalamine	KS
n-Nitrosomorpholine	KS
n-Nitrosopiperidine	KS
n-Nitrosopyrrolidine	KS
o,o,o-Triethyl phosphorothioate	KS
Parathion, ethyl	KS
Pentachlorobenzene	KS
Pentachloronitrobenzene	KS
Pentachlorophenol	KS
Phenacetin	KS
Phenanthrene	KS
Phenol	KS
Phorate	KS
Pronamide (Kerb)	KS
Pyrene	KS
Pyridine	KS
Safrole	KS
Sulfotep (Tetraethyl dithiopyrophosphate)	KS
Thionazin (Zinophos)	KS
Method EPA 8270C SIM	
1-Methylnaphthalene	KS
2-Methylnaphthalene	KS
Acenaphthene	KS
Acenaphthylene	KS
Anthracene	KS
Benzo(a)anthracene	KS
Benzo(a)pyrene	KS
Benzo(b)fluoranthene	KS
Benzo(g,h,i)perylene	KS
Benzo(k)fluoranthene	KS
Chrysene	KS
Dibenz(a,h) anthracene	KS
Fluoranthene	KS

Attachment 9: Pace Analytical Services Indianapolis Laboratory Accreditation (cont.)

EPA Number: ***IN00043*** **Scope of Accreditation for Certification Number:** **E-10177** Page 26 of 26

Pace Analytical Services, Inc - Indianapolis IN

	Primary AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***	
Fluorene	KS
Indeno(1,2,3-cd) pyrene	KS
Naphthalene	KS
Phenanthrene	KS
Pyrene	KS
Method EPA 9012A	
Amenable cyanide	KS
Cyanide	KS
Method EPA 9045C	
pH	KS
Method EPA 9066	
Total phenolics	KS
Method EPA 9095B	
Paint Filter Test	KS

End of Scope of Accreditation