Fixed Station Water Monitoring Quality Assurance Program Plan (QAPP)

B-055-OWQ-WAP-TGM-23-Q-R0

Office: Water Quality

Branch: Watershed Assessment and Planning

Section: Targeted Monitoring

IDEM contract(s): Memorandum of Understanding Between the Department of Environmental Management and the Indiana Department of Health (1990)

Original effective date: October 17, 2023

Most current effective date: October 17, 2023

IDEM requires annual reviews of program QAPPs to confirm the requirements of the data operation have not changed. Both project and program QAPPs should be immediately revised and re-approved if any changes occur to the goals, acceptance criteria, methodology, or analysis requirements. For project QAPPs, changes to the time or location also require revision.

QAPP Revision Number: 0

QAPP author(s): Kaleb Duncan, Khai Duncan, Ali Meils and Miranda Belanger

A. Program Management

The elements under this section address basic program management (e.g., program history and objectives, roles, responsibilities of participants). These elements ensure the program has a defined goal, the participants understand the goal and the planned approach, and planning outputs are documented.

A.1. Title and Approval Sheet

Ali Mells, Chief, Targeted Monitoring Section — Date: 11/6/2024

David Tsetse, Chief, Technical and Logistical Services — Date: 11/8/2024

Timothy Bowren, Quality Assurance Lead, Technical and Logistical Services — Date: 11/7/2024

Charles Hostetter, Quality Assurance Officer, Technical and Logistical Services — Date: 11/8/2024

David Jordan, Quality Assurance Officer, Technical and Logistical Services — Date: 11/6/2024

Kristen Arnold, Chief, Watershed Assessment and Planning Branch — Date: 11/7/2024

The IDEM quality assurance (QA) reviewer

Quality Assurance Staff
IDEM Office of Program Support — Date: 11/27/2024

QAPP Summary:

The Quality Assurance Program Plan (QAPP) for the Fixed Station Monitoring Program has been prepared for environmental data collection for a wide variety of Watershed Assessment and Planning Branch (WAPB), Office of Water Quality (OWQ), and other non-point source Indiana Department of Environmental Management (IDEM) water quality monitoring programs. The structure and organization of the QAPP complies with the most recent 2006 “EPA Guidance for Quality Assurance Program Plans, EPA QA/G-5” (EPA/240/R-02/009); and provides a comprehensive description of several elements specified by the United States Environmental Protection Agency (U.S. EPA). The Title, Signature Page, and Table of Contents of this QAPP constitute the first two elements. The remaining elements provide the body of the QAPP.

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

This QAPP is expected to serve as a guide to WAPB project officers, field personnel, and quality assurance staff charged with the collection and review of physical, chemical, and microbiological water quality data. It is intended to provide guidance to Indiana Department of Health (IDOH) analytical laboratory staff charged with the analysis of fixed station samples to provide results that will meet the DQOs. Successful collection of precise, accurate, and complete data will provide IDEM and U.S. EPA with decisiveness that can be used to implement programs to improve and maintain water quality in the State of Indiana.

QAPP Contact Information:

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Indianapolis, IN 46204-2251
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Ray Beebe
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Indianapolis, IN 46202

Phone: (317) 921-5815
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Laboratory Accreditation and Performance Testing Information:

Laboratory contracts require accreditation by outside bodies and participation in at least annual performance studies which exists for the contracted lab methods and media. Typically, labs maintain accreditation with National Environmental Laboratory Accreditation Program (NELAP), American Association for Laboratory Accreditation (A2LA), and other state accreditation bodies. Accreditation is usually renewed annually. Current accreditation and recently completed performance studies are detailed in the annual IDEM Quality Assurance Annual Report to the U.S. EPA (section A.2). Accreditation information for the current contract lab is listed in the table below.

2023 Contract Lab Accreditation			
	Current Lab Accreditations		
Contract Lab	**Accrediting Body**	**Certification or Accreditation Number(s)**	**Expiration Date**
IDOH (formerly ISDH)	EPA Region 5	LAB-10C SDWA	10/24/2025

Program QA staff:

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IDEM QA staff:

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A.1. Table of Contents

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A.2. Distribution List

The IDEM staff listed in Table 1 will be notified by email and copied on the most recent version of this QAPP each time:

- This QAPP is revised and replaced by an up-to-date version.
- This QAPP (effective from 2023 – 2027) has passed its expiration date and is either replaced by a reauthorized version of this same QAPP or a revised QAPP, or the program under which this QAPP was implemented is ended.

Table 1 QAPP Distribution List

Name	QAPP Tasks or Roles	Email
Kristen Arnold	Branch Chief, Watershed Assessment and Planning Branch	karnold@idem.in.gov
Martha Clark Mettler	WAPB OWQ Commissioner	mclark@idem.in.gov
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Stacey Sobat	Probabilistic Monitoring Section Chief	stobat@idem.in.gov
David Tsetse	Technical and Logistical Services Section Chief WAPB QA Manager – Review laboratory data results, manage lab contracts	dtsetse@idem.in.gov
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Charles Hostetter David Jordan	WAPB QA Staff – Review laboratory data results, manage lab contracts	cjhostet@idem.in.gov djordan@idem.in.gov
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James (Michael) French	IDEM Office of Legal Counsel (OLC) representative	jfrench@idem.in.gov

A.3. Program or Task Organization

Individuals or organizations with a role in this QAPP are identified below in Table 2.

Table 2 Key QAPP Individuals

Role	Name	Affiliation	Phone	Email
WAPB Branch Chief	Kristen Arnold	IDEM	(317) 308-3142	karnold@idem.in.gov
Targeted Monitoring Section Chief	Ali Meils	IDEM	(317) 308-3204	ameils@idem.in.gov
Fixed Station Program Manager	Khai Duncan Kaleb Duncan	IDEM	(317) 308-3024 (317) 619-0656	kaduncan@idem.in.gov kmduncan@idem.in.gov
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QAPP Maintenance and Distribution	Ali Meils	IDEM	(317) 308-3204	ameils@idem.in.gov
Lead Data Reviewer	Tim Bowren Charles Hostetter David Jordan	IDEM	(317) 308-3181 (317) 308-3369 (317) 308-3100	tbowren@idem.in.gov cjhostet@idem.in.gov djordan@idem.in.gov
Integrated Report Coordinator	Paul McMurray	IDEM	(317) 308-3210	pmcmurra@idem.in.gov
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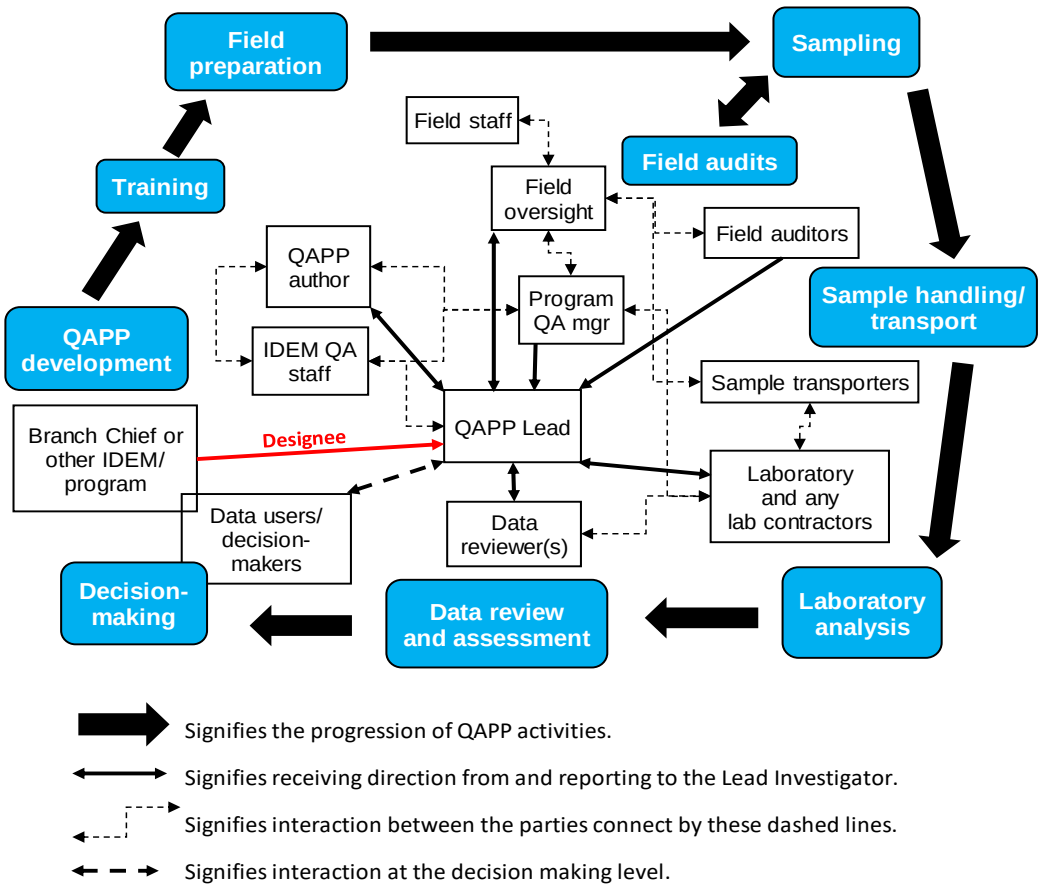
The organizational chart, “IDEM QAPP Lines of Authority”, depicts the relationships and the lines of communication among the key program participants listed in Table 2, throughout the various stages of this QAPP. This QAPP is a product of planning by the lead investigator, or project leader and a team of program area staff, which could include any of the staff depicted in the organizational chart, plus other program area staff with expertise in the topic of this QAPP.

Nearly all standard IDEM data operations (QAPPs) include the same basic staff relationships, with these primary exceptions:

- Some of the positions shown may be staffed by more than one person.
- One person may staff more than one of the positions shown.

IDEM QAPP Lines of Authority



A.4. Background

A.5.1. The Study

The Fixed Station Monitoring Program was created in 1957 by the Division of Sanitary Engineering, Indiana State Board of Health. Initially, 49 sites were selected from across the state for the bi-weekly collection of surface water samples for physical, chemical, and bacteriological water quality analyses. IDEM was created in April 1986 and the Office of Water Management (OWM), now called the Office of Water Quality (OWQ), assumed operation of this program. Numerous changes and improvements have been made since this program was first established and taken over by IDEM.

Currently, the Indiana Fixed Station Water Quality Monitoring Program is designed to gather monthly water quality data from 165 sampling locations statewide. Sampling locations target major rivers and tributaries, drinking water intakes, and monitoring recommendations by other agency programs, enabling routine water quality assessments that can show changes in pollutants over time.

The Fixed Station Program collects surface water quality data for the following purposes:

- To fulfill requirements of Clean Water Act (CWA) §305(b), §303(d), and §314 to assess all waters of the state to determine if they are meeting their designated uses and to identify those waters that are not.
- To support OWQ programs including water quality standards (WQS) development, National Pollutant Discharge Elimination System (NPDES) permitting, and compliance.
- To determine water quality trends and to evaluate program performance.

For Fixed Station sampling, the state is divided geographically into 16 routes, listed in Table 3 and illustrated in Figure 5.1. A table of historical Fixed Station sites and their sampling period can be found in Appendix A.

Fixed Station Sampling Route

East	Northwest B
Indianapolis	Northwest Central
North Central	South A
North	South B
Northeast Central	Southeast
Northeast Ft. Wayne	Southwest A
Northeast IDEM	Southwest B
Northwest A	West

Chemical and microbiological analyses for fixed station monitoring programs are performed by the Indiana Department of Health (IDOH) Laboratory. Parameters measured and data quality objectives and assessments for the Fixed Station Monitoring Program are covered and documented in this QAPP.

Figure 1: Fixed Station Routes

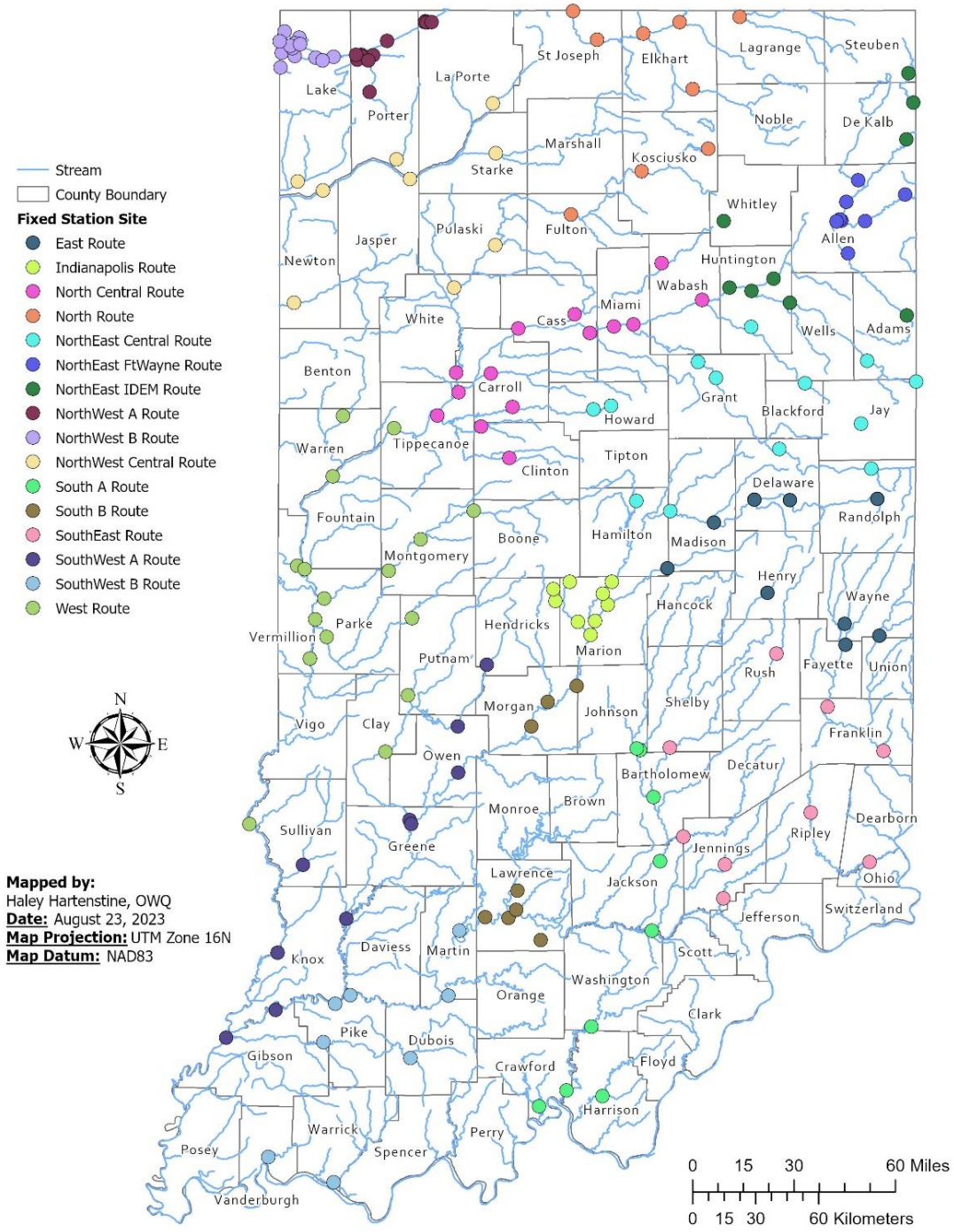


Table 3 Fixed Station Sampling Network (N=165)

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
East Route						
BL-64	WED010-0005	10	Big Blue River	CR 400 South, near Spiceland	39.8736726	-85.4390804
GF-2	GMW020-0001	11	Greens Fork	South Jacksonburg Road - east of Milton at Kirlin Road	39.7723359	-85.1086882
NF-1	GMW030-0001	12	Nolands Fork	CR 440, Waterloo	39.7035198	-85.10457916
WHE-27	GMW070-0006	13	East Fork Whitewater River	Potter Shop Road Bridge, east of Abington	39.7331951	-84.95936344
WR-348	WWU010-0006	14	West Fork White River	US 27, Winchester	40.1820446	-84.96885353
WR-319	WWU010-0001	15	West Fork White River	Memorial Drive, Muncie	40.1783333	-85.34222222
WR-309	WWU020-0005	16	West Fork White River	Tiger Drive, canoe launch at Morrow's Meadow City Park, Yorktown	40.178812	-85.49491813
WR-293	WWU030-0003	17	West Fork White River	Edgewater Park boat ramp near Old Water Works Dam site, Anderson	40.1039725	-85.66832673
FC-26	WWU100-0001	18	Fall Creek	Southeastern Parkway (Old SR 238), near Fortville	39.954571	-85.86721387
Indianapolis Route						
FC-0.6	WWU110-0001	19	Fall Creek	Stadium Drive, Indianapolis	39.7817287	-86.17678786
FC-7	WWU110-0002	20	Fall Creek	Keystone Avenue, near 38th Street and IWC intake, Indianapolis	39.834341	-86.12189113
IWC-9	WWU090-0004	21	Indianapolis Waterway Canal	Guilford Avenue, Broad Ripple	39.8713112	-86.14294359

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
WR-248	WWU090-0002	22	West Fork White River	86th Street, Nora	39.9103666	-86.10503468
EC-21	WWU120-0007	23	Eagle Creek	86th Street, south of Zionsville	39.9102654	-86.28567477
EC-7	WWU120-0002	24	Eagle Creek	Lynhurst Drive, Indianapolis	39.7782507	-86.25066696
EC-1	WWU120-0001	25	Eagle Creek	Raymond Street, Indianapolis	39.7352794	-86.19657553
SB-6	WWU-11-0007	167	School Branch	Maloney Road	39.885829	-86.355542
SB-3	WWU-11-0009	168	School Branch	Noble Drive	39.847356	-86.346527
North Central Route						
WCS-34	WAW040-0001	62	South Fork Wildcat Creek	CR 200 North, east of SR 38/SR 39/US 421	40.3150116	-86.54361852
WCM-7	WAW030-0022	63	Middle Fork Wildcat Creek	SR 26, at Edna Mills	40.4171336	-86.66357948
WC-32	WAW020-0039	64	Wildcat Creek	SR 75, near Cutler	40.4817866	-86.53009831
DC-5	WDE050-0002	65	Deer Creek	CR 300 North, northeast of Delphi	40.5905028	-86.62139957
TR-9	WTI150-0011	66	Tippecanoe River	SR 18, near Delphi	40.5938229	-86.77070859
WC-3	WAW050-0005	67	Wildcat Creek	SR 25, northeast of Lafayette	40.4537798	-86.85139234
WB-320	WDE060-0001	68	Wabash River	Americus Road/Grant Road, near SR 25	40.5288636	-86.76001791
WB-347	WDE010-0007	69	Wabash River	CR 675 West, west of Georgetown	40.7363591	-86.50488174
ELL-7	WAE070-0011	70	Eel River	CR 150 North, northeast of Logansport	40.782326	-86.26449731
PIP-5	WUW170-0002	71	Pipe Creek	CR 925 East, north of Onward	40.7218446	-86.19874928
WB-370	WUW160-0006	72	Wabash River	Business US 31, Peru	40.7427616	-86.09621705
MS-1	WMI060-0006	73	Mississinewa River	SR 124, downstream of reservoir, near Peru	40.749368	-86.0120578
ELL-41	WAE050-0001	74	Eel River	SR 15, boat ramp 150 ft upstream of SR 15 Bridge, northeast of Roann (Public Access Site)	40.9479224	-85.89075519

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
S-0	WSA040-0001	75	Salamonie River	East Hanging Rock Road Bridge, near Lagro	40.8296612	-85.71873431
North Route						
TR-105	WTI050-0036	53	Tippecanoe River	CR 200 West Bridge	41.1047222	-86.28027778
TR-139	WTI030-0001	54	Tippecanoe River	Kosciusko CR 700 West Bridge, near Atwood	41.2438889	-85.9775
TR-164	WTI010-0001	55	Tippecanoe River	SR 13, North Webster	41.3163889	-85.69222222
ER-29	LMJ190-0006	56	Elkhart River	Boat ramp 200 ft downstream of US 33 Bridge, Benton	41.5077778	-85.75944444
PGN-54	LMJ120-0009	57	Pigeon River	Scott Game Preserve boat ramp, off CR 675	41.74	-85.55694444
SJR-87	LMJ150-0004	58	Saint Joseph River	Boat ramp 500 yds upstream of North Division Street, Bristol	41.7227778	-85.81472222
ER-.3	LMJ-19-0002	59	Elkhart River	Pedestrian walk bridge off Waterfall Drive	41.685899	-85.970406
SJR-63	LMJ240-0026	60	Saint Joseph River	Boat ramp 300 ft upstream of Mishawaka Avenue bridge at Merrifield Park	41.6663889	-86.16777778
SJR-50	LMJ240-0024	61	Saint Joseph River	Boat Ramp at St. Patrick's County Park, South Bend	41.7577778	-86.27166667
Northeast Central Route						
WR-280	WWU040-0038	26	White River	Boat ramp on Water Street, east of Perkinsville	40.1421111	-85.85491667
CIC-17	WWU080-0002	27	Cicero Creek	Mt. Pleasant Road, east of Arcadia	40.1744444	-86.00055556
WC-60	WAW020-0004	28	Wildcat Creek	CR 300 W/Malfalfa Road, 1 mile west of Kokomo	40.4736111	-86.18416667
WC-66	WAW010-0063	29	Wildcat Creek	SR 931/South Reed Road/Old US 31, Kokomo	40.4861111	-86.1075

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
MS-36	WMI060-0005	30	Mississinewa River	Highland Avenue at boat ramp, Marion	40.5761111	-85.65972222
MS-28	WMI060-0004	31	Mississinewa River	Off CR 380 West, 500 yards downstream of CR 500 North Bridge, near Jalapa	40.6280556	-85.73583333
S-25	WSA040-0005	32	Salamonie River	SR 124, south of Lancaster	40.7416667	-85.50888889
WB-449	WUW060-0007	33	Wabash River	CR 400 West, northeast of Geneva	40.6311111	-85.01277778
S-50	WSA020-0002	34	Salamonie River	CR 500 East, Montpelier	40.5591667	-85.27861111
S-71	WSA010-0002	35	Salamonie River	CR 75 South, west of Portland	40.4275	-85.03888889
MS-99	WMI020-0002	36	Mississinewa River	CR 100 West, near Ridgeville	40.28	-84.99527778
MS-68	WMI030-0001	37	Mississinewa River	North Walnut Street, west of Eaton	40.3438889	-85.38833333
WB-467	WUW040-0005	163	Wabash River	Indiana-Ohio Line Road, at state line	40.5636111	-84.80277778
Northeast Ft. Wayne Route						
STM-.8	LES-06-0003	43	St Mary's River	Wells Street Bridge, Fort Wayne	41.0828185	-85.14402956
STJ-.5	LEJ100-0003	44	Saint Joseph River	Tennessee Street bridge, Fort Wayne	41.0891667	-85.12916667
CC-4	LEJ090-0026	45	Cedar Creek	Hursh Road Bridge	41.215	-85.05138889
M-114	LEM010-0013	49	Maumee River	SR 101 Bridge, 3 miles north of Woodburn	41.1697222	-84.84916667
M-129	LEM010-0014	50	Maumee River	Landin Road Bridge, New Haven/Fort Wayne	41.0844444	-85.02055556
STM-12	LES-06-0009	51	St Mary's River	Bostick Road Walk Bridge	40.979239	-85.094727
STJ-4	LEJ-08-0005	161	Saint Joseph River	Shoaff Park boat ramp	41.1455694	-85.10073056
M-132	LEM-01-0014	162	Maumee River	Tecumseh Street	41.084796	-85.122275

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
Northeast IDEM Route						
WB-420	WUW070-0002	38	Wabash River	SR 3 Bridge, Markle (2nd bridge after leaving town)	40.8194444	-85.3425
LR-7	WUW120-0002	39	Little River	CR 200 East, near Huntington	40.8984104	-85.41311283
WB-409	WUW090-0001	40	Wabash River	Etna Road, Huntington	40.8583635	-85.50737389
WB-402	WUW140-0001	41	Wabash River	SR 105 Bridge, north of Andrews	40.8686614	-85.6017086
ELL-66	WAE040-0002	42	Eel River	SR 5/14 Bridge, South Whitley	41.0834031	-85.62599248
FSH-18	LEJ050-0006	46	Fish Creek	SR 427, northeast of Hamilton	41.5586111	-84.83555556
FSH-5	LEJ050-0007	47	Fish Creek	CR 79, Artic	41.465	-84.81416667
STJ-36	LEJ060-0006	48	Saint Joseph River	SR 8 Bridge, Newville	41.3475	-84.84388889
STM-37	LES040-0007	52	St Mary's River	SR 101 Bridge, north of Pleasant Mills	40.7791667	-84.84222222
Northwest A Route						
TC-2	LMG070-0005	101	Trail Creek	Krueger Park Bridge, Michigan City	41.722838	-86.8753611
TC-1	LMG070-0008	102	Trail Creek	US 12 Bridge, Michigan City	41.72122	-86.89638607
LM-M	LMG070-0004	103	Lake Michigan	Raw water sample, Michigan City Waterworks	41.7250768	-86.9016515
TC-.5	LMG070-0007	104	Trail Creek	Franklin Street, Michigan City	41.7227821	-86.90467667
LM-DSP	LMM010-0002	105	Lake Michigan	Beach sample, Dunes State Park	41.6626639	-87.0659104
LCR-39	LMG060-0008	106	East Branch Little Calumet River	SR 149, south of US Highway 12, northwest of Porter	41.6168181	-87.12622159
SLC-17	LMG050-0007	107	Salt Creek	SR 130 Bridge, below STP, near Valparaiso	41.4987989	-87.14125894
SLC-1	LMG050-0006	108	Salt Creek	US 20, Portage	41.59968	-87.1463997
BD-3W	LMG040-0003	109	Burns Ditch	Portage Boat Yard Dock, Portage	41.6024729	-87.19342733
BD-2E	LMG060-0005	110	Burns Ditch	Crisman Road near SR 249, Portage	41.6126122	-87.17404518
BD-1	LMG060-0007	111	Burns Ditch	US 12, Portage Public Marina	41.6184014	-87.17632693

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
LM-OD	LMG020-0013	112	Lake Michigan	Raw water sample, Northwest Indiana Water Company, Ogden Dunes Treatment Plant	41.6183462	-87.19906122
Northwest B Route						
LM-G	LMG020-0009	113	Lake Michigan	Raw water sample, Northwest Indiana Water Company (Gary), Borman Park Treatment Plant	41.5997955	-87.34295552
GCR-42	LMG020-0012	114	Grand Calumet River	Bridge Street, near US Steel, Gary	41.6091529	-87.37201882
GCR-37	LMG020-0011	115	Grand Calumet River	Kennedy Avenue, East Chicago	41.6140953	-87.46160001
IHC-3S	LMG020-0004	116	Indiana Harbor Canal	Columbus Drive, East Chicago	41.6393929	-87.47129468
IHC-3W	LMG020-0005	117	Indiana Harbor Canal	Indianapolis Boulevard, East Chicago	41.6466558	-87.48077892
LM-EC	LMG020-0008	118	Lake Michigan	Raw sample water, East Chicago Waterworks	41.6524177	-87.43812602
IHC-2	LMG020-0003	119	Indiana Harbor Canal	Dickey Road, East Chicago	41.655114	-87.45928619
IHC-0	LMM010-0001	120	Indiana Harbor Canal	Harbor mouth at LTV Steel, East Chicago	41.6726427	-87.44234612
LM-H	LMG020-0010	122	Lake Michigan	Raw water sample, Hammond Waterworks	41.6923205	-87.50540236
WL-SL	LMG020-0014	123	Wolf Lake	Culvert at State Line Road, at end of 129th Street	41.661739	-87.52520402
GCR-34	UMC050-0002	124	Grand Calumet River	Hohman Avenue, Hammond	41.6243717	-87.51783346

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
LCR-13	UMC030-0004	125	Little Calumet River	Hohman Avenue, Hammond	41.5775661	-87.52236553
GCR-46	LMG020-0001	160	Grand Calumet River	At US Steel	41.6114401	-87.2950184
Northwest Central Route						
I-63	UMI050-0006	92	Iroquois River	CR 400 West, north of Kentland	40.8201436	-87.4640273
SD-10	UMK130-0001	93	Singleton Ditch	Parrish Avenue Bridge, north of Schneider	41.2120654	-87.44846907
KR-68	UMK110-0002	94	Kankakee River	SR 55, Shelby	41.1826966	-87.34058233
CRC-2	UMK090-0001	95	Crooked Creek	SR 49, south of Kouts	41.2820417	-87.02573392
KR-91	UMK080-0001	96	Kankakee River	CR 500 East, Dunns Bridge	41.2200109	-86.96907992
KR-117	UMK030-0020	97	Kankakee River	CR 1000 South, near LaPorte	41.4616585	-86.61399251
YR-12	UMK060-0001	98	Yellow River	CR 500 East, east of Knox	41.3022884	-86.60153629
TR-56	WTI080-0001	99	Tippecanoe River	SR 119, south of Winamac	41.006522	-86.60290718
BMC-1	WTI110-0001	100	Big Monon Ditch	SR 16, north of Monticello	40.8690764	-86.77907671
South A Route						
SGR-1	WED090-0004	143	Sugar Creek	CR 800 South, bridge to Atterbury west of US 31, Edinburgh	39.3609228	-85.99775593
BL-.7	WED050-0001	144	Big Blue River	US 31, Edinburgh	39.3552385	-85.98344131
EW-239	WEF060-0003	145	East Fork White River	SR 46, Columbus	39.2003685	-85.92662229
EW-168	WEU040-0001	146	East Fork White River	CR 725 North, at boat ramp above Seymour Waterworks Dam	38.9870095	-85.89837206
MU-20	WEM090-0002	147	Muscatatuck River	SR 39, west of Austin	38.7549727	-85.93434383
BLW-57	OBS140-0004	148	Blue River	US 150, Fredericksburg	38.4337882	-86.19169962
IND-23	OBS100-0004	149	Indian Creek	SR 135, city park south of Corydon	38.2013889	-86.145
BLW-10	OBS150-0008	150	Blue River	SR 62, near Wyandotte Cave	38.2203726	-86.2982754

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
LBR-3	OBS180-0007	151	Little Blue River	South Beechwood Road, northeast of Alton, southeast of Deuchers	38.1669419	-86.41577594
South B Route						
TC-MC	WEL020-0001	152	Mill Creek	Twin Caves, Spring Mill State Park, Mitchell	38.7243474	-86.40920377
BSC	WEL100-0001	153	Mystery River	Bluespring Caverns, Hartleyville, southwest of Bedford	38.7978873	-86.54700997
EW-79	WEL100-0002	154	East Fork White River	Williams Dam, Williams	38.7999886	-86.64668236
SLT-12	WEL090-0003	155	Salt Creek	Oolitic Road, near Oolitic	38.888438	-86.50861111
EW-94	WEL040-0003	156	East Fork White River	US 50/SR 37, public access boat ramp at, south of Bedford	38.8250319	-86.51348138
WR-192	WWU160-0004	157	West Fork White River	SR 39, Martinsville	39.4337962	-86.44942161
WLC-2	WWU150-0007	158	White Lick Creek	CR 600 North, near Centerton	39.5140765	-86.37999234
WR-210	WWU140-0003	159	West Fork White River	SR 144, near Waverly	39.5668659	-86.25514777
Southeast Route						
FR-64	WEF020-0002	1	Flatrock River	Gings Road, northeast of Rushville	39.6732765	-85.40109123
WHW-47	GMW040-0005	2	Whitewater River	Laurel Road, east of SR 121, north of US 52	39.4983384	-85.18266352
WHW-22	GMW080-0001	3	Whitewater River	Old SR 1, south of US 52, Cedar Grove	39.3532051	-84.94291345
LC-12	OML080-0003	4	Laughery Creek	Ford downstream of SR 262, near Milton	38.9841803	-85.00102243
LC-54	OML060-0004	5	Laughery Creek	SR 350, east of Osgood	39.1485747	-85.25349032
VF-38	WEM070-0001	6	Vernon Fork Muscatatuck River	CR 60 South, Vernon	38.9763615	-85.61982644

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
GC-8	WEM020-0002	7	Graham Creek	Ford at CR 75 West, near Commiskey	38.8631961	-85.6272643
SND-4	WEU030-0011	8	Sand Creek	CR 600 East, east of Reddington	39.0683781	-85.79875897
FR-17	WEF050-0002	9	Flatrock River	SR 252, near Flat Rock	39.3632004	-85.85632799
Southwest A Route						
MC-35	WWE060-0004	126	Mill Creek	US 40 Bridge, Stilesville	39.6367352	-86.64039749
MC-18	WWE060-0002	127	Mill Creek	US 231, near Devore	39.4335282	-86.76358544
WR-162	WWL020-0003	128	West Fork White River	South Main Street, Spencer	39.2805083	-86.76238014
EEL-1	WWE090-0001	129	Eel River	SR 67 Bridge, Worthington	39.1243248	-86.97007649
WR-134	WWL030-0003	130	West Fork White River	SR 157, Worthington	39.1100986	-86.96337893
BU-7	WBU160-0002	131	Busseron Creek	SR 58, Carlisle	38.9742196	-87.42611565
WR-81	WWL070-0003	132	West Fork White River	SR 358, near Edwardsport	38.7950463	-87.24186646
WB-130	WBU200-0003	133	Wabash River	Vigo Street/Old US Highway 50, Vincennes	38.6814725	-87.53525865
WR-19	WWL-10-0006	134	White River	Hazleton Public Access Site boat ramp	38.4908518	-87.54297815
WB-94	WLW-03-0001	166	Wabash River	SR 64, near Mount Carmel	38.3979841	-87.75532178
Southwest B Route						
WR-46	WWL100-0005	135	White River	SR 61, Petersburg	38.5112545	-87.28854767
EW-1	WEL170-0001	136	East Fork White River	SR 57, northeast of Petersburg	38.5390296	-87.22323988
P-35	WPA060-0002	137	Patoka River	CR 300 West, north of Oakland City	38.3828823	-87.33812904
PIG-3	OHP040-0004	138	Pigeon Creek	First Avenue, Evansville, Center Park	37.9956109	-87.5747795

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
LPC-5	OLP150-0007	139	Little Pigeon Creek	Yankeetown Road	37.9101404	-87.29566434
P-76	WPA040-0003	140	Patoka River	Old Huntingburg Road (CR 350 West), north of CR 400 South, west of US 231	38.3294488	-86.96684716
LST-2	WEL160-0003	141	Lost River	Simmons Creek Road	38.538163	-86.80462447
IN-2	WEL110-0002	142	Indian Creek	SR 450, near Trinity Springs	38.7557439	-86.75669293
West Route						
SC-57	WSU020-0003	76	Sugar Creek	CR 1100 East Bridge, Boone-Montgomery County line,	40.1433709	-86.69579875
WB-303	WLV030-0003	77	Wabash River	CR 700 West, south of Lafayette	40.4118191	-87.03623668
PC-21	WLV040-0003	78	Big Pine Creek	SR 55 Bridge, Pine Village	40.4523877	-87.25451699
WB-284	WLV080-0003	79	Wabash River	CR 200 West, south of Williamsport	40.2550918	-87.29966552
SC-39	WSU050-0002	80	Sugar Creek	US 136, Crawfordsville	40.050058	-86.92268622
RC-46	WLV160-0001	81	Big Raccoon Creek	CR 625 West bridge, northwest of Morton	39.7901003	-86.958799
SC-25	WSU050-0005	82	Sugar Creek	SR 234, boat ramp 100 ft downstream of bridge	39.9464557	-87.05911819
WB-256	WLV140-0001	83	Wabash River	SR 234, Cayuga	39.9517925	-87.41964283
V-0.8	WVE100-0001	84	Vermillion River	SR 63, Cayuga	39.9617786	-87.45084556
SC-2	WSU060-0004	85	Sugar Creek	Tow Path Road, West Union	39.8549219	-87.33636049
WB-240	WLV-16-0001	86	Wabash River	Boat ramp, Montezuma Town Park	39.786217	-87.373321
RC-5	WLV190-0012	87	Big Raccoon Creek	Wabash Street, Mecca	39.7292413	-87.32463687
WB-230	WLV200-0001	88	Wabash River	Upstream of SR 163, boat ramp at bottom of stairs, Clinton	39.6576736	-87.39582084
WB-172	WBU-13-0001	89	Wabash River	SR 154, near Hutsonville, IL	39.1102028	-87.65476111
EEL-38	WWE080-0001	90	Eel River	CR 200 East, southwest of Bowling Green	39.3506834	-87.07277768

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
BWC-4	WWE040-0001	91	Big Walnut Creek	CR 875 South, near Reelsville	39.5357771	-86.97639912

A.5.2. The Goal

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

Secondary objectives include providing data to:

- Calibrate and verify waste load allocations for NPDES permits;
- Make water quality assessments;
- Help develop TMDL documents;
- Help with watershed planning documents; and
- Verify dissolved metals trends from prior assessments using estimates from total metals.

All sites will be sampled for concentrations of physical and chemical parameters and evaluated as “supporting” or “non-supporting” when compared with water quality criteria shown in Table 4 [327 IAC 2-1-6 and 327 IAC 2-1.5-8] and following the decision-making processes that are described in Indiana’s 2024 Consolidated Assessment Listing Methodology (CALM) (IDEM 2024a). Water quality assessment of the entire state is expected to be completed biennially.

A.5.3. Inputs to be Used

The data generated by this operation will be compared to the following standards in Table 4 to support the decision-making process.

Table 4 (327 IAC 2-1-6, 327 IAC 2-1.5-8) Target Constituents for Decision-making

Parameters	Water Quality Criteria	Criterion
Ammonia-Nitrogen	Calculated based on pH and Temperature	Calculated CAC/CCC
Nitrate+Nitrite-Nitrogen	≤10 mg/L	Human Health point of drinking water intake
Metals (dissolved)	Calculated based on hardness	Calculated CAC/CCC
Arsenic III (dissolved)	190 µg/L	Calculated CAC/CCC
Cyanide	Total = 200 µg/L	Human Health point of drinking water intake
	Free = 5.2 µg/L (analyzed only if hit on Total)	Calculated CAC/CCC
Dissolved oxygen	≥ 5.0 mg/L (Warm Waters)	Daily Average
	Not less than 4.0 mg/L at any time	Single Reading
Dissolved oxygen	At least 6.0 mg/L (cold-water fish*)	Not less than 6.0 mg/L at any time and shall not be less than 7.0 mg/L in areas where spawning occurs
pH	6.0 - 9.0 S.U.	Must remain between 6.0 and 9.0 S.U. except for daily fluctuations that exceed 9.0 due to photosynthetic activity
Sulfate	Calculated based on hardness and chloride	In all waters outside the mixing zone
Chloride	Calculated based on hardness and sulfate values	Calculated CAC/CCC
*Escherichia coli (E. coli)*** (April-October Recreational season)	≤125 CFU/100mL or ≤125 MPN/100 mL	5 sample geometric mean based on at least 5 samples equally spaced over a 30-day period
	≤235 CFU/100 mL or ≤235 MPN/100 mL	Not to exceed in any one sample in a 30-day period; in cases where there are at least 10 samples, 10% of the samples may exceed the criterion when the exceedances are attributable solely to the discharge of treated wastewater from a WWTP
Dissolved solids	750 mg/L	Public water supply

CAC = Chronic Aquatic Criterion; CCC = Criterion Continuous Concentration; S.U. = Standard Units; MPN = Most Probable Number; CFU = Colony Forming Unit

*Waters protected for cold-water fish include those waters designated by the Indiana Department of Natural Resources for put-and-take trout fishing as well as salmonid waters listed in 327 IAC 2-1.5-5.
***E. coli* sampling was discontinued at Fixed Station sites in 2024.

In addition to the physical and chemical criteria listed in Table 4, data for several nutrient parameters will be evaluated with the benchmarks listed in the Consolidated Assessment and Listing Methodology (CALM, IDEM 2024a) and described below. Assuming a minimum of three sampling events, if two or more of the conditions below are met on the same date, the waterbody will be classified as "non-supporting" 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 (in the range 4.0-5.0 mg/L); or, any dissolved oxygen percent saturation measurements greater than 120%
- pH: any measurement greater than 9.0 Standard Units (S.U.); or, measurements consistently at or close to the Water Quality Standard (in the range 8.7-9.0 S.U.)
- Algae are described as "excessive" based on field observations

In addition to the standards in Table 4, other inputs (e.g., field conditions, matrix conditions, weather, etc.) that may impact sample results in this study are listed in Table 5. Occurrence of these conditions shall be reported on the Field Data Sheet.

Table 5 Other Inputs into this Study

Variables to be Recorded During Sample Collection	Why the Variable is Relevant
Frozen River	Unable to take samples if the river is frozen
Flooded Conditions	Unable to reach sampling locations when flooded
High Water Flow	Hazardous conditions; unable to reach main flow of river
Road Construction/Closure	Unable to reach sampling locations

A.5.4. Study Parameters

Each year, monthly sampling is conducted at fixed locations statewide. See Attachments 3-7 for geographic boundaries and specific parameters collected at fixed sampling locations for project years 2023-2027. While the focus of this program will consist of a network of 165 sites, additional sites may be sampled annually to fulfill requests by other programs or entities.

A.5.5. Analytic Approach

If the levels of parameters in Table 4 are exceeding water quality criterion established by Indiana Code 327 IAC 2-1-6 and 327 IAC 2-1.5-8, the program will recommend a “non-supporting” classification. Where the levels of parameters in Table 4 do not exceed water quality criterion established by Indiana Code 327 IAC 2-1-6 and 327 IAC 2-1.5-8 the program will recommend a “supporting” classification.

A.5. Program or Task

This section provides a detailed overview of all work to be performed, products to be produced, and the schedule for QAPP implementation necessary to resolve the problems addressed in A.5.

A.6.1. Sampling Plan

The sampling plan to be used for this QAPP are targeted locations. Any further details about the design of the sampling plan will be addressed in B.1.

Table 6 Constituents or Characteristics to be Sampled

Target Constituents or Parameters to be Sampled, Measured, or Recorded	Matrix from Which Sample will be Taken	Units in Which Constituents will be Measured	Sampling SOP or Procedure to be Followed
General chemistries (GC)	Water	mg/L	B-015-OWQ-WAP-XXX-24-T-R1
Nutrients	Water	mg/L	B-015-OWQ-WAP-XXX-24-T-R1
Metals	Water	ug/L	B-015-OWQ-WAP-XXX-24-T-R1
Organics, pesticides	Water	ug/L	B-015-OWQ-WAP-XXX-24-T-R1
*E. coli**	Water	MPN/100mL	B-013-OWQ-WAP-XXX-23-T-R1

***E. coli* sampling was discontinued at Fixed Station sites in 2024.

Table 7 Method of Analysis to be Employed in the Field or Lab

Constituent or Parameter	Method	Sensitivity Limit	Units
DO (data sonde optical)	ASTM D888-09(C)	0.01	mg/L
DO (field meter)	SM 4500-OG	0.01	mg/L
DO % Saturation (data sonde optical)	ASTM D888-09(C)	0.01	%
pH (data sonde)	EPA 150.2	0.01	SU
pH (field pH meter)	SM 4500H-B	0.01	SU
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)	0.1	°C
Turbidity (Data sonde)	SM 2130B	0.02	NTU
Turbidity (Hach Turbidimeter)	EPA 180.1	0.01	NTU

General Chemistries	CAS Number or OWQ Identifier	Method	IDEM CRQL (mg/L)
Alkalinity (as $CaCO_3$)	E-14506	EPA 310.2	10.0
Chloride	16887-00-6	SM4500Cl-E	1
Fluoride	16984-48-8	EPA 340.2	0.1
Cyanide (total)	57-12-5	EPA 335.4	0.01
Cyanide (weak acid dissociable)	57-12-5	SM4500CN- I	0.01
Cyanide (amenable to chlorination)	57-12-5	SM4500CN-G	0.01
Hardness (as $CaCO_3$)	E-11778	SM2340B	0.4
Solids, dissolved total (TDS)	E-10173	SM2540C	10.0
Solids, suspended total, (TSS)	E-10151	SM2540D	4.0
Solids, total (TS)	E-10151	SM2540B	1.0
Sulfate	14808-79-8	ASTM D516-16	6
Calcium	7440-70-2	EPA 200.7	0.20
Magnesium	7439-95-4	EPA 200.7	0.095

Nutrients	CAS Number or OWQ Identifier	Method	IDEM CRQL (mg/L)
$TBOD_5$	E-10106T5	SM5210B	2.0

Nutrients	CAS Number or OWQ Identifier	Method	IDEM CRQL (mg/L)
COD (chemical oxygen demand)	E-10117	SM5220D	3.0
Nitrogen, ammonia	7664-41-7	EPA 350.1	0.01
Nitrogen, nitrate+nitrite	E-10128	SM4500NO3-H	0.01
Phosphorus, total	7723-14-0	EPA 200.7	0.24
TKN	E-10264	EPA 351.2	0.1
DOC	E-DOC	EPA 415.3	0.5
TOC	E-10195	EPA 415.3	1.0

Total and/or Dissolved Metals	CAS Number or OWQ Identifier	Method	IDEM CRQL (µg/L)
Aluminum	7429-90-5	EPA 200.7	20.0
Arsenic	7440-38-2	EPA 200.8	2.0
Barium	7440-39-3	EPA 200.8	2.0
Boron	7440-42-8	EPA 200.7	20
Calcium	7440-70-2	EPA 200.7	20
Cadmium	7440-43-9	EPA 200.8	1.0
Chromium, Total (VI + III)	7440-47-3	EPA 200.8	3.0
Copper	7440-50-8	EPA 200.8	2.0
Iron	7439-89-6	EPA 200.7	20
Lead	7439-92-1	EPA 200.8	2.0
Magnesium	7439-95-4	EPA 200.7	95
Manganese	7439-96-5	EPA 200.8	0.5
Nickel	7439-92-1	EPA 200.8	1.5
Potassium	7440-09-7	EPA 200.7	100
Selenium	7440-02-0	EPA 200.8	4.0
Sodium	7440-23-5	EPA 200.7	100
Strontium	7440-24-6	EPA 200.7	2.0
Zinc	7440-66-6	EPA 200.7	6.0

Pesticide and SVOC Parameters	CAS Number or OWQ Identifier	Method	IDEM CRQL (µg/L)
4,4'-DDT	50-29-3	EPA 525.3	0.1
Acetochlor	34256-82-1	EPA 525.3	0.1
Alachlor	15972-60-8	EPA 525.3	0.1

Pesticide and SVOC Parameters	CAS Number or OWQ Identifier	Method	IDEM CRQL (µg/L)
Aldrin	309-00-2	EPA 525.3	0.1
Atrazine (Aatrex)	1912-24-9	EPA 525.3	0.1
Chlordane, Alpha-	5103-71-9	EPA 525.3	0.1
Chlordane, Gamma-	5103-74-2	EPA 525.3	0.1
Chlorpyrifos	2921-88-2	EPA 525.3	0.1
Clomazone	81777-89-1	EPA 525.3	0.1
Cyanazine (Bladex)	21725-46-2	EPA 525.3	0.1
Desethylatrazine	6190-65-4	EPA 525.3	1.0
Desisopropylatrazine	1007-28-9	EPA 525.3	1.0
Di(2-ethylhexyl) adipate	103-23-1	EPA 525.3	1.0
Dieldrin	60-57-1	EPA 525.3	0.1
Endrin	72-20-8	EPA 525.3	0.1
Heptachlor	76-44-8	EPA 525.3	0.1
Heptachlor Epoxide	1024-57-3	EPA 525.3	0.1
Lindane	58-89-9	EPA 525.3	0.1
Methoxychlor	72-43-5	EPA 525.3	0.1
Metolachlor	51218-45-2	EPA 525.3	0.1
Nonachlor, cis-	5103-73-1	EPA 525.3	0.1
Oxychlordane	27304-13-8	EPA 525.3	0.1
Pendimethalin	40487-42-1	EPA 525.3	0.1
Pentachlorophenol	87-86-5	EPA 525.3	0.1
Propachlor	1918-16-7	EPA 525.3	0.1
Simazine	122-34-9	EPA 525.3	0.1
trans-Nonachlor	39765-80-5	EPA 525.3	0.1
Benzo[a]pyrene	50-32-8	EPA 525.3	0.1
DEHP	117-81-7	EPA 525.3	1.0
Hexachlorobenzene	118-74-1	EPA 525.3	0.1
Hexachlorocyclopentadiene	77-47-4	EPA 525.3	0.1
Trifluralin	1582-09-8	EPA 525.3	0.1
2-Hydroxyatrazine	2163-68-0	EPA 540	0.01
Acetamiprid	135410-20-7	EPA 540	0.01
Atrazine	1912-24-9	EPA 540	0.01
Clothianidin	210880-92-5	EPA 540	0.01
Desethylatrazine (DEA)	6190-65-4	EPA 540	0.01
Desisopropylatrazine (DIA)	1007-28-9	EPA 540	0.01

Pesticide and SVOC Parameters	CAS Number or OWQ Identifier	Method	IDEM CRQL (µg/L)
Fipronil	120068-37-3	EPA 540	0.01
Imidacloprid	138261-41-3	EPA 540	0.01
Simazine	122-34-9	EPA 540	0.01
Thiacloprid	111988-49-9	EPA 540	0.01
Thiamethoxam	153719-23-4	EPA 540	0.01

Bacteriology Method SM9223B	CAS Number or OWQ Identifier	IDEM CRQL (MPN)
*E. coli**	ECOLI	1.0

***E. coli sampling was discontinued at Fixed Station sites in 2024.*

A.6. Quality Objective and Criteria

This QAPP will measure and attempt to address the statistical variability of the data gathered following the data quality objective process described below.

A.7.1. Performance, Acceptance, and Decision Criteria

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

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

DQOs are qualitative and quantitative statements that specify study objectives and acceptable criteria for the collection, evaluation, or use of environmental data.

The objective of this program is to gather water quality data that can be used for Clean Water Act assessments, permitting and compliance programs, determining long-term water quality trends, watershed characterization, and in limited cases to determine source water quality.

Representative DQOs include:

- Determine ambient concentrations of physical and chemical parameters for trend analysis over time for overall assessment of water quality.

- Collect and analyze monthly water samples from fixed station locations statewide. Specific parameters are selected after consideration of potential sources of pollution, matrix, and intended data use.
- Each year, sampling locations statewide are sampled monthly. Nearby U.S. Geological Survey (USGS) gaging stations are used for flow measurements for pollutant load calculations.
- The information is used in determining background data for pollutants and future pollution abatement activities. Information gathered from this program is published in the state biennial Integrated Report.
- These data are used in waste load allocation models for NPDES permits.
- The optimum design is monthly sampling from fixed station locations statewide.

Sampling design error is minimized by utilizing a comprehensive checklist of informational sources, evaluation of historical information, and a thorough watershed pre-survey. Described in Section A.6.12 of the Surface Water Monitoring Programs QAPP (IDEM 2023a), this sampling design has been formulated to address data deficiencies and render the optimum amount of data needed to fill gaps in the decision process.

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

Site specific aquatic life use and recreational use assessments include program specific controls to minimize the introduction of errors. These controls include water chemistry and bacteriological blanks and duplicates, and laboratory controls as described in the Water Chemistry Field Sampling Procedures (IDEM 2024d).

The QA/QC process detects deficiencies in the data collection as set forth in the Surface Water QAPP (IDEM 2023a). The QAPP requires all contract laboratories to adhere to rigorous standards during sample analyses and to provide good quality usable data. Chemists within the WAPB review the laboratory analytical results for quality assurance. Any data which is “Rejected” due to analytical problems or errors will not be used for water quality assessment decisions. Any data flagged as “Estimated” may be used on a case-by-case basis and is noted in the QA/QC report. Criteria for acceptance or rejection of results as well as application of data quality flags is presented in the following Surface Water Monitoring Programs QAPP tables:

- Tables 28 & 29: Data Flags and Qualifiers
- Table 15: Quality Controls for Laboratory Analysis

- Table 14: Field Parameters Showing Method and IDEM Quantification Limits

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

The IDEM Office of Water Quality employed the DQO process to pre-establish the following tolerable error rates; or performance, acceptance, and decision criteria, for the data collected by this study.

Table 8 Performance, Acceptance, and Decision Criteria for this Study

Each Constituent or Parameter to be Measured	The DQIs for each Constituent or Parameter	Performance, Acceptance, and Decision Criteria per Constituent	Why this PARCCS was Selected as a DQI	Blank or QC Sample Type Used
Lab Chemistry	Contaminants from field sampling	< MRL		Field blank
Lab Chemistry	Contaminants from lab sample prep	< MRL	Test Method QA/QC	Lab blank
Lab Chemistry	Precision	RPD ≤ Control limits		Field duplicate
Lab Chemistry	Precision	RPD ≤ Control limits	Test Method QA/QC	Lab duplicates, MS/MSD
Lab Chemistry	Accuracy	Recoveries within control limits	Test Method QA/QC	MS/MSD, LCS, SS, CV
Lab Chemistry	Sensitivity	≤ 1/3 Water Quality Standard if applicable or best available technology	Required for 99% confidence	Detection limit
Lab Chemistry	Completeness	≥ 95% of possible results		% of all planned samples taken

Note: The DQIs (data quality indicators) in the second column of the table above are selected from the PARCCS (or data characteristics); Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity (aka Detection Limit). QC samples used to measure the data characteristics precision or accuracy are used to determine data variability. The other PARCCS measurements also can be used to establish the quality, or variability of collected data. QC sample blanks are used to determine whether samples have been contaminated.

A.7.2. The Plan for Gathering Data

The optimum design for this program is monthly sampling statewide from targeted fixed station locations (see Attachments 3-7). Sampling locations

are divided into sampling routes designed to reduce waste in terms of resources and time, see Figure 3. Targeted Monitoring Section staff will sample these routes monthly for water quality.

A.7. Specialized Training or Certification

Specialized training or certifications required by staff to successfully complete the specific program or task identified in this QAPP include:

Table 9 Specialized Training or Certifications Needed

Role	Required Training and Experience	Responsibilities	Training References
Program manager	AIMS II Database experience Demonstrated experience in project management and QA/QC procedures	Establish Program in the AIMS II database Oversee development of Program documents Oversee entry and QC of field data	IDEM 2023a U.S. EPA 2006
Field crew chief	At least one year of experience in sampling methodology Annually review relevant safety procedures Annually review relevant SOP documents for field operations Personal Protective Equipment (PPE) Policy Memorandum “Use of Personal Flotation Devices (PFD) by Branch Personnel” dated February 29, 2000 Basic First Aid and CPR IDEM Injury and Illness Resulting from Occupational Exposure Policy (IDEM 2016a)	Completion of field data sheets Sampling efficiency and representation Overall operation of the field crew when remote from central office Follow all safety and SOP procedures while engaged in field sampling activities Ensure that multi-probe analyzers are calibrated weekly prior to field sampling activities Ensure that field sampling equipment is functioning properly and loaded into field vehicles prior to field sampling activities Basic First Aid and CPR	YSI 2017 IDEM 1997, 2002, 2008, 2010a, 2010b, 2023 YSI 2018 February 29, 2000, WAPB internal memorandum regarding use of approved PFDs IDEM Hazard Communication (HazCom) Plan (IDEM 2019)
Quality assurance officer	Familiarity with QA/QC practices and methodologies	Ensure adherence to QA/QC requirements of Surface Water QAPP	IDEM 2023a, 2017b

Role	Required Training and Experience	Responsibilities	Training References
	Familiarity with the Surface Water QAPP and data qualification methodologies	Evaluate data collected by sampling crew for adherence to program work plan Review data collected by field sampling crews for completeness and accuracy Perform a data quality analysis of data generated by the program Assign data quality levels based on the data quality analysis Import data into the AIMS II data base	U.S. EPA 2006

A.8. Documents and Records

The PM will post the current versions of each agency QAPP and standard operating procedure (SOP) on IDEM's Surface Water Monitoring webpage. All PMs are expected to direct staff participating in data operations/QAPP implementation to refer to the QA SharePoint page, Quality Assurance (QA) System Tools, to find the current versions of all active IDEM QAPPs on IDEM's Surface Water Monitoring webpage. In addition, it remains the responsibility of the program staff with oversight roles designated in this QAPP to ensure all participants are working from the same, current version of this QAPP.

A.9.1. The QAPP Report

The following information associated with implementation of this QAPP can be accessed as follows:

- The QAPP under which work was done is stored in the IDEM QA Library or previous versions in the QA library archives.
- SOPs referenced herein will be similarly stored. Current or future interested parties should contact the appropriate IDEM program area QA manager, or the IDEM QA manager, for date-specific copies of this QAPP or any SOPs referenced by it.
- All completed forms generated during implementation of the data operation are cataloged in a QAPP or data report.

Table 10 Records Associated with 2023-2027 Fixed Station Monitoring

Record Type	Where Records are Stored	Document Title	Indexing Reference	Retention Periods
Field Data Sheets	Information recorded on the data sheet is entered into AIMS, and goes through at least 2 rounds of data entry checks (QC) by someone other than the person entering the data. After data entry is finalized, the forms are scanned and uploaded into the AIMS database as a .pdf attachment to the Project.	YYFSWXXX FS YY = Year FS = Media Type (SW is Surface Water) XXX = Analysis Set Number FS = Fixed Station Example: 23SW219 FS		10 years or until uploaded into VFC
Chain of Custody Forms	The forms are scanned and uploaded into the AIMS database as a .pdf attachment to the Project.	YYFSWXXX CC Example: 23FS219 CC	AIMS II	10 years or until uploaded into VFC
Laboratory Reports	IDEM Shared drive: S:\IGCN\OWQ\AIMS\ EDIFiles\ in folders for the lab and project year. Example: S:\IGCN\OWQ\AIMS\ EDIFiles\ISDH\YYYY Fixed Station	Filenames include the Analysis set number and lab job number in title. Example: 22FSW107 SDG 18855 with COC Final signed.pdf	Stored in folders named for the project year	10 years or until uploaded into VFC
QA Reports	IDEM Shared drive: S:\IGCN\OWQ\AIMS\ QCreports and SharePoint site (Technical & Logistical Services - 2022 QA Reviews)	Titles include the Analysis set number, lab name and report sequence number assigned by the Quality Assurance Officer (QAO). Example: 22FSW107QCreport-112 NWB.doc	Stored in folders named for the project year	10 years or until uploaded into VFC

Record Type	Where Records are Stored	Document Title	Indexing Reference	Retention Periods
Field Audit Reports	The field audit reports are put in a Shared Drive location that can only be accessed by Section Chiefs and the Branch Chief; however, the templates for field audits can be viewed on SharePoint at: Watershed Assessment & Planning > Branch SOPs in Development > Audit Checklists			10 years or until uploaded into VFC
EDI File from Laboratory	S:\IGCN\OWQ\AIMS\EDIFiles\ISDH\YYYY Fixed Station	By lab analysis set number		
Related Laboratory Contracts	IDEM VFC	1990 MOU with IDOH		
WAPB Surface Water QAPP	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents	WAPB Indiana Surface Water Programs B-001-OWQ-WAP-XX-23-Q-R5		

A.9.2. Field Activities

The Field Record for the Fixed Station Monitoring Program is included in Attachment 2. Completed field sheets are scanned and saved as an attachment to the project in AIMS. QA staff audit field data reduction, validation, and reporting procedures as a component of performance audits described in Surface Water QAPP Section C1.1, WAPB Field Performance and System Audits (IDEM 2023a).

A.9.3. Laboratory Activities

IDEM's OWQ receives the analytical results from the IDOH laboratory. The data is subject to the Laboratory Reporting Requirements in Table 11, including receipt of data in the electronic data import specification (IDEM 2021b). Data results in the laboratory reports shall meet requirements of DQA Level 3 or 4 described in section D.3.2. The Technical and Logistical Services Section receives the reports and edits files for review. Section D.3.1 contains additional information.

Table 11: Laboratory Reporting Requirements

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

Report Element
required only for DQA Level 4).
Case narrative indicating any deviations from the test method or SOP, unexpected or unusual results, out-of-limits QC check sample results.
Explanations of any laboratory flags included in the report.
ORIGINAL copy of IDEM/OWQ chain-of-custody forms and copy of IDEM/OWQ sample and test request form.
Lab Identification and Contact Information.

A.9.4. QA Records and Reports

The IDEM principal project investigator ensures the appropriate project staff have the most current approved version of the QAPP and keeps QA, project, and site managers up to date on any revisions and edits made to the QAPP during the term of the project. Each analysis set includes field sheets and laboratory reports available in hard copy and electronic formats. As with other project reports, store any QA records or reports generated in electronic format on the IDEM server shared drive (S Drive).

A.9.5. Retention Time and Location of Records and Reports

Retain all hard copy files of data and reports, for a minimum of three years, in accordance with the State of Indiana Records Retention Policy (General State of Indiana Schedule and the IDEM-specific schedule). Maintain hard copy records at the IDEM Shadeland office currently located at 2525 N Shadeland Avenue, Indianapolis, IN 46219. Store an electronic copy of all data files on the IDEM virtual file cabinet.

B. Data Generation and Acquisition

The elements under this section address all aspects of program design and implementation. Implementation of these elements ensure appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and QC activities are employed and are properly documented.

B.1. Sampling Process Design

B.1.1. Sampling Methods

Water Chemistry Sampling

Staff will collect grab water chemistry samples and record physical site observations on the field data sheet during monthly sampling events. All water chemistry sampling will adhere to the Water Chemistry Field Sampling Procedures TSOP (IDEM 2024d). A variety of water chemistry parameters are collected from sites, including nutrients, general chemistry, metals, pesticides, BODs, and cyanide. For a list of sites and associated parameters, see Attachments 3-7.

Field Parameter Measurements

Field parameter measurements are recorded at every sampling event. Dissolved oxygen (DO), pH, water temperature, specific conductance, and DO percent saturation will be measured with a data sonde. Measurement procedures and operation of the data sonde shall be performed according to the manufacturers' manuals (YSI 2017; YSI 2018) and the Water Chemistry Field Sampling Procedures TSOP (IDEM 2024d). Calibration of the data sonde will follow the Calibration of YSI Multi-parameter Data sondes TSOP (IDEM 2024c). Turbidity will be measured with a Hach™ turbidity kit and the meter number written in the comments under the field parameter measurements. If a Hach™ turbidity kit is not available, the data sonde measurement for turbidity will be recorded and noted in the comments. All field parameter measurements and weather codes will be recorded on the IDEM OWQ Stream Sampling Field Data Sheet (Attachment 2). The field parameters and their respective test methods and quantification limits are identified in Table 19.

Pesticides Sampling

Due to the completion and discontinuation of the Pesticides Monitoring Program in 2001, and the need to renew a capability of sampling to screen Fixed Station Monitoring Program sites for currently and widely used pesticides, 18 fixed station sites were chosen for monthly testing beginning in April 2002. Most of these original sites were at or near drinking water source intakes. In 2024, the number of pesticide sites was expanded to 40, with additional parameters (listed under method EPA 540 in Table 7) added to the analyses. Sites added to the original 18 sites were selected based on being co-located with a Regional Monitoring Network site, to capture waterbodies entering and leaving the state boundaries, and to depict spatial coverage of primary basins within the state of Indiana. See Attachments 3-7 for the list of sites selected for pesticide monitoring.

Dissolved Metals and Dissolved Organic Carbon Sampling

Due to resource and time constraints, dissolved metals (DM) and dissolved organic carbon (DOC) cannot be sampled at all fixed station sites, so a small subset of existing sites were chosen for this purpose. Twelve sites were selected for DM analysis in the Fixed Station Monitoring Program beginning in 2011. Starting in 2019 DOC was added to these sites. Sites were selected on larger rivers and were selected to cover large basins throughout the entire state. See Attachments 3-7 for a current list of sites selected for DM and DOC sampling.

The initial set of 12 sites were sampled from 2011 to 2021. In 2021, 12 new sites were selected based on historical total metals results from fixed station sites and input from the NPDES Permits Program. This set of 12

sites will be sampled monthly from 2022-2024, at which time a new set of 12 sites will be selected. This 3-year cycle will continue indefinitely.

In addition, in 2022 IDEM began using a new screening tool, developed by EPA and modified by IDEM, to detect possible DM water quality criterion exceedances based on total metal results. WAPB staff analyze the previous years' fixed station total metal results and identify sites that have greater than or equal to two sampling events indicating an exceedance of the WQS. These sites are updated annually and will be sampled to meet the minimum data requirements of three sampling events in a calendar year to verify the exceedance. See Attachments 4-8 for a list of sites sampled for DM and DOC in a project year.

Dissolved Reactive Phosphorus Sampling

Dissolved reactive phosphorus (DRP) sampling was added to all fixed station sites located in the Lake Erie Basin beginning in 2018 to support Indiana's Great Lakes Water Quality Agreement (GLWQA) Domestic Action Plan (DAP). The DAP is a dynamic document acknowledging that nutrient pollution in general, and phosphorus loading in particular, is a very complex problem caused by point and nonpoint sources across all sectors, which requires a multi-dimensional solution. Due to resource and time constraints, DRP cannot be sampled at all fixed station sites. See Attachments 3-7 for a list of sites selected for dissolved reactive phosphorus sampling.

***E. coli* Sampling**

E. coli was collected from a subset of Fixed Station sites from 1988 to 2023. Historically, *E. coli* sampling was conducted near water intakes on the Northwest A and B routes, and the East route. *E. coli* was also added to the Indianapolis route at a later date. In May of 2020, sampling *E. coli* from sites on the Northwest A route were discontinued due to travel distance from the laboratory and the inability to meet holding times and in 2022 *E. coli* from the East route sites was discontinued due to logistical scheduling. In 2024, all *E. coli* sampling was discontinued. See Attachment 4 for a table of sampling locations in 2023.

Analytical Methods

All analyses, other than field parameters, will be performed at the Indiana Department of Health (IDOH) Environmental Lab in accordance with pre-approved test methods and allotted holding time frames (see Tables 24-28). More information on the competency of IDOH to perform the requested work may be found in the IDEM QAPP (IDEM 2023a). All parameters that are measured in the laboratory are listed in Tables 6 & 7. These tables identify numerous parameters (semi-volatile organics, inorganics, nutrients, and general chemistry) and their respective test

methods and reporting limits. A chain-of-custody form will accompany each sample set through the analytical process.

B.2. Quality Control and Custody Requirements

Field Parameter Measurements

The data sonde will be calibrated on a routine basis (IDEM 2024d). The dissolved oxygen component of the calibration procedure will be conducted using the air calibration method (IDEM 2024d). Calibration results and drift values will be recorded, maintained, stored, and archived 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 user manuals (YSI 2017; YSI 2018). The unit will be field checked for accuracy once during each route/analysis set by comparison with a portable dissolved oxygen meter, as well as Hach™ turbidity, pH, and temperature meters. Calibration verification will be recorded on the field calibration portion of the field sheet. A portable dissolved oxygen meter test will also be conducted in the field at sites where the field measurement of the dissolved oxygen concentration is 5.0 mg/L or less. Similarly, a secondary pH meter will be used in the field to validate any pH field measurements outside the range of 6.0-9.0 SU.

In-situ water chemistry field data are collected in the field using calibrated or standardized equipment. Calculations may be done in the field or later at the office. Analytical results, which have limited QC checks, are included in this category. Detection limits and ranges have been set for each analysis (Table 7). Quality control checks (such as duplicate measurements, measurements of a secondary standard, or measurements using a different test method or instrument), which are performed on field or laboratory data, are usable for estimating precision, accuracy, and completeness for the program, as described in the Surface Water QAPP (IDEM 2023a, Table 3, p 37 and Section B.5 p 91).

Water Chemistry Data

Sample bottles and preservatives used will be certified for purity by the manufacturer. Sample collection containers for each parameter, preservative, and holding time (Table 12) will adhere to U.S. EPA requirements. Field duplicates shall be collected at the rate of one per route/analysis set. Additionally, field blank samples will be taken at a rate of one set per route/analysis set. A Chain of Custody (CoC) form created by the AIMS II database accompanies each sample set through the analytical process.

What will be Sampled

Numerous variables of interest exist to the user for each sample taken. Information on the samples taken covered by this QAPP can be found above in Table 7 and in Attachments 3-7.

Table 12 Sample Characteristics

Target or Constituents to be Sampled, Measured, and Recorded	Units	Bottle Type	Number of Bottles	Preservative	Maximum Holding Time
$TBOD_5$	mg/L	Clear plastic (1000 mL)	1	Cool, ≤6 °C	48 Hours
General chemistries, Cl, F, SO_4					28 Days
Alkalinity					14 days
Solids (total and dissolved), TS, TDS	mg/L	Clear plastic (1000 mL)	1	Cool, ≤6 °C	7 Days
Solids, total suspended, TSS					
Metals, total and hardness (Calculated from Ca and Mg)	ug/L and mg/L	Clear plastic (1000 mL)	1	HNO_3 < pH 2	6 Months
Nutrients – total phosphorus, Ammonia-N, TKN, Nitrate+nitrite-N, COD, TOC	mg/L	Clear plastic (1000 mL)	1	Cool, ≤6 °C, H_2SO_4 < pH 2	28 Days
Pesticides	ug/L	Glass amber (1000 mL) Clear plastic (1000 mL)	2 2	Cool, ≤6 °C, pH 5-9; Plastic Bottles are Frozen in Lab	7 days to extract, 28 after extraction
Dissolved, metals	ug/L	Clear plastic (1000 mL)	1	filtered in field then HNO_3 < pH 2	6 Months
DOC	mg/L	Glass amber (1000 mL)	1	Cool, ≤6 °C, H_2SO_4 < pH 2, filtered in field	28 Days
Dissolved reactive phosphorus (DRP), Dissolved orthophosphate	mg/L	Brown plastic (500 mL)	1	Frozen, filtered in field	6 Days (If frozen) including 2 days for lab to prep; 48 hours (If not frozen)
E. coli	MPN/ 100ml	Presterilized, wide mouth (120 mL)	1	Cool, <10 °C, 0.008% $Na_2S_2O_3$	8 hours including 2 hours for lab prep (6 hours field time)
Cyanides	mg/L	Clear plastic (1000 mL)	1	Cool, ≤6 °C, NaOH to pH > 12	14 days

B.3. Sampling Methods

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

Table 13 SOPs or Standard Scientific Methodologies

Because numerous variables of interest exist to the user for each method or SOP used, this table is broken into several tables.

Method or SOP #	Name of Method or SOP	Doc Version Number	Document Location
B-004-OWQ-WAP-TL-22-S-R1	AIMS Results Upload Template Instructions	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-014-OWQ-WAP-XXX-23-T-R1	Calibration of YSI Multi-parameter Data sondes	R1	
S-004-OWQ-WAP-TL-20-T-R0	EDI Imports to AIMS ll	R0	
B-015-OWQ-WAP-XXX-24-T-R1	Water Chemistry Field Sampling Procedures	R1	

Table 14 SOPs or Standard Scientific Methodologies History and Related Information

Method / SOP #	Method / SOP Source (IDEM, U.S. EPA, ANSI, NELAC)	Date Approved
B-004-OWQ-WAP-TL-22-S-R1	IDEM	2020
B-014-OWQ-WAP-XXX-23-T-R1	IDEM	2023
S-004-OWQ-WAP-TL-20-T-R0	IDEM	2020
B-015-OWQ-WAP-XXX-24-T-R1	IDEM	2024

Table 15 SOPs or Standard Scientific Methodologies; Sampling Details (from Water Chemistry Field Sampling Procedures, B-015-OWQ-WAP-XXX-24-T-R1.

	Sample Volume	Sample Preservation Type	Holding Time to Analysis
E. coli and total coliforms	100 mL	$Na_2S_2O_3$, iced	8 hours (Total) 6 hours (Field)
General chemistries	1000 mL	Iced; ≤ 6˚C	7 days – 28 days
Nutrients	1000 mL	Sulfuric acid, iced; ≤ 6˚C	28 days
Metals/dissolved metals	1000 mL	Nitric acid	6 months
TOC, DOC	1000 mL	Sulfuric acid, iced; ≤ 6˚C	28 days
DRP	500 mL	Frozen	4 days frozen 2 days for analysis
TBOD5	1000 mL	Iced; ≤ 6˚C	2 days to prep
Pesticides	(2) 1000 mL	Iced; ≤ 6˚C	42 days
Cyanides	1000 ml	NaOH, iced; ≤ 6˚C	14 days

Table 16 Types of Samples to Be Collected

Constituents	Type of Samples	Number of Samples Needed	Frequency of Sampling	Type and Number of QC Samples[7]
Water Samples	Grab	165	Monthly	1 field duplicate and 1 field blank per each of 16 monthly routes/analysis sets

[1]The general rule is 10 percent of all samples should be quality control (QC) samples.

If a failure, disruption, or other breakdown occurs during the implementation of this QAPP, take corrective action. Any technical staff may identify a nonconformity. Once identified, the individual section chief, program officer, or QAO is responsible for corrective action for the one or more programs within their responsibility. The section chief, program officer, or QAO is responsible for documenting the nonconformity, working with relevant staff members to develop corrective actions, and notifying the Quality Assurance Manager (QAM) of corrective action progress. Depending on the nonconformity and associated corrective actions either the section chief or the QAO approves the final corrective action.

B.4. Sample Handling and Custody

The requirements for sample handling and custody in the field, laboratory, and transport are set forth in Tables 17 – 20.

Table 17 Sample Handling in the Field

Sample Collection Location	Sample Constituent of Concern	Container Type and Size	Package Temperature or Special Condition	Additional Sample Handling Documentation Sources
Detailed in Attachments 3-7	Metals and dissolved metals	Clear plastic (1000 mL)	Room temperature	Water Chemistry Field Sampling Procedures
	Nutrients, BOD, general chemistries	Clear plastic (1000 mL)	Iced; ≤ 6˚C	
	Pesticides, DOC Pesticides, neonics	Glass amber (1000 mL) Clear plastic (1000 mL)	Iced; ≤ 6˚C Iced; ≤ 6˚C	
	DRP	Brown plastic (500 mL)	Frozen	
	E. coli	Presterilized wide mouth (120 mL)	Iced; ≤ 6˚C	
	Cyanides	Clear plastic (1000 mL)	Iced; ≤ 6˚C	
	TSS/TDS/TS	Clear plastic (1000 mL)	Iced; ≤ 6˚C	

Table 18 Sample Transport Details

Carrier	Means of Transport	Allowable Time from Collection Time to Lab	Days of the Week when Shipping is Unavailable
IDEM	State vehicles	See parameter holding times	Weekends

Table 19 Sample Handling in Laboratory

Lab Location	Lab Contact Info	Time Span Lab is Open for Sample Receipt	Samples are Stored Where and How, Until Analysis
IDOH Laboratory, Indianapolis, IN	Bharat Patel – bpatel@health.in.gov	Monday – Friday	The laboratories store all samples in accordance with method requirements

The following agency or program area SOPs include additional information on sample package handling:

Sample container labels, custody forms, and sample custody logs are available at:

- Labels: Bottles are labeled with permanent markers detailing sample identification and preservative.
- Forms: Printed from the AIMS II database or received as required from the contract lab project manager.

The laboratory contact for information on sample receipt, storage, handling, and preparation is:

- Lab contacts are detailed in QAPP Contact Information Section

Table 20 Sample Handling System (responsible person or laboratory group)

Sample Collection, Packaging, and Shipment
Sample Collection: Program Field Staff
Sample Packaging: Program Field Staff
Sample Transport: Program Field Staff
Sample Receipt and Analysis
Responsible Organization: IDOH Chemistry Lab or Contract Laboratory (backup)
Sample Receipt: IDOH Chemistry Lab Personnel or Contract Laboratory Personnel (backup)
Sample Custody and Storage: IDOH Chemistry Lab Personnel or Contract Laboratory Personnel (backup)
Sample Preparation: IDOH Chemistry Lab Personnel or Contract Laboratory Personnel (backup)
Sample Determinative Analysis: IDOH Chemistry Lab Personnel or Contract Laboratory Personnel (backup)
Sample Disposal
Responsible Organization: IDOH Chemistry Lab Personnel or Contract Laboratory Personnel (backup)
Responsible Personnel: IDOH Chemistry Lab Personnel or Contract Laboratory Personnel (backup)

Analytical methods can be found in Table 7 and field parameters are found in the table below.

Table 21 Field Parameters

Parameters	Method	IDEM Quantification Limit
Dissolved oxygen (data sonde optical)	ASTM D888-09	0.05 mg/L
Dissolved oxygen % saturation (data sonde optical aka Luminescence Sensor)	ASTM D888-09	0.05 %
Dissolved oxygen (membrane probe)	SM4500-OG [2]	0.05 mg/L
pH (data sonde)	U.S. EPA 150.2	0.10 SU
pH (field pH meter)	SM 4500H-B [2]	0.10 SU
Specific conductance (data sonde)	SM 2510B	1.00 µmhos/cm
Temperature (data sonde)	SM 2550B(2)	0.1 Degrees Celsius (°C)

Parameters	Method	IDEM Quantification Limit
Temperature (field meter)	SM 2550B(2) [2]	0.1 Degrees Celsius (°C)
Turbidity (data sonde)	SM 2130B	0.02 NTU [2]
Turbidity (Hach™ turbidity kit)	U.S. EPA 180.1	0.05 NTU [3]

[2] SM = Standard Method
[3] Method used for Field Calibration Check
[4] NTU = Nephelometric Turbidity Unit(s)

If a failure, disruption, or other breakdown occurs during the implementation of this QAPP, take corrective action. Any technical staff may identify a nonconformity. Once identified, the individual section chief, program officer, or QAO is responsible for corrective action for the one or more programs within their responsibility. The section chief, program officer, or QAO is responsible for documenting the nonconformity, working with relevant staff members to develop corrective actions, and notifying the QAM of corrective action progress. Depending on the nonconformity and associated corrective actions either the section chief or the QAO approves the final corrective action.

The laboratory turnaround time needed is 30 days.

B.5. Quality Controls

Identified below are the QC activities needed for field sampling activities.

Table 22 Quality Controls for Field Sampling

Parameters and Test Procedure	Field Duplicate	Calibration Verification Standard	Equipment/Field Blank
General chemistry	1/route	n/a	n/a
Metals and dissolved metals	1/route	n/a	1/route
Nutrients	1/route	n/a	1/route
Pesticides	n/a	n/a	1/route
Cyanide	n/a	n/a	1/route
Data sonde tests (pH, Water Temp., DO) and turbidity (HACH turbidimeter	1/route as a field calibration check with different instrument	Used for turbidity instead of field duplicate	n/a

Identified below are the QC activities needed for laboratory analysis.

Table 23 Quality Controls for Laboratory Analysis

LABORATORY QUALITY CONTROL CHECK FREQUENCIES									
Parameters and Test Procedures	**Calibration[1] and/or Verification**	**Sample Lab Duplicate**	**MS/ MSD[2]**	**LCS**	**Method Blank**	**External QC Standard**	**Surrogate**	**Serial Dilution**	**Interference Check**
Metals	1/10	1/20	1/20	1/20	1/run	1/20	n/a	1/run w/ dilutions	2/run
Inorganic Chemicals, & Nutrients	1/run	1/20	1/20	1/run	1/run	1/run	n/a	n/a	n/a
Physical Properties	n/a	1/20	n/a	1/run	1/run	n/a	n/a	n/a	n/a
Volatile Organic Compounds (GC)	every day	1/20	1/10	1/10	1/day	4/day	every sample	n/a	n/a
Volatile Organic Compounds (GC/MS)	every day	1/20	1/20	1/20	1/day	4/day	every sample	n/a	n/a
Semi- Volatile Organic Compounds (GC/MS)	every day	1/20	1/20	1/20	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Organotin Compounds (GC/FPD)	every day	1/20	1/20	1/20	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Coliforms (*E. coli & Total coliforms)*	n/a	1/run	n/a	n/a	1/run	1+ & 1- / run	n/a	when required	EC, KP, & PA each media batch
Fixed Stations – Pesticides & SVOCs									
Pesticide Compounds GC/MS EHL-S125 or EPA Method 525.3	every day (LFB)	1/20 minimum	1/20	1/20 for SDWA pest. 1/45 for others	1/20 or 1/extract batch	1/quarter	every sample	every sample	n/a
Neonicotinoids EPA Method 540	every day (LFB)	1/20 minimum	1/20	1/20 for SDWA pest. 1/45 for others	1/20 or 1/extract batch	1/quarter	every sample	every sample	n/a
Glyphosate HPLC/PCD EPA Method 547	every day (LFB)	1/20 minimum	1/20	1/20 for SDWA pest. 1/45 for others	1/20 or 1/extract batch	1/quarter	every sample	every sample	n/a
Herbicides/ Pesticides HPLC/PDA (EHL-L131)	1/batch (LFB)	1/20 minimum	1/20	1/20	1/20	N/A	N/A	N/A	n/a

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

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

If control limits are exceeded, the laboratory will take corrective action as prescribed in the test procedure. Deviations are documented in the narrative and QA/QC sections of the laboratory report.

The effectiveness of the corrective action is reviewed in the data validation process.

B.6. Instrument and Equipment Testing, Inspection, and Maintenance

Preventive maintenance is the planned upkeep program for measurement instruments which enhances the instrument performance, ensures accurate and precise readings, and prolongs useful life.

Measurement equipment requires periodic calibration or standardization to reliably produce accurate results. IDEM requires labs to follow this QAPP and requires a quality system which includes standards for calibration and corrective actions. In addition, IDEM may elect to request pertinent QA data, including calibration standards.

Contract laboratories providing analytical services to the WAPB water quality monitoring programs, must document calibration procedures and frequency. The requirements specify a QA system is in place and QA/QC data related to the project must be available to IDEM.

Instruments and equipment used to implement this data operation in-house are inspected, maintained, and tested as follows.

Table 24 Instrument and Equipment Calibration, Inspection, and Maintenance

Instrument or Equipment Type	Frequency			Responsible Staff	Acceptance Criteria	Corrective Action
	Calibration	Maintenance	Inspection			
Data sondes - YSI 6600, YSI 6920, YSI EXO1, Hydrolab MS 5, Hydrolab Quanta	Weekly	Annually or as needed	Day of use	Program manager	Successful calibration as indicated by sonde display	Replacing or repairing probes/parts; Recalibration
DO meter	Weekly	Annually or as needed	Day of use	Program manager	Successful calibration as indicated by sonde display	Replacing or repairing probes/parts; Recalibration
Turbidimeters Hach 2100P, Hach 2100Q	Monthly	Annually or as needed	Day of use	Program manager	Successful calibration as indicated by turbidimeter display	Replacing or repairing parts; Recalibration
pH Meters-Oakton Acorn Series 4 and 5	Weekly	Annually or as needed	Day of use	Program manager	Best Professional Judgement – mV reading for buffers within specified ranges. pH slope 55-60.	Replacing probe or recalibrate with fresh reagents

Instrument or Equipment Type	Frequency			Responsible Staff	Acceptance Criteria	Corrective Action
	Calibration	Maintenance	Inspection			
Millipore water	n/a	As needed	Day of use	Staff system expert	Specific conductivity < 0.0555 uS/cm	Replacing filter or light

B.7. Inspection and Acceptance of Critical Supplies

Supplies and consumables are inspected to requisition requirements and accepted by the project managers per IDEM DOA regulations and the IDEM Quality Management Plan Section 4.0 (IDEM 2023b). Below is a table of items needed for field sampling activities.

Table 25 Critical Supplies

Critical Supplies				
Vehicle binder	Cell phone	Raingear	Stainless steel bucket	Turbidity meter
Chain of Custody Form	Sunscreen	Personal Flotation Device (PFD)	Pump	DO meter
Datasheets	Hand sanitizer	Hip waders and chest waders	Filters and tubing	pH/Temp Meter
IDOH parameter checklist	Insect repellent	Backpack	Preservatives	500 mL brown plastic bottles
Clipboard	First Aid Kit	Rope With Carabiner	Nitrile Gloves	1000 mL Plastic Bottles
Pens/Pencils/Permanent markers	Safety Vest	Bridge Sampler	Millipore Water	1000 mL Glass Amber Bottles
Maps/Directions	Fire Extinguisher	Pole Sampler	Data sonde	Coolers with ice

B.8. Data Management (also see section A.9. Documents and Records)

Records generated by this data operation will be preserved as described in the table at section A.9. above.

Table 26 Mechanism for Avoiding Errors

Potential Data Errors	Mechanism for Avoiding Errors and Data Loss
Database uploads	Per **6.4.4. Data Security Standards,** of the U.S. EPA R5 approved IDEM 2023a Quality Management Plan, the Indiana Office of Information Technology provides an Information Security Network which secures all IDEM information assets. .
Hand-entered data	All data entered goes through two rounds of QC to minimize errors in the transcription process.
Lab Reports	WAPB chemists review the data packages to ensure reports are complete and meet all DQOs.

Table 27 Computer Equipment

Required Computer Software or Hardware	Associated Performance Requirements
Windows Computer	
Microsoft Office Suite, Excel, Word	Microsoft Office
AIMS II Database	Edge, Google Chrome, or Firefox Browsers

C. Assessment and Oversight

The following assessment activities are planned to track implementation of the data operation to ensure the plan is implemented as prescribed.

Table 28 Data Operation Tracking

Activities Targeted for Assessment	Type of Assessment[12] Planned	Performed by[13]	Number of Assessments Scheduled	Findings Reported to?	Corrective Actions (CAs) Anticipated
Field performance and system audits	Sample collection and handling	Fixed station program expert	1 per year	Field crew chief	Section C.1.
Contract laboratory performance and system audits	Sample handling; sample analysis, record keeping, preventative maintenance, proficiency testing, staff requirements, and training	IDOH program expert	1 per year	Program manager	Section C.1.

[7] The assessment types may be supervisory surveillance, management systems reviews, readiness reviews, technical systems audits, audits of data quality, or data quality assessments.
[8] Assessors must be independent of the group with interest in the data operation.

C.1. Assessments and Response Actions

Any WAPB technical staff may identify a field or laboratory nonconformity. Once identified, the PM is responsible for corrective action in concert with the pertinent WAPB section chief or QAO. The PM works with the section chief, QAO, or other pertinent staff to document the nonconformity, and then develop and implement corrective actions. Depending on the nonconformity and associated corrective actions, a WAPB section chief or the QAO may need to approve the final corrective action.

For field corrective actions, the field crew chief assigned to the sampling event is responsible for all field decisions, including corrective action. Any unusual or unexpected occurrence during data or sample collection is brought to the attention of the crew chief who will decide what immediate actions are taken and what follow up actions, if any, are necessary. The field crew chief has discretion on field corrective actions and documents the action upon return to the office. The section chief assigns a staff member to follow up and document any further required action.

Laboratory corrective actions require IDOH to maintain a corrective action program. The laboratory must document any resulting corrective actions taken for problems during the handling, preparation, analysis, or reporting of analytical data to the WAPB. Document corrective actions in the case narrative section of the report for each sample set.

Problems indicating the laboratory QA system may be out of control, trigger a system audit by the QAO or a designee.

Significant nonconformities are reported to the IDEM PM within 14 days. Once identified, the Gatekeeper is responsible for ensuring implementation of the corrective action. If the laboratory and the IDEM Gatekeeper cannot come to an agreement on corrective actions or program progress is irreparably harmed, IDEM may conduct other corrective actions. The laboratory shall apply the highest professional and technical guidelines and standards. Further, if the state becomes dissatisfied with the work product of or the working relationship with staff assigned to work on the project, it may request in writing the replacement of any or all such staff.

Finally, in the event any problem is identified with QA or any changes are necessary to the QAPP, make recommendations to the PM and QAM. Communicate any necessary changes to the program team.

C.2. Reports to Management

WAPB QAO submits QA reports, upon completion of the data validation, to the program manager. This ensures investigation and correction of problems arising during the sampling and analysis phases of the program. Each report addresses:

- Data assessment and qualification results since the last report.
- Laboratory audits performed since the last report.
- Significant QA system and QC task problems.
- Recommended solutions, and status of corrective actions.
- Status of the extent to which program DQOs are satisfied.

Problems arising during data assessment and qualification due to any contract laboratory or QA actions should be brought to the PM’s attention. The PM will work with other staff as necessary to determine whether immediate corrective action is required. Implement laboratory corrective actions according to the MOU.

The QAM, relevant WAPB Section Chief, PM, any technical staff working on corrective actions, and QA staff receive copies of the progress reports when new developments arise. Store corrective actions progress reports along with the program correspondence in IDEM’s Virtual File Cabinet which provides availability to any interested parties.

Assessment reports and any resultant corrective actions will be distributed as set forth in the table below.

Table 29 Distribution of Assessment Reports and Corrective Actions

Assessment Report Recipient	Why Recipient is Receiving the Assessment Results
Targeted Monitoring Section Chief	Oversight of program
Program manager	Oversight of program and directly responsible for annual project
QA staff	Oversight of laboratory and field data

D. Determining Data Usability

Once data packets are returned from the laboratory after the data collection or generation phase of each project, the chemists in the OWQ WAPB, Technical and Logistical Services Section will perform data review, verification, and validation.

See "Laboratory Data Review For Non-chemists," a helpful manual of reviewing laboratory data packets published by U.S. EPA Region 9 in October 2014.

D.1. Data Verification

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

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

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

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

D.1.1. Data Review

The data review to proceed evaluation (data verification, validation, and assessment) of this program should include review of the items in the table below.

Table 30 Data Review

Principal Actions, Steps, or Processes to be Reviewed Which Could Impact Data Quality	Documents or Forms to Review to Determine Deficiencies or Missing or Incomplete Data
Entering datasheets into AIMS	Field Data *Sheet – Attachment 2*
EDI review and import to AIMS per “EDI Import to AIMS II S-004-OWQ-WAP-TL-20-T-R0" and the AIMS User Guide.	MS Access used to export data to a MS Excel spreadsheet for further data validation and use in the QA Review Report.
QA Review of each contract lab report	A MS Word QA review report is created for each lab report. A checklist of items reviewed are provided in each QA report. Deficiencies are communicated with the lab project managers for corrections if possible.

Other data review processes to be used include:

D.1.2. Data Validation

The data validation process for this data operation will include comparison of the following laboratory results to the data quality indicators established in A.7.

Data validation is the process of qualifying analytical or measurement data on the performance of the field and laboratory QC measures incorporated into the sampling and analysis procedures.

Prior to entering data into AIMS II database, a completeness check is run on the field data sheets. The check includes verifying all applicable fields are filled and are legible to field staff conducting observations. Finally, data on the original field data sheets are entered into the AIMS II database and double-checked, then any discrepancies are resolved. In addition, data collection in the field is subject to the QC checks described in Section B.5 and the calibration checks described in Section B.7.

Analytical laboratories are responsible for validating data from samples analyzed in the laboratory. WAPB QA staff review laboratory validation results and perform an additional level of data validation for 100% of the data received from a contract laboratory. This independent validation is conducted based on data flags and other QA/QC information obtained from the contract laboratories.

Data reporting is the detailed description of the data deliverables used to completely document the calibration, analysis, QC measures, and calculations. Data is only reported from the field after the responsible technical staff perform reduction and validation. Data from WAPB contract laboratory analyses are reported after the laboratory reports the data by reviewing, assessing for QA, and determining the data usability identified by assigning one of four DQA Levels to the data.

The data verification process for this data operation will include review of the items in Table 30. Additional information covered in the AIMS II User Guide

(IDEM 2022a) and EDI Import to AIMS II S-004-OWQ-WAP-TL-20-T-R0 (IDEM 2020).

Table 31 Data Verification

Factors or Characteristics used for Verification	Verification Performed Against Specifications	How Errors are Noted
Two rounds of QC for datasheet entry into database	100% data transcription accuracy	Errors are corrected in the AIMS database

Table 32 Data Verifiers

Staff Assigned to Verify Data	Other Roles they may have had with the Program
Program manager and other technical WAPB field staff	Sample collection and oversight
WAPB QA staff	Workplan or QAPP review

D.2. Reconciliation with User Requirements

DQA is the process of determining the scientific and statistical quality of data collected to satisfy the program DQOs. Assess field data and laboratory results for usability regarding each specific program DQO (Section A.7); Section D.1 Data Verification; D.2. Verification and Validation; C.1. Assessments and Response Actions; C.2. Reports to Management; and Section C. on performance and system audits describe the procedures used to produce data and to evaluate the data production system's effectiveness.

D.2.1. Data Quality Assessment

Data Quality Assessment (DQA) is the process of determining the scientific and statistical quality of data collected to satisfy the project data quality objectives. Field data and laboratory results are assessed for usability with regard to each specific project data quality objectives. Section D1 on Data Reduction, Validation, and Reporting; and Section C.1.2 on Performance and System Audits describe the procedures used to produce data and to evaluate the data production system effectiveness.

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

- Sampler Signature
- Custodian Signature
- Containers
- Collection Date(s)
- Receiving Time(s)

- Receiving Date(s)
- Preservatives
- Samples received and stored at proper temperatures.

Quality Control (QC) Checks and Compliance:

- Summary Data Package
- Approved Analytical Methods
- Approved Detection and Reporting Limits
- Prep Dates
- Analysis Dates
- Holding Times
- Positive Control (> 0) – *E. coli* and Total Coliforms Media Test
- Negative Control – *E. coli* and Total Coliforms Media Test
- Beginning and Ending Sterility Controls (0) – *E. coli* and Total Coliforms Media Test
- Initial, Continuing, Method, Field, and Trip Blanks (< CRQL, MRL, or Control Limit)
- Field and Method Duplicate RPDs (RPD ± 20% or ≤ Control Limit)
- Matrix Spikes/Duplicate Recoveries (≤ Control Limit)
- Matrix Spikes/Duplicate RPDs (± 20%; RPD ±≤ 20%)
- Laboratory Control Standards or Laboratory Fortified Blanks (+ 20%)
- Surrogates (< CRQL or Control Limit)
- Internal Standards (70% to 100%)
- Instrument Calibrations (Correlation Coefficient > 0.995)
- Initial and Continuing Calibration Verification Standards (± 10%)
- ICP Interference Check Standards (< CRQL or < Control Limit; ± 20%)
- ICP Serial Dilutions (± 10%)
- ICP Linear Range Studies (± 10%)
- ICP Interelement Correction Factors
- Ratio of Dissolved Metals to Total Recoverable Metals (< 1) if applicable
- Ratio of Total Solids to (Total Dissolved Solids + Total Suspended Solids) (± 15%) if applicable
- System Performance

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

D.2.2. Data Verification Report

Laboratory Results for Data Validation Process

In lieu of the data validation table identifying the analytes to be validated and the DQIs used to compare how analyte results aligned with MQLs, as would be done using the data quality objective process, the WAPB Surface Water Monitoring Program uses the following criteria to establish data usability.

Table 33: Data Validators

Staff Assigned to Validate the Data	How they are Independent of the Project
QA officers	QA Officers do not lead in sampling, or data interpretation activities for a project.

QA staff review and qualify laboratory data by using U.S. EPA Contract Laboratory Program (CLP) guidance for data validation. Data flags consist of two parts, a cause (UJ, Q, D, B, or H) and an action (R or J). For WAPB projects, assign data qualifiers and flags and enter them into AIMS II. Use flags for both the individual test result and QA/QC Review Reports. Table 35 lists data qualifiers and Table 34 lists data quality flags for analytical results.

Table 34: WAPB Data Flags

Flags	Description
Q	**QC Checks or Criteria.** One or more of the QC checks or criteria are out of control
D	**RPD for Duplicates.** The RPD for a parameter result is outside the acceptable control limits. Consider the parameter an estimate or rejected on the basis listed below: 1. If either the sample or duplicate value is less than the RL and the other value exceeds 5 times the MDL, then the sample result is an estimate. 2. If the RPD is outside the established control limits (max. RPD) but below two times the established control limits (max. RPD), then the sample result is an estimate. 3. If the RPD is twice the established control limits (max. RPD) or greater, then reject the sample result.
H	**Holding Time.** The performance of the analysis for this parameter is out of the holding time. Estimate or reject the results on the basis listed below: 1. If performance of the analysis is between the holding time limit and 1.5 times the holding time limit, estimate the result. 2. If performance of the analysis is outside 1.5 times the holding time limit, reject the result.
B	**Blank Contamination.** This parameter is found in a field or a lab blank. Whether to accept, estimate, or reject the result is based upon the level of contamination listed below: If the result of the sample is greater than the RL but less than five times the blank contamination, reject the result. 1. If the result of the sample is between five and ten times the blank contamination, estimate the result. 2. If the result of the sample is less than the RL or greater than ten times the blank contamination, accept the result

Table 35. WAPB Data Qualifiers

Qualifier	Description
R	**Rejected.** Result is not acceptable for use in decision making processes.
J	**Estimated.** The use of the result in decision making processes are determined on a case-by-case basis.
UJ	**Estimated (Between MDL and RL).** The parameter result is above the MDL but below the Laboratory RL and are estimates

Report data from WAPB contract laboratory analyses after the laboratory reports the data are reviewed, assessed for QA, and the data usability determined and assigned one of four DQA Levels to the data.

DQA Level 1 **Screening Data:** The results are usually generated onsite with no QC checks. This category includes analytical results with no QC checks, precision or accuracy information, or detection limit calculations. Use is primarily onsite data for presurvey and for preliminary rapid assessment.

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

DQA Level 3 **Laboratory Analytical Data:** Analytical results include QC check samples for each batch of samples from which precision, accuracy, and completeness can be determined. Method detection limits (MDLs) have been determined using 40 CFR Part 136 Appendix B. Additionally, all reporting information required in the laboratory contract, and in the Surface Water QAPP, especially Table 6, are included in the analytical data reports. Raw data, chromatograms, spectrograms, and bench sheets are not included as part of the analytical report but are maintained by the contract laboratory for easy retrieval and review upon request from WAPB. Data can be elevated from DQA Level 3 to DQA Level 4 by inclusion of this information in the data report and the QC data are reported using U.S. EPA required CLP forms or CLP format. Data falling under this category are considered as complete, legally defensible, and used for regulatory decisions.

DQA Level 4 **Enforcement Data:** Analytical results mostly meet the CLP data analysis, contract-required quantification limit, and validation procedures. QC data are reported on CLP forms or CLP format. Raw data, chromatograms, spectrograms, and bench sheets are included as part of the analytical report. Additionally, all reporting information required in the laboratory contract, and in the Surface Water QAPP, especially Table 6 in section A.9 are included in the analytical data reports. Data falling under this category are considered as complete, legally quantitative in value, and used for regulatory decisions.

D.2.3. Data Assessment Guidelines

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

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

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

"U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review", U.S. EPA Contract Laboratory Program, EPA-540-R-2016-001, November 2020, Washington DC.

"U.S. EPA Contract Laboratory Program National Functional Guidelines for High Resolution Superfund Methods Data Review", U.S. EPA Contract Laboratory Program, EPA-542-B-16-001, November 2020, Washington DC.

"National Functional Guidelines for Superfund Organic Methods Data Review", U.S. EPA Contract Laboratory Program, "EPA-540-R-2016-002, November 2020, Washington DC.

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

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

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

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

Assessments and Response Actions

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

Field Corrective Action

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

Laboratory Corrective Action

The analytical laboratory is required to maintain a corrective action program. The laboratory is required to document any corrective actions taken as a result of problems during the handling, preparation, analysis, or reporting of analytical data to the IDEM/OWQ/WAPB. Corrective actions are documented in the case narrative section of the report for each sample set. Problems that indicate that the laboratory quality assurance system may be out of control will trigger a system audit by the QAO or a designee.

Data Assessment and Qualification Corrective Action

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

E. References

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FR 2012. 40 CFR Part 136, Revised March 14, 2023.

FR 2013. 40 CFR Part 141, Subpart C , Revised March 14, 2023.

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

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

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

U.S. EPA 1991. Methods for the Determination of Metals in Environmental Samples. Washington, DC: U.S. Environmental Protection Agency. EPA/600/4-91/010.

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

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

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

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

F. Attachments

The blank field forms, checklists, and other materials to be used by staff implementing this QAPP include:

Attachment 1: Fixed Station Chain of Custody Form Template
Attachment 2: Fixed Station Field Data Sheet Template
Attachment 3: 2023 Fixed Station Project
Attachment 4: 2024 Fixed Station Project
Attachment 5: 2025 Fixed Station Project
Attachment 6: 2026 Fixed Station Project
Attachment 7: 2027 Fixed Station Project

Attachment 1: Fixed Station Chain of Custody Form Template

Indiana Department of Environmental Management

OWQ Chain of Custody Form

Project: *XXXX Fixed Station Monitoring* *Route Name, Date*
OWQ Analysis Set: *XXFSWXXX*

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

Signature:_____ Section:_____

Lab Assigned Number	IDEM Control Number	Sample Type	ID	1000 ml P, N,M	1000 ml G, N,M	40 ml VIAL	120 ml G (Bact)	500 ml P, N,M	250 ml P, N,M	Date and Time Collected	
										Date	Time

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:					

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:_____

Attachment 2: Fixed Station Field Data Sheet Template

Route Name Field Data - Month Year

Collector: Collector Name **Analysis Set: XXFSWXXX**

ID	Sample #	FSite	Site	Date	Time	DO	% Sat	pH	Temp	Cond	Turb	Weather

Field Calibrations:

Sample #	Type	Meter #	Value	Units

Calibration Type
pH
DO
Turbidity

Weather Code Definitions

SC Sky Conditions				WD Wind Direction		WS Wind Strength		AT Air Temp	
1	Clear	8	Rain	00	North (0 degrees)	0	Calm	1	< 32
2	Scattered	9	Snow	09	East (90 degrees)	1	Light	2	33-45
3	Partly	10	Sleet	18	South (180	2	Mod./Light	3	46-60
4	Cloudy			27	degrees)	3	Moderate	4	61-75
5	Mist				West (270 degrees)	4	Mod./Strong	5	76-85
6	Fog					5	Strong	6	> 86
7	Shower					6	Gale		

Preservatives/Bottle Lots:

Group Preservative	Preservative Lot #	Bottle Lot #

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

Data Entered By: _____ QC1: _____

QC2: _____

Attachment 3

2023 Fixed Station Project

Specific Sampling Locations
Figures 2-3 and Tables 36-37 and describe the 2023 sampling sites.

Figures 4-5 and Tables 38-43 identify the numerous variables of interest to the user for each sampling site.

Figure 2: Fixed Station Monitoring Program Sampling Locations

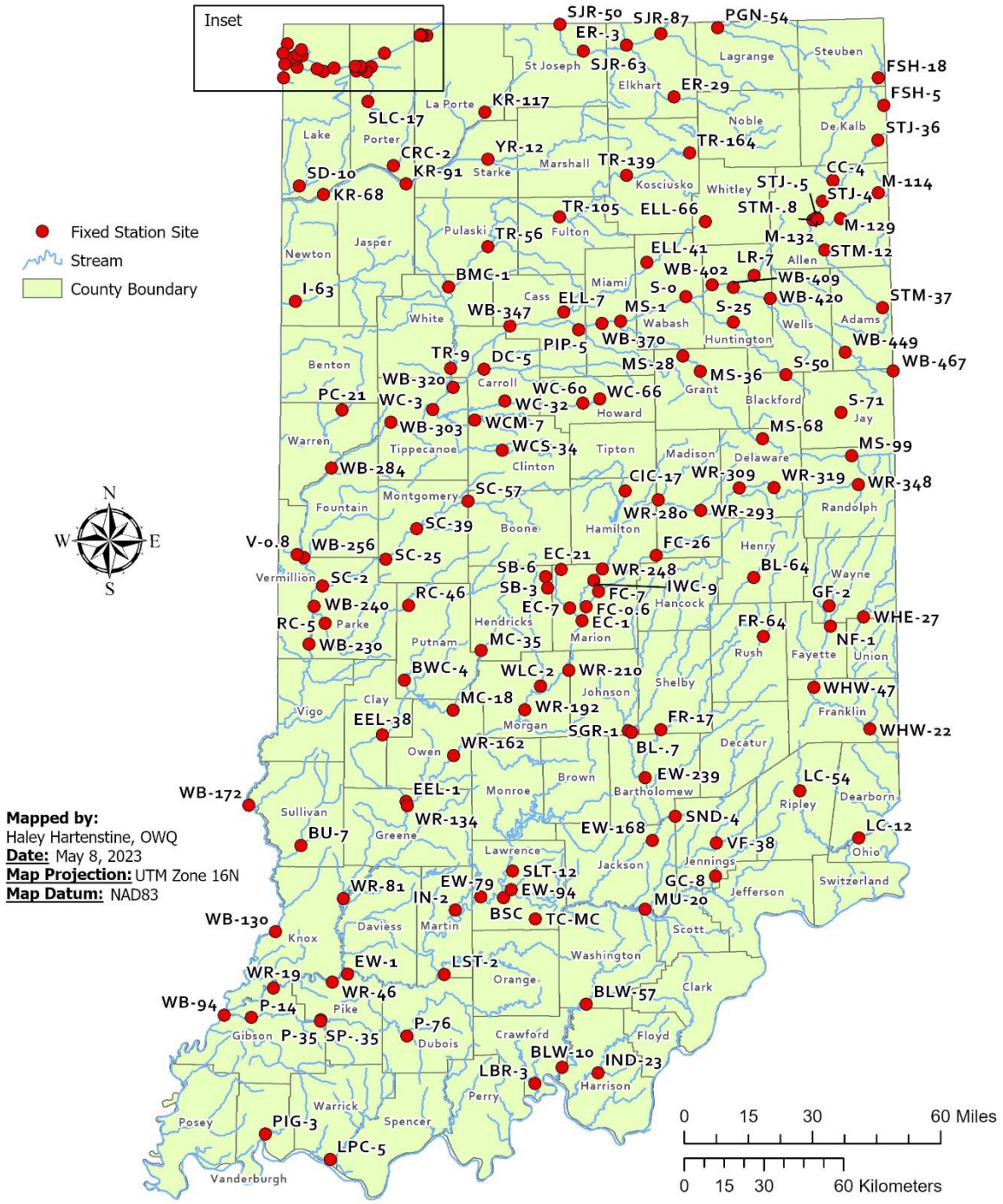

Figure 3: Northwest Indiana Fixed Station Monitoring Sampling Locations

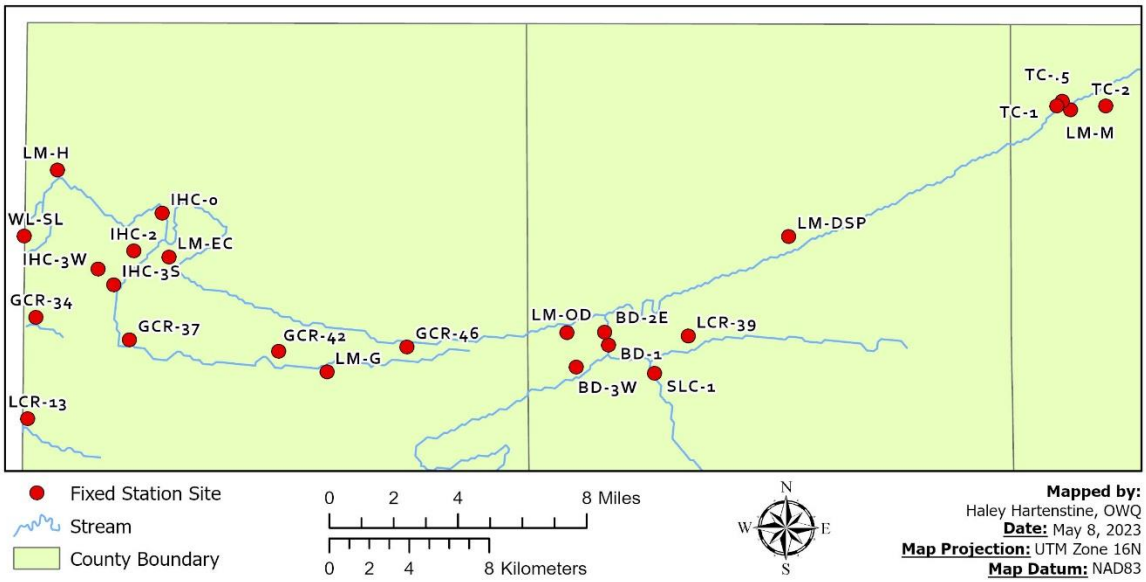

Table 36. Analytical Parameters Sampled at 2023 Fixed Station Sites

Fixed Station Site	L-Site	Site #	GC	Fluoride	Nutrients	^{1}TBOD$_5$	Pesticides	*E. coli*	^{2}DM	DOC	DRP	Dissolved Reactive Silica	Cyanide
East Route													
BL-64	WED010-0005	10	✓		✓	✓							
GF-2	GMW020-0001	11	✓		✓								
NF-1	GMW030-0001	12	✓		✓								
WHE-27	GMW070-0006	13	✓		✓	✓							
WR-348	WWU010-0006	14	✓		✓	✓							
WR-319	WWU010-0001	15	✓	✓	✓	✓	✓						
WR-309	WWU020-0005	16	✓		✓	✓							
WR-293	WWU030-0003	17	✓	✓	✓	✓							
FC-26	WWU100-0001	18	✓		✓								
Indianapolis Route													
FC-0.6	WWU110-0001	19	✓		✓	✓		✓					
FC-7	WWU110-0002	20	✓	✓	✓	✓	✓	✓					
IWC-9	WWU090-0004	21	✓	✓	✓	✓	✓	✓					
WR-248	WWU090-0002	22	✓		✓	✓		✓					
EC-21	WWU120-0007	23	✓		✓	✓	✓	✓					
EC-7	WWU120-0002	24	✓	✓	✓	✓		✓					
EC-1	WWU120-0001	25	✓		✓	✓		✓					
SB-6	WWU-11-0007	167	✓		✓		✓	✓					
SB-3	WWU-11-0009	168	✓		✓		✓	✓					
North Central Route													
WCS-34	WAW040-0001	62	✓		✓	✓							
WCM-7	WAW030-0022	63	✓		✓								
WC-32	WAW020-0039	64	✓		✓								
DC-5	WDE050-0002	65	✓		✓								

Fixed Station Site	L-Site	Site #	GC	Fluoride	Nutrients	[1]TBOD$_5$	Pesticides	*E. coli*	[2]DM	DOC	DRP	Dissolved Reactive Silica	Cyanide
TR-9	WTI150-0011	66	✓		✓	✓							
WC-3	WAW050-0005	67	✓		✓	✓							
WB-320	WDE060-0001	68	✓		✓	✓							
WB-347	WDE010-0007	69	✓		✓	✓							
ELL-7	WAE070-0011	70	✓		✓	✓							
PIP-5	WUW170-0002	71	✓		✓								
WB-370	WUW160-0006	72	✓		✓	✓							
MS-1	WMI060-0006	73	✓		✓	✓							
ELL-41	WAE050-0001	74	✓		✓	✓							
S-0	WSA040-0001	75	✓		✓	✓							
North Route													
TR-105	WTI050-0036	53	✓		✓	✓							
TR-139	WTI030-0001	54	✓		✓								
TR-164	WTI010-0001	55	✓		✓								
ER-29	LMJ190-0006	56	✓		✓								
PGN-54	LMJ120-0009	57	✓		✓								
SJR-87	LMJ150-0004	58	✓		✓	✓							
ER-.3	LMJ-19-0002	59	✓		✓	✓							
SJR-63	LMJ240-0026	60	✓		✓	✓	✓						
SJR-50	LMJ240-0024	61	✓		✓	✓							
Northeast Central Route													
WR-280	WWU040-0038	26	✓		✓	✓							
CIC-17	WWU080-0002	27	✓		✓								
WC-60	WAW020-0004	28	✓		✓	✓							
WC-66	WAW010-0063	29	✓		✓	✓	✓						
MS-36	WMI060-0005	30	✓		✓	✓							

Fixed Station Site	L-Site	Site #	GC	Fluoride	Nutrients	^{1}TBOD$_5$	Pesticides	*E. coli*	^{2}DM	DOC	DRP	Dissolved Reactive Silica	Cyanide
MS-28	WMI060-0004	31	✓		✓	✓	✓						
S-25	WSA040-0005	32	✓		✓	✓			✓	✓			
WB-449	WUW060-0007	33	✓		✓	✓							
S-50	WSA020-0002	34	✓		✓								
S-71	WSA010-0002	35	✓		✓	✓							
MS-99	WMI020-0002	36	✓		✓	✓			✓	✓			
MS-68	WMI030-0001	37	✓		✓								
WB-467	WUW040-0005	163	✓		✓	✓							
Northeast Ft Wayne Route													
STM-.8	LES-06-0003	43	✓		✓	✓	✓				✓		
STJ-.5	LEJ100-0003	44	✓	✓	✓	✓	✓				✓		
CC-4	LEJ090-0026	45	✓		✓						✓		
M-114	LEM010-0013	49	✓		✓	✓					✓		
M-129	LEM010-0014	50	✓		✓	✓			✓	✓	✓		
STM-12	LES-06-0009	51	✓		✓	✓			✓	✓	✓		
STJ-4	LEJ-08-0005	161	✓		✓						✓		
M-132	LEM-01-0014	162	✓		✓						✓		
Northeast IDEM Route													
WB-420	WUW070-0002	38	✓		✓	✓							
LR-7	WUW120-0002	39	✓		✓								
WB-409	WUW090-0001	40	✓		✓	✓							
WB-402	WUW140-0001	41	✓		✓	✓							
ELL-66	WAE040-0002	42	✓		✓								
FSH-18	LEJ050-0006	46	✓		✓						✓		
FSH-5	LEJ050-0007	47	✓		✓						✓		
STJ-36	LEJ060-0006	48	✓		✓						✓		

Fixed Station Site	L-Site	Site #	GC	Fluoride	Nutrients	^{1}TBOD$_5$	Pesticides	*E. coli*	^{2}DM	DOC	DRP	Dissolved Reactive Silica	Cyanide
STM-37	LES040-0007	52	✓		✓	✓					✓		
Northwest A Route													
TC-2	LMG070-0005	101	✓		✓	✓						✓	
TC-1	LMG070-0008	102	✓		✓	✓						✓	
LM-M	LMG070-0004	103	✓	✓	✓	✓	✓					✓	
TC-.5	LMG070-0007	104	✓	✓	✓	✓						✓	
LM-DSP	LMM010-0002	105	✓	✓	✓	✓						✓	
LCR-39	LMG060-0008	106	✓	✓	✓	✓						✓	
SLC-17	LMG050-0007	107	✓	✓	✓	✓	✓					✓	
SLC-1	LMG050-0006	108	✓	✓	✓	✓						✓	
BD-3W	LMG040-0003	109	✓	✓	✓	✓						✓	
BD-2E	LMG060-0005	110	✓	✓	✓	✓						✓	
BD-1	LMG060-0007	111	✓	✓	✓	✓						✓	
LM-OD	LMG020-0013	112	✓	✓	✓	✓	✓					✓	
Northwest B Route													
LM-G	LMG020-0009	113	✓	✓	✓	✓		✓				✓	
GCR-42	LMG020-0012	114	✓	✓	✓	✓						✓	✓
GCR-37	LMG020-0011	115	✓	✓	✓	✓						✓	✓
IHC-3S	LMG020-0004	116	✓	✓	✓	✓						✓	✓
IHC-3W	LMG020-0005	117	✓	✓	✓	✓						✓	✓
LM-EC	LMG020-0008	118	✓	✓	✓	✓		✓				✓	
IHC-2	LMG020-0003	119	✓	✓	✓	✓						✓	✓
IHC-0	LMM010-0001	120	✓	✓	✓	✓						✓	✓
LM-H	LMG020-0010	122	✓	✓	✓	✓	✓	✓				✓	
WL-SL	LMG020-0014	123	✓		✓	✓						✓	
GCR-34	UMC050-0002	124	✓	✓	✓	✓						✓	✓

Fixed Station Site	L-Site	Site #	GC	Fluoride	Nutrients	[1]TBOD$_5$	Pesticides	*E. coli*	[2]DM	DOC	DRP	Dissolved Reactive Silica	Cyanide
LCR-13	UMC030-0004	125	✓		✓	✓			✓	✓		✓	✓
GCR-46	LMG020-0001	160	✓	✓	✓	✓		✓				✓	✓
Northwest Central Route													
I-63	UMI050-0006	92	✓		✓								
SD-10	UMK130-0001	93	✓		✓								
KR-68	UMK110-0002	94	✓		✓	✓			✓	✓			
CRC-2	UMK090-0001	95	✓		✓								
KR-91	UMK080-0001	96	✓		✓								
KR-117	UMK030-0020	97	✓		✓	✓							
YR-12	UMK060-0001	98	✓		✓								
TR-56	WTI080-0001	99	✓		✓								
BMC-1	WTI110-0001	100	✓		✓								
South A Route													
SGR-1	WED090-0004	143	✓		✓	✓							
BL-.7	WED050-0001	144	✓		✓	✓							
EW-239	WEF060-0003	145	✓		✓	✓							
EW-168	WEU040-0001	146	✓	✓	✓	✓	✓						
MU-20	WEM090-0002	147	✓		✓	✓							
BLW-57	OBS140-0004	148	✓		✓	✓							
IND-23	OBS100-0004	149	✓		✓								
BLW-10	OBS150-0008	150	✓		✓								
LBR-3	OBS180-0007	151	✓		✓								
South B Route													
TC-MC	WEL020-0001	152	✓		✓	✓							
BSC	WEL100-0001	153	✓		✓	✓							
EW-79	WEL100-0002	154	✓		✓	✓							

Fixed Station Site	L-Site	Site #	GC	Fluoride	Nutrients	^{1}TBOD$_5$	Pesticides	*E. coli*	^{2}DM	DOC	DRP	Dissolved Reactive Silica	Cyanide
SLT-12	WEL090-0003	155	✓		✓	✓	✓						
EW-94	WEL040-0003	156	✓		✓	✓	✓						
WR-192	WWU160-0004	157	✓		✓	✓							
WLC-2	WWU150-0007	158	✓		✓				✓	✓			
WR-210	WWU140-0003	159	✓		✓	✓							
Southeast Route													
FR-64	WEF020-0002	1	✓		✓								
WHW-47	GMW040-0005	2	✓		✓								
WHW-22	GMW080-0001	3	✓		✓								
LC-12	OML080-0003	4	✓		✓								
LC-54	OML060-0004	5	✓		✓		✓						
VF-38	WEM070-0001	6	✓		✓								
GC-8	WEM020-0002	7	✓		✓								
SND-4	WEU030-0011	8	✓		✓				✓	✓			
FR-17	WEF050-0002	9	✓		✓								
Southwest A Route													
MC-35	WWE060-0004	126	✓		✓	✓							
MC-18	WWE060-0002	127	✓		✓	✓							
WR-162	WWL020-0003	128	✓		✓	✓							
EEL-1	WWE090-0001	129	✓		✓	✓			✓	✓			
WR-134	WWL030-0003	130	✓		✓								
BU-7	WBU160-0002	131	✓		✓				✓	✓			
WR-81	WWL070-0003	132	✓		✓	✓							
WB-130	WBU200-0003	133	✓	✓	✓	✓							
WR-19	WWL-10-0006	134	✓		✓	✓							
WB-94	WLW-03-0001	166	✓		✓								

Fixed Station Site	L-Site	Site #	GC	Fluoride	Nutrients	[1]TBOD$_5$	Pesticides	*E. coli*	[2]DM	DOC	DRP	Dissolved Reactive Silica	Cyanide
Southwest B Route													
WR-46	WEL170-0001	135	✓		✓	✓							
EW-1	WPA060-0002	136	✓		✓	✓							
P-35	OHP040-0004	137	✓		✓	✓							
PIG-3	OLP150-0007	138	✓		✓				✓	✓			
LPC-5	WPA040-0003	139	✓		✓								
P-76	WEL160-0003	140	✓		✓	✓							
LST-2	WEL110-0002	141	✓		✓								
IN-2	WWL100-0005	142	✓		✓								
West Route													
SC-57	WSU020-0003	76	✓		✓								
WB-303	WLV030-0003	77	✓		✓	✓							
PC-21	WLV040-0003	78	✓		✓	✓							
WB-284	WLV080-0003	79	✓		✓								
SC-39	WSU050-0002	80	✓		✓								
RC-46	WLV160-0001	81	✓		✓								
SC-25	WSU050-0005	82	✓		✓	✓							
WB-256	WLV140-0001	83	✓		✓	✓							
V-0.8	WVE100-0001	84	✓		✓	✓							
SC-2	WSU060-0004	85	✓		✓								
WB-240	WLV-16-0001	86	✓		✓	✓							
RC-5	WLV190-0012	87	✓		✓								
WB-230	WLV200-0001	88	✓		✓	✓							
WB-172	WBU-13-0001	89	✓		✓	✓							
EEL-38	WWE080-0001	90	✓		✓								
BWC-4	WWE040-0001	91	✓		✓								

[1]TBOD is sampled at these sites every other month, see Table 41.
[2]DM includes aluminum, arsenic, barium, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, dissolved reactive silica, silver, sodium, strontium, and zinc.

Table 37. Metal Parameters Sampled at 2023 Fixed Station Sites

Fixed Station Site	L-Site	Site #	Aluminum	Arsenic	Barium	Boron	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Zinc
East Route																			
BL-64	WED010-0005	10	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GF-2	GMW020-0001	11	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NF-1	GMW030-0001	12	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WHE-27	GMW070-0006	13	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WR-348	WWU010-0006	14	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WR-319	WWU010-0001	15	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WR-309	WWU020-0005	16	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WR-293	WWU030-0003	17	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FC-26	WWU100-0001	18	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Indianapolis Route																			
FC-0.6	WWU110-0001	19	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
FC-7	WWU110-0002	20	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
IWC-9	WWU090-0004	21	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
WR-248	WWU090-0002	22	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
EC-21	WWU120-0007	23	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
EC-7	WWU120-0002	24	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
EC-1	WWU120-0001	25	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
SB-6	WWU-11-0007	167	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
SB-3	WWU-11-0009	168	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
North Central Route																			
WCS-34	WAW040-0001	62	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓

Fixed Station Site	L-Site	Site #	Aluminum	Arsenic	Barium	Boron	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Zinc
WCM-7	WAW030-0022	63	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
WC-32	WAW020-0039	64	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
DC-5	WDE050-0002	65	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
TR-9	WTI150-0011	66	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
WC-3	WAW050-0005	67	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
WB-320	WDE060-0001	68	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
WB-347	WDE010-0007	69	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
ELL-7	WAE070-0011	70	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
PIP-5	WUW170-0002	71	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
WB-370	WUW160-0006	72	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
MS-1	WMI060-0006	73	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
ELL-41	WAE050-0001	74	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
S-0	WSA040-0001	75	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
North Route																			
TR-105	WTI050-0036	53	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
TR-139	WTI030-0001	54	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
TR-164	WTI010-0001	55	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
ER-29	LMJ190-0006	56	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
PGN-54	LMJ120-0009	57	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
SJR-87	LMJ150-0004	58	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
ER-.3	LMJ-19-0002	59	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
SJR-63	LMJ240-0026	60	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
SJR-50	LMJ240-0024	61	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
Northeast Central Route																			
WR-280	WWU040-0038	26	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
CIC-17	WWU080-0002	27	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓

Fixed Station Site	L-Site	Site #	Aluminum	Arsenic	Barium	Boron	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Zinc
WC-60	WAW020-0004	28	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WC-66	WAW010-0063	29	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
MS-36	WMI060-0005	30	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
MS-28	WMI060-0004	31	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
S-25	WSA040-0005	32	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WB-449	WUW060-0007	33	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
S-50	WSA020-0002	34	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
S-71	WSA010-0002	35	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
MS-99	WMI020-0002	36	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
MS-68	WMI030-0001	37	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WB-467	WUW040-0005	163	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Northeast Ft Wayne Route																			
STM-.8	LES-06-0003	43	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
STJ-.5	LEJ100-0003	44	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
CC-4	LEJ090-0026	45	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
M-114	LEM010-0013	49	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
M-129	LEM010-0014	50	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
STM-12	LES-06-0009	51	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
STJ-4	LEJ-08-0005	161	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
M-132	LEM-01-0014	162	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
Northeast IDEM Route																			
WB-420	WUW070-0002	38	✓	✓			✓	✓	✓	✓	✓		✓		✓			✓	✓
LR-7	WUW120-0002	39	✓	✓			✓	✓	✓	✓	✓		✓		✓			✓	✓
WB-409	WUW090-0001	40	✓	✓			✓	✓	✓	✓	✓		✓		✓			✓	✓
WB-402	WUW140-0001	41	✓	✓			✓	✓	✓	✓	✓		✓		✓			✓	✓
ELL-66	WAE040-0002	42	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓

Fixed Station Site	L-Site	Site #	Aluminum	Arsenic	Barium	Boron	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Zinc
FSH-18	LEJ050-0006	46	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
FSH-5	LEJ050-0007	47	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
STJ-36	LEJ060-0006	48	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
STM-37	LES040-0007	52	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
Northwest A Route																			
TC-2	LMG070-0005	101	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
TC-1	LMG070-0008	102	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
LM-M	LMG070-0004	103	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
TC-.5	LMG070-0007	104	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
LM-DSP	LMM010-0002	105	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
LCR-39	LMG060-0008	106	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
SLC-17	LMG050-0007	107	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
SLC-1	LMG050-0006	108	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
BD-3W	LMG040-0003	109	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
BD-2E	LMG060-0005	110	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
BD-1	LMG060-0007	111	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
LM-OD	LMG020-0013	112	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
Northwest B Route																			
LM-G	LMG020-0009	113	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GCR-42	LMG020-0012	114	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GCR-37	LMG020-0011	115	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IHC-3S	LMG020-0004	116	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IHC-3W	LMG020-0005	117	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LM-EC	LMG020-0008	118	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IHC-2	LMG020-0003	119	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IHC-0	LMM010-0001	120	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Fixed Station Site	L-Site	Site #	Aluminum	Arsenic	Barium	Boron	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Zinc
LM-H	LMG020-0010	122	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WL-SL	LMG020-0014	123	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GCR-34	UMC050-0002	124	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LCR-13	UMC030-0004	125	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GCR-46	LMG020-0001	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Northwest Central Route																			
I-63	UMI050-0006	92	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
SD-10	UMK130-0001	93	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
KR-68	UMK110-0002	94	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
CRC-2	UMK090-0001	95	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
KR-91	UMK080-0001	96	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
KR-117	UMK030-0020	97	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
YR-12	UMK060-0001	98	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
TR-56	WTI080-0001	99	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
BMC-1	WTI110-0001	100	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
South Route																			
SGR-1	WED090-0004	143	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
BL-.7	WED050-0001	144	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
EW-239	WEF060-0003	145	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
EW-168	WEU040-0001	146	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
MU-20	WEM090-0002	147	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
BLW-57	OBS140-0004	148	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
IND-23	OBS100-0004	149	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
BLW-10	OBS150-0008	150	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
LBR-3	OBS180-0007	151	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
South B Route																			

Fixed Station Site	L-Site	Site #	Aluminum	Arsenic	Barium	Boron	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Zinc
TC-MC	WEL020-0001	152	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
BSC	WEL100-0001	153	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
EW-79	WEL100-0002	154	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
SLT-12	WEL090-0003	155	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
EW-94	WEL040-0003	156	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WR-192	WWU160-0004	157	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WLC-2	WWU150-0007	158	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WR-210	WWU140-0003	159	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Southeast Route																			
FR-64	WEF020-0002	1	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
WHW-47	GMW040-0005	2	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
WHW-22	GMW080-0001	3	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
LC-12	OML080-0003	4	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
LC-54	OML060-0004	5	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
VF-38	WEM070-0001	6	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
GC-8	WEM020-0002	7	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
SND-4	WEU030-0011	8	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
FR-17	WEF050-0002	9	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓			✓	✓
Southwest A Route																			
MC-35	WWE060-0004	126	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
MC-18	WWE060-0002	127	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
WR-162	WWL020-0003	128	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
EEL-1	WWE090-0001	129	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
WR-134	WWL030-0003	130	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
BU-7	WBU160-0002	131	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
WR-81	WWL070-0003	132	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓

Fixed Station Site	L-Site	Site #	Aluminum	Arsenic	Barium	Boron	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Zinc
WB-130	WBU200-0003	133	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
WR-19	WWL-10-0006	134	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
WB-94	WLW-03-0001	166	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
Southwest B Route																			
WR-46	WEL170-0001	135	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
EW-1	WPA060-0002	136	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
P-35	OHP040-0004	137	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
PIG-3	OLP150-0007	138	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
LPC-5	WPA040-0003	139	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
P-76	WEL160-0003	140	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
LST-2	WEL110-0002	141	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
IN-2	WWL100-0005	142	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
West Route																			
SC-57	WSU020-0003	76	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WB-303	WLV030-0003	77	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
PC-21	WLV040-0003	78	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WB-284	WLV080-0003	79	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
SC-39	WSU050-0002	80	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
RC-46	WLV160-0001	81	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
SC-25	WSU050-0005	82	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WB-256	WLV140-0001	83	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
V-0.8	WVE100-0001	84	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
SC-2	WSU060-0004	85	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WB-240	WLV-16-0001	86	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
RC-5	WLV190-0012	87	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
WB-230	WLV200-0001	88	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓

Fixed Station Site	L-Site	Site #	Aluminum	Arsenic	Barium	Boron	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Zinc
WB-172	WBU-13-0001	89	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
EEL-38	WWE080-0001	90	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
BWC-4	WWE040-0001	91	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓

Table 38. Fixed Station Sites Sampled for Dissolved Metals and Dissolved Organic Carbon

Site #	Waterbody	Site Location
32	Salamonie River	SR 124, South of Lancaster
37	Mississinewa River	N Walnut St, West of Eaton
50	Maumee River	Landin Rd bridge, New Haven/Fort Wayne
51	St Mary's River	Bostick Rd Walk Bridge
38	Wabash River	SR 3 Bridge, Markle, IN
125	Little Calumet River	Hohman Ave, Hammond
94	Kankakee River	SR 55, Shelby
158	White Lick Creek	CR 600 N, Near Centerton
8	Sand Creek	CR 600 E, East of Reddington
129	Eel River	SR 67 Bridge, Worthington
131	Busseron Creek	SR 58, Carlisle
138	Pigeon Creek	First Ave, Evansville, Center Park

Table 39. Fixed Station Sites Sampled for Pesticides

Site #	Waterbody	Site Location
15	West Fork White River	Memorial Dr, Muncie
20	Fall Creek	Keystone Ave, near 38th St, and IWC Intake, Indianapolis
21	Indianapolis Waterway Canal	Guilford Ave, Broad Ripple
23	Eagle Creek	86th St, south of Zionsville
167	School Branch	Maloney Rd
168	School Branch	Noble Dr
60	Saint Joseph River	Boat ramp 300 ft upstream of Mishawaka Ave Bridge @ Merrifield Pk
29	Wildcat Creek	SR 931/S Reed Rd/Old US 31, Kokomo
43	St Mary's River	Wells Street Bridge in Fort Wayne
44	Saint Joseph River	Tennessee St Bridge, Fort Wayne

Site #	Waterbody	Site Location
103	Lake Michigan	Raw Water, Michigan City Waterworks
107	Salt Creek	SR 130 Bridge, Below STP, Near Valparaiso
112	Lake Michigan	Raw Water, Northwest Indiana Water Company, Ogden Dunes Treatment Plant
122	Lake Michigan	Raw Water, Hammond Waterworks
146	East Fork White River	CR 725 N, above Seymour Waterworks Dam at boat ramp
155	Salt Creek	Oolitic Rd, Near Oolitic
156	East Fork White River	Public Access Boat Ramp at US 50/SR 37, S of Bedford
5	Laughery Creek	SR 350, East of Osgood

Figure 4: Dissolved Metals and Pesticides Monitoring Locations

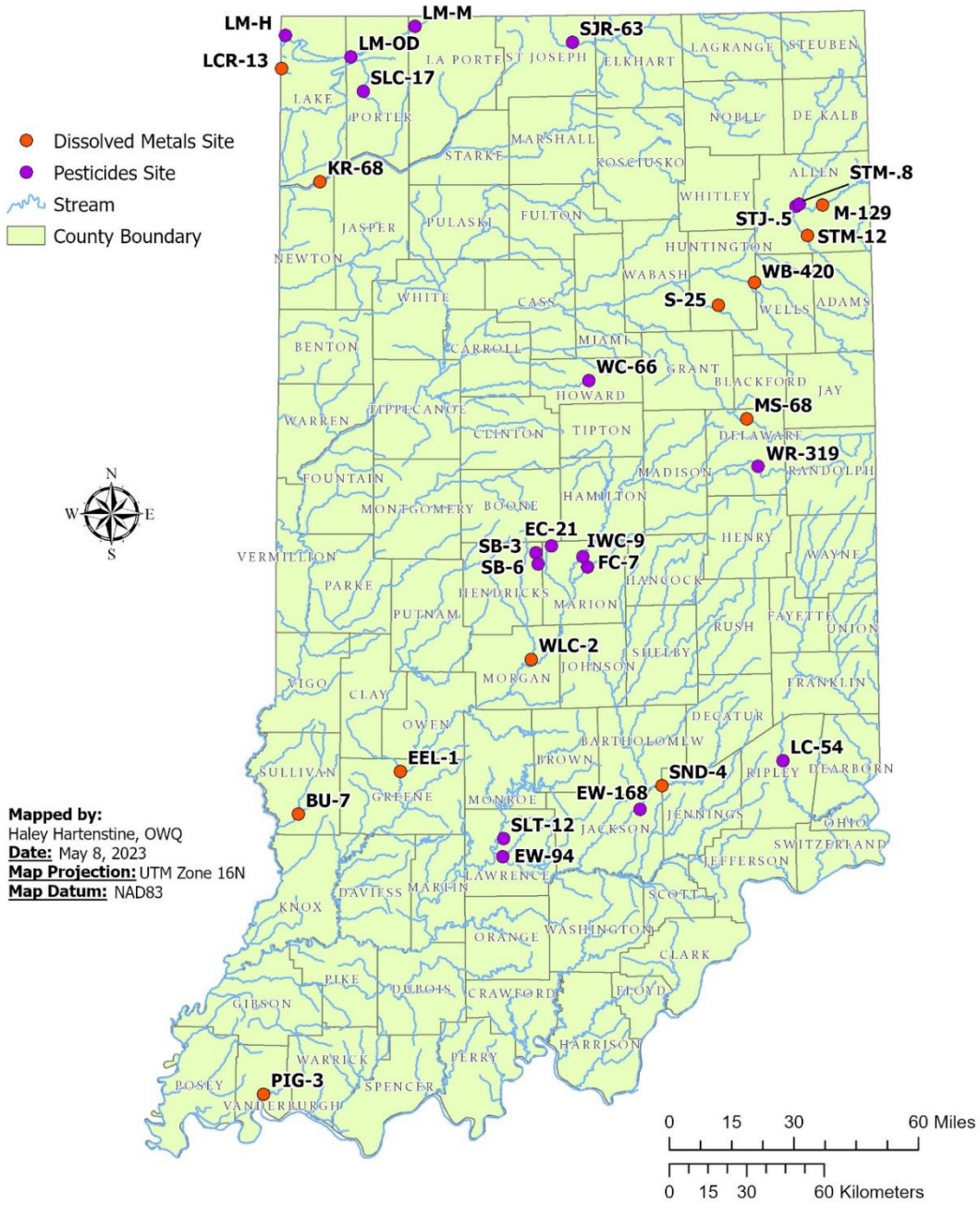

Table 40. Fixed Station Sites Sampled for Dissolved Reactive Phosphorus (DRP)

Site #	Waterbody	Site Location
43	St Marys River	Wells Street Bridge in Fort Wayne
44	Saint Joseph River	Tennessee St Bridge, Fort Wayne
45	Cedar Creek	Hursh Rd Bridge
49	Maumee River	SR 101 Bridge, 3 Miles north of Woodburn
50	Maumee River	Landin Rd bridge, New Haven/Fort Wayne
51	St Marys River	Bostick Rd Walk Bridge
161	Saint Joseph River	Shoaff Park boat ramp
162	Maumee River	Tecumseh St.
46	Fish Creek	SR 427 northeast of Hamilton
47	Fish Creek	CR 79, Artic
48	Saint Joseph River	SR 8 bridge, Newville
52	St Marys River	SR 101 Bridge, north of Pleasant Mills

Figure 5:Dissolved Reactive Phosphorus Monitoring Locations in the Northeast Fort Wayne Route

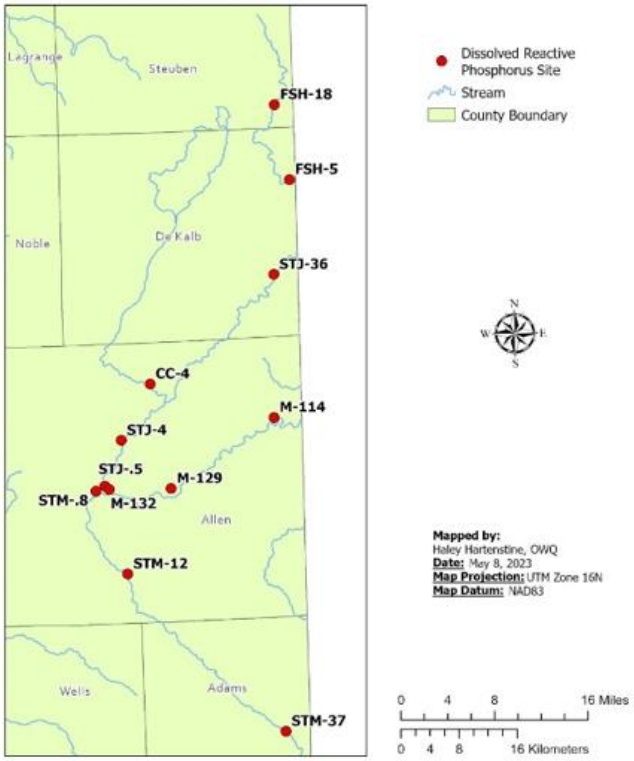

Table 41. Fixed Station Sites Sampled for Biological Oxygen Demand (BOD)

Site #	Waterbody	Site Location	Odd Months	Even Months
East Route				
10	Big Blue River	CR 400 S, near Spiceland	✓	
13	East Fork Whitewater River	Potter Shop Rd bridge, East edge of Abington	✓	
14	West Fork White River	US 27, Winchester	✓	
15	West Fork White River	Memorial Dr, Muncie	✓	
16	West Fork White River	Tiger Dr, Canoe Launch at Morrow's Meadow City Park, Yorktown	✓	
17	West Fork White River	Edgewater Park Boat Ramp Near Old Water Works Dam Site, Anderson	✓	
Indianapolis Route				
19	Fall Creek	Stadium Dr, Indianapolis	✓	
20	Fall Creek	Keystone Ave, near 38th St, and IWC Intake, Indianapolis	✓	
21	Indianapolis Waterway Canal	Guilford Ave, Broad Ripple	✓	
22	West Fork White River	86th St, Nora	✓	
23	Eagle Creek	86th St, south of Zionsville	✓	
24	Eagle Creek	Lynhurst Dr, Indianapolis	✓	
25	Eagle Creek	Raymond St, Indianapolis	✓	
Northeast Central Route				
26	White River	Boat Ramp east of Perkinsville on Water St	✓	
28	Wildcat Creek	CR 300 W/Malfalfa Rd, 1 mile west of Kokomo	✓	

Site #	Waterbody	Site Location	Odd Months	Even Months
29	Wildcat Creek	SR 931/S Reed Rd/Old US 31, Kokomo	✓	
30	Mississinewa River	Highland Ave, Marion at boat ramp	✓	
31	Mississinewa River	Off of CR 380 W, bank sample, 500 yards downstream of CR 500 N Bridge, near Jalapa	✓	
32	Salamonie River	SR 124, south of Lancaster	✓	
33	Wabash River	CR 400 W, northeast of Geneva	✓	
35	Salamonie River	CR 75 S, west of Portland	✓	
36	Mississinewa River	CR 100 W, near Ridgeville	✓	
163	Wabash River	Indiana Ohio Line Rd @ Stateline	✓	
Northeast IDEM Route				
38	Wabash River	SR 3 Bridge, Markle 2nd bridge going out of town	✓	
40	Wabash River	Etna Rd, Huntington	✓	
41	Wabash River	SR 105 Bridge, north of Andrews	✓	
52	St Marys River	SR 101 Bridge, north of Pleasant Mills	✓	
Northeast Ft Wayne Route				
43	St Marys River	Old Wells Street Walk Bridge in Fort Wayne	✓	
44	Saint Joseph River	Tennessee St Bridge, Fort Wayne	✓	
49	Maumee River	SR 101 Bridge, 3 Miles north of Woodburn	✓	

Site #	Waterbody	Site Location	Odd Months	Even Months
50	Maumee River	Landin Rd bridge, New Haven/Fort Wayne	✓	
51	St Marys River	Bostick Rd Walk Bridge	✓	
North Route				
53	Tippecanoe River	CR 200 W Bridge		✓
58	Saint Joseph River	Boat ramp 500yds upstream of N Division St, Bristol		✓
59	Elkhart River	Pedestrian Walk Bridge off of Waterfall Dr		✓
60	Saint Joseph River	Boat ramp 300 ft upstream of Mishawaka Ave Bridge @ Merrifield Pk		✓
61	Saint Joseph River	Boat Ramp at St. Patrick's County Park, South Bend, IN		✓
North Central Route				
62	South Fork Wildcat Creek	CR 200 N, east of SR 38, 39, US 421		✓
66	Tippecanoe River	SR 18, near Delphi		✓
67	Wildcat Creek	SR 25, northeast of Lafayette		✓
68	Wabash River	Americus Rd/Grant Rd near SR 25		✓
69	Wabash River	CR 675 W, west of Georgetown		✓
70	Eel River	CR 150 N, northeast of Logansport		✓
72	Wabash River	Business US 31, Peru		✓
73	Mississinewa River	SR 124, d/s of reservoir, near Peru		✓

Site #	Waterbody	Site Location	Odd Months	Even Months
74	Eel River	SR 15, Boat ramp 150 ft upstream of SR 15 Bridge, northeast of Roann (Public Access Site)		✓
75	Salamonie River	East Hanging Rock Road Bridge Near Lagro		✓
West Route				
77	Wabash River	CR 700 W, south of Lafayette		✓
78	Big Pine Creek	SR 55 bridge in Pine Village		✓
82	Sugar Cr	SR 234, boat ramp 100 ft downstream Bridge.		✓
83	Wabash River	SR 234, Cayuga		✓
84	Vermillion River	SR 63, Cayuga		✓
86	Wabash River	Boat Ramp in Montezuma Town Park		✓
88	Wabash River	u/s of SR 163, boat ramp @ bottom of the stairs, Clinton		✓
89	Wabash River	SR 154 near Hutsonville, IL		✓
Northwest Central Route				
94	Kankakee River	SR 55, Shelby		✓
97	Kankakee River	CR 1000 S Near LaPorte		✓
Northwest A Route				
101	Trail Creek	Krueger Park Bridge, Michigan City		✓
102	Trail Creek	US 12 Bridge, Michigan City		✓
103	Lake Michigan	Raw Water, Michigan City Waterworks		✓

Site #	Waterbody	Site Location	Odd Months	Even Months
104	Trail Creek	Franklin St, Michigan City		✓
105	Lake Michigan	Beach Sample, Dunes State Park		✓
106	East Branch Little Calumet River	SR 149, south of US Hwy 12, northwest of Porter		✓
107	Salt Creek	SR 130 Bridge, Below STP, Near Valparaiso		✓
108	Salt Creek	US 20, Portage		✓
109	Burns Ditch	Portage Boat Yard Dock, Portage		✓
110	Burns Ditch	Crisman Rd near SR 249, Portage		✓
111	Burns Ditch	US 12, Portage Public Marina		✓
112	Lake Michigan	Raw Water, Northwest Indiana Water Company, Ogden Dunes Treatment Plant		✓
Northwest B Route				
113	Lake Michigan	Raw Water, Northwest Indiana Water Company (Gary), Borman Pk Treatment Plant		✓
114	Grand Calumet River	Bridge St Near US Steel, Gary		✓
115	Grand Calumet River	Kennedy Ave, East Chicago		✓
116	Indiana Harbor Canal	Columbus Dr, East Chicago		✓
117	Indiana Harbor Canal	Indianapolis Blvd, East Chicago		✓
118	Lake Michigan	Raw Water, E Chicago Waterworks		✓

Site #	Waterbody	Site Location	Odd Months	Even Months
119	Indiana Harbor Canal	Dickey Rd, East Chicago		✓
120	Indiana Harbor Canal	Mouth at LTV Steel, East Chicago		✓
122	Lake Michigan	Raw Water, Hammond Waterworks		✓
123	Wolf Lake	Culvert at State Line Rd at End of 129th St		✓
124	Grand Calumet River	Hohman Ave, Hammond		✓
125	Little Calumet River	Hohman Ave, Hammond		✓
160	Grand Calumet River	at US Steel		✓
Southwest A Route				
126	Mill Creek	US 40 Bridge at Stilesville	✓	
127	Mill Creek	US 231, near Devore	✓	
128	West Fork White River	South Main St, Spencer	✓	
129	Eel River	SR 67 Bridge, Worthington	✓	
132	West Fork White River	SR 358, Near Edwardsport	✓	
133	Wabash River	Vigo St/Old US Hwy 50, Vincennes	✓	
134	White River	Hazleton Public Access Site boat ramp	✓	
Southwest B Route				
135	White River	SR 61, Petersburg	✓	
136	East Fork White River	SR 57, northeast of Petersburg	✓	
137	Patoka River	CR 300 W, north of Oakland City	✓	
140	Patoka River	Old Huntingburg Rd (CR 350W) north of CR 400 S, west. of US 231	✓	

South A Route				
Site #	**Waterbody**	**Site Location**	**Odd Months**	**Even Months**
143	Sugar Cr	CR 800 S, Bridge to Atterbury west of US 31, Edinburgh	✓	
144	Big Blue River	US 31, Edinburgh	✓	
145	East Fork White River	SR 46, Columbus	✓	
146	East Fork White River	CR 725 N, above Seymour Waterworks Dam at boat ramp	✓	
147	Muscatatuck River	SR 39, west of Austin	✓	
148	Blue River	US 150, Fredericksburg	✓	
South B Route				
152	Mill Creek	Twin Caves, Spring Mill State Park, Mitchell	✓	
153	Mystery River	Bluespring Caverns, Hartleyville, southwest of Bedford	✓	
154	East Fork White River	Williams Dam, Williams	✓	
155	Salt Creek	Oolitic Rd, Near Oolitic	✓	
156	East Fork White River	Public Access Boat Ramp at US 50/SR 37, south of Bedford	✓	
157	West Fork White River	SR 39, Martinsville	✓	
159	West Fork White River	SR 144, near Waverly	✓	

Table 41. Fixed Station Sites Sampled for *E. coli*

Site #	Waterbody	Site Location
Indianapolis Route		
19	Fall Creek	Stadium Dr, Indianapolis

Site #	Waterbody	Site Location
20	Fall Creek	Keystone Ave, near 38th St, and IWC Intake, Indianapolis
21	Indianapolis Waterway Canal	Guilford Ave, Broad Ripple
22	West Fork White River	86th St, Nora
23	Eagle Creek	86th St, south of Zionsville
24	Eagle Creek	Lynhurst Dr, Indianapolis
25	Eagle Creek	Raymond St, Indianapolis
167	School Branch	Maloney Rd
168	School Branch	Noble Dr
Northwest B Route		
113	Lake Michigan	Raw Water, Northwest Indiana Water Company (Gary), Borman Pk Treatment Plant
114	Grand Calumet River	Bridge St Near US Steel, Gary
118	Lake Michigan	Raw Water, E Chicago Waterworks
122	Lake Michigan	Raw Water, Hammond Waterworks

There were two special studies included in the 2023 Fixed Station Project which resulted in the addition of 5 sampling sites. While these sites are not part of the Fixed Station sampling network, evaluation of short-term results may be enough to answer questions and/or indicate whether additional sampling is needed in the future. See Table 43 for site locations. All sites will be sampled for total metals, nutrients and general chemistry parameters.

Lake Michigan Sampling Sites

The 2022 dissolved metals analysis indicated there were three sites along Lake Michigan with dissolved copper exceedances. Upon further review of the sites, all three locations were Lake Michigan drinking water intakes which entail collection of Lake Michigan water samples through an intake pipe. The pipes that transport water are often made from metal materials. To validate whether Lake Michigan proper has a copper exceedance, an additional three locations along Lake Michigan were sampled in 2023. These locations were sampled by Fixed Station program managers and the Lake Michigan DNR field office. Samples were collected in May, August and September which meet the data minimum requirements specified in the CALM.

Patoka River Basin Sampling Sites

Historical WAPB surface water results and land use indicate that South Fork Patoka River and the Patoka River mainstem may be influenced by mining activities. The Patoka River, downstream of the confluence with South Fork Patoka River, has a direct permitted underground mine discharge and the mining influences from Keg Creek impact the surface water quality. The South Fork Patoka River has been impacted by past mining activities and continues to have some of the highest hardness and sulfate concentrations in the state. The current Fixed Station sampling network sites are not positioned to capture the influence of these potential sources so two new sites were selected to be sampled. The additional site on the Patoka River will be sampled for two years beginning in 2023. Data from this site will help IDEM understand what Patoka is discharging to the Wabash River. The additional site on the South Form Patoka River will be sampled from April through October in 2023 at which time the data will be evaluated. Both sites are sampled as part of the Southwest B Route.

Table 42. Additional Sampling Site Locations in the 2023 Fixed Station Project

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
Lake Michigan Sampling Sites						
LM-G(a)	LMG020-0057	NA	Lake Michigan	Lake Water near, Borman Park - Gary	41.64211563	-87.34185091
LM-OD(a)	LMG020-0058	NA	Lake Michigan	Lake Water near, Ogden Dunes	41.63259701	-87.20276621
LM-H(a)	LMG020-0059	NA	Lake Michigan	Lake Water near, Hammond Waterworks	41.69828	-87.5092
Patoka River Basin Sampling Sites						
P-14	WPA-08-0038	171	Patoka River	CR 400 W	38.39075	-87.63694444
SP-.35	WPA-07-0027	172	South Fork Patoka River	CR 300W in Gibson County	38.3790118	-87.3397241

Attachment 4

2024 Fixed Station Project

Specific Sampling Locations
Figures 6-7 and Table 44 describe the 2024 sampling sites.

Figures 8-9 and Tables 45 - 49 identify the numerous variables of interest to the user for each sampling site.

Figure 6: Fixed Station Monitoring Program Sampling Locations

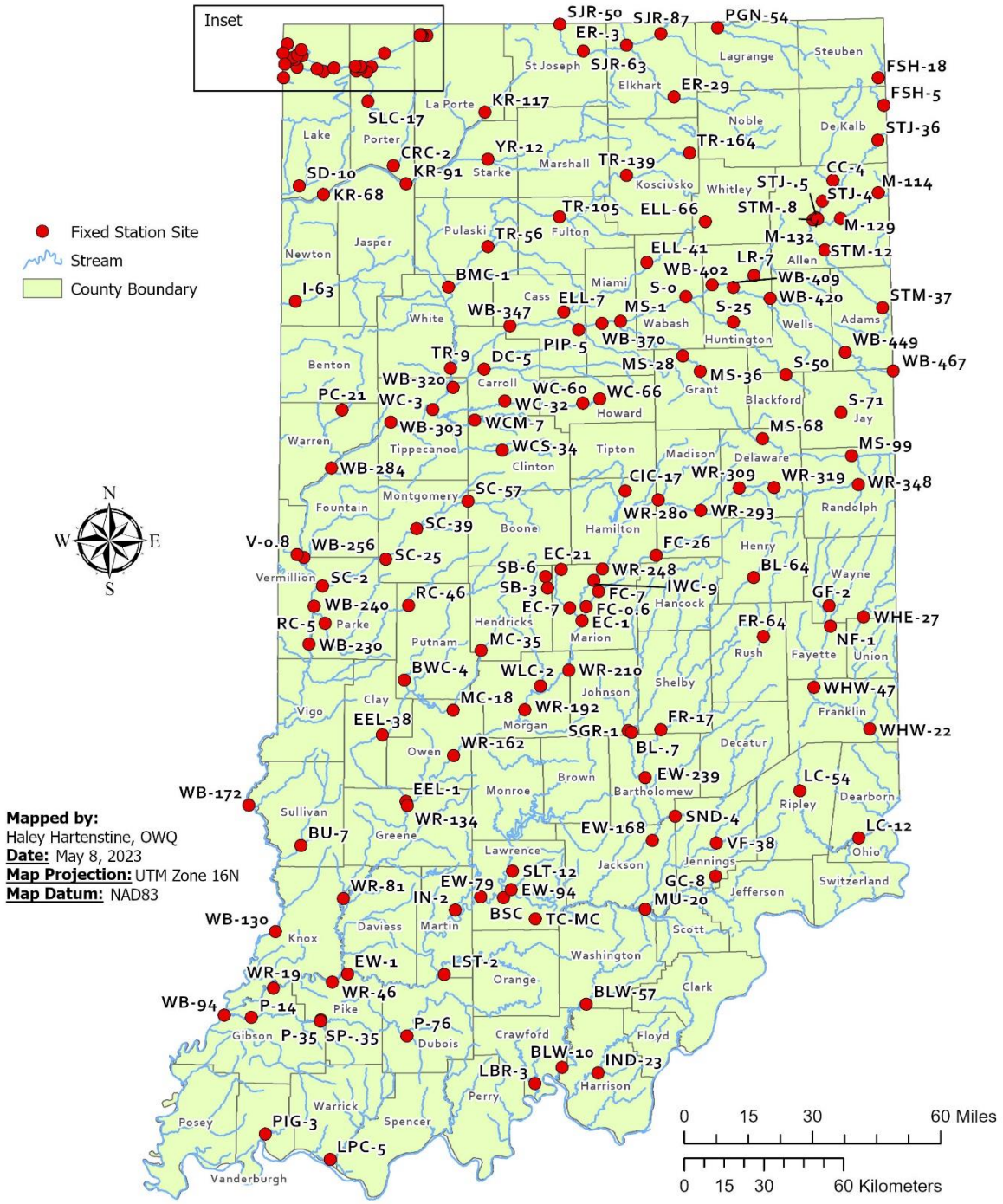

Figure 7: Northwest Indiana Fixed Station Monitoring Program Sampling Locations

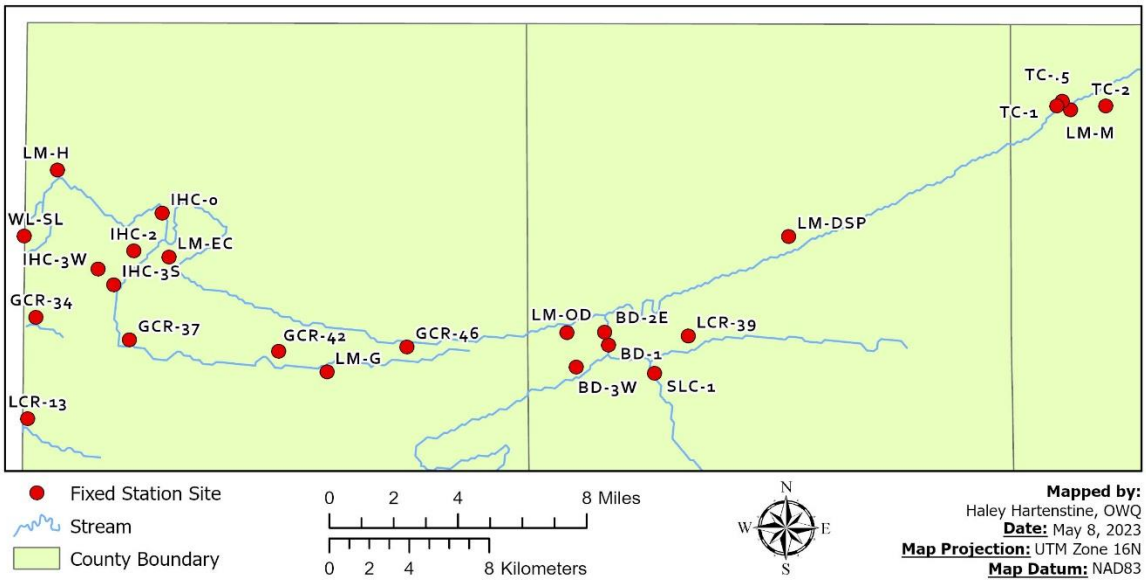

Table 43. Analytical Parameters Sampled at 2024 Fixed Station Sites

Fixed Station Site	L-Site	Site #	GC	Nutrients	Metals	$TBOD_5$	Pesticides	*E. coli*	DM	DOC	DRP	Cyanide
East Route												
BL-64	WED010-0005	10	✓	✓	✓	✓						
GF-2	GMW020-0001	11	✓	✓	✓							
NF-1	GMW030-0001	12	✓	✓	✓							
WHE-27	GMW070-0006	13	✓	✓	✓	✓						
WR-348	WWU010-0006	14	✓	✓	✓	✓						
WR-319	WWU010-0001	15	✓	✓	✓	✓	✓					
WR-309	WWU020-0005	16	✓	✓	✓	✓						
WR-293	WWU030-0003	17	✓	✓	✓	✓						
FC-26	WWU100-0001	18	✓	✓	✓							
Indianapolis Route												
FC-0.6	WWU110-0001	19	✓	✓	✓	✓						
FC-7	WWU110-0002	20	✓	✓	✓	✓	✓					
IWC-9	WWU090-0004	21	✓	✓	✓	✓	✓					
WR-248	WWU090-0002	22	✓	✓	✓	✓						
EC-21	WWU120-0007	23	✓	✓	✓	✓	✓					
EC-7	WWU120-0002	24	✓	✓	✓	✓						
EC-1	WWU120-0001	25	✓	✓	✓	✓						
SB-6	WWU-11-0007	167	✓	✓	✓		✓					
SB-3	WWU-11-0009	168	✓	✓	✓		✓					
North Central Route												
WCS-34	WAW040-0001	62	✓	✓	✓	✓						
WCM-7	WAW030-0022	63	✓	✓	✓							
WC-32	WAW020-0039	64	✓	✓	✓		✓					
DC-5	WDE050-0002	65	✓	✓	✓							

Fixed Station Site	L-Site	Site #	GC	Nutrients	Metals	$TBOD_5$	Pesticides	*E. coli*	DM	DOC	DRP	Cyanide
TR-9	WTI150-0011	66	✓	✓	✓	✓	✓					
WC-3	WAW050-0005	67	✓	✓	✓	✓						
WB-320	WDE060-0001	68	✓	✓	✓	✓						
WB-347	WDE010-0007	69	✓	✓	✓	✓						
ELL-7	WAE070-0011	70	✓	✓	✓	✓	✓					
PIP-5	WUW170-0002	71	✓	✓	✓							
WB-370	WUW160-0006	72	✓	✓	✓	✓	✓					
MS-1	WMI060-0006	73	✓	✓	✓	✓						
ELL-41	WAE050-0001	74	✓	✓	✓	✓						
S-0	WSA040-0001	75	✓	✓	✓	✓						
North Route												
TR-105	WTI050-0036	53	✓	✓	✓	✓						
TR-139	WTI030-0001	54	✓	✓	✓							
TR-164	WTI010-0001	55	✓	✓	✓							
ER-29	LMJ190-0006	56	✓	✓	✓							
PGN-54	LMJ120-0009	57	✓	✓	✓							
SJR-87	LMJ150-0004	58	✓	✓	✓	✓						
ER-.3	LMJ-19-0002	59	✓	✓	✓	✓						
SJR-63	LMJ240-0026	60	✓	✓	✓	✓	✓					
SJR-50	LMJ240-0024	61	✓	✓	✓	✓						
Northeast Central Route												
WR-280	WWU040-0038	26	✓	✓	✓	✓						
CIC-17	WWU080-0002	27	✓	✓	✓							
WC-60	WAW020-0004	28	✓	✓	✓	✓						
WC-66	WAW010-0063	29	✓	✓	✓	✓	✓					
MS-36	WMI060-0005	30	✓	✓	✓	✓						

Fixed Station Site	L-Site	Site #	GC	Nutrients	Metals	$TBOD_5$	Pesticides	*E. coli*	DM	DOC	DRP	Cyanide
MS-28	WMI060-0004	31	✓	✓	✓	✓	✓					
S-25	WSA040-0005	32	✓	✓	✓	✓	✓		✓	✓		
WB-449	WUW060-0007	33	✓	✓	✓	✓						
S-50	WSA020-0002	34	✓	✓	✓							
S-71	WSA010-0002	35	✓	✓	✓	✓						
MS-99	WMI020-0002	36	✓	✓	✓	✓						
MS-68	WMI030-0001	37	✓	✓	✓				✓	✓		
WB-467	WUW040-0005	163	✓	✓	✓	✓	✓					
Northeast Ft. Wayne Route												
STM-.8	LES-06-0003	43	✓	✓	✓	✓	✓				✓	
STJ-.5	LEJ100-0003	44	✓	✓	✓	✓	✓				✓	
CC-4	LEJ090-0026	45	✓	✓	✓						✓	
M-114	LEM010-0013	49	✓	✓	✓	✓	✓				✓	
M-129	LEM010-0014	50	✓	✓	✓	✓			✓	✓	✓	
STM-12	LES-06-0009	51	✓	✓	✓	✓			✓	✓	✓	
STJ-4	LEJ-08-0005	161	✓	✓	✓						✓	
M-132	LEM-01-0014	162	✓	✓	✓						✓	
Northeast IDEM Route												
WB-420	WUW070-0002	38	✓	✓	✓	✓			✓	✓	✓	
LR-7	WUW120-0002	39	✓	✓	✓							
WB-409	WUW090-0001	40	✓	✓	✓	✓						
WB-402	WUW140-0001	41	✓	✓	✓	✓						
ELL-66	WAE040-0002	42	✓	✓	✓							
FSH-18	LEJ050-0006	46	✓	✓	✓						✓	
FSH-5	LEJ050-0007	47	✓	✓	✓						✓	
STJ-36	LEJ060-0006	48	✓	✓	✓						✓	

Fixed Station Site	L-Site	Site #	GC	Nutrients	Metals	$TBOD_5$	Pesticides	*E. coli*	DM	DOC	DRP	Cyanide
STM-37	LES040-0007	52	✓	✓	✓	✓	✓				✓	
Northwest A Route												
TC-2	LMG070-0005	101	✓	✓	✓	✓						
TC-1	LMG070-0008	102	✓	✓	✓	✓						
LM-M	LMG070-0004	103	✓	✓	✓	✓	✓					
TC-.5	LMG070-0007	104	✓	✓	✓	✓						
LM-DSP	LMM010-0002	105	✓	✓	✓	✓						
LCR-39	LMG060-0008	106	✓	✓	✓	✓						
SLC-17	LMG050-0007	107	✓	✓	✓	✓	✓					
SLC-1	LMG050-0006	108	✓	✓	✓	✓						
BD-3W	LMG040-0003	109	✓	✓	✓	✓						
BD-2E	LMG060-0005	110	✓	✓	✓	✓						
BD-1	LMG060-0007	111	✓	✓	✓	✓						
LM-OD	LMG020-0013	112	✓	✓	✓	✓	✓					
Northwest B Route												
LM-G	LMG020-0009	113	✓	✓	✓	✓						
GCR-42	LMG020-0012	114	✓	✓	✓	✓						✓
GCR-37	LMG020-0011	115	✓	✓	✓	✓						✓
IHC-3S	LMG020-0004	116	✓	✓	✓	✓						✓
IHC-3W	LMG020-0005	117	✓	✓	✓	✓						✓
LM-EC	LMG020-0008	118	✓	✓	✓	✓						
IHC-2	LMG020-0003	119	✓	✓	✓	✓	✓					✓
IHC-0	LMM010-0001	120	✓	✓	✓	✓						✓
LM-H	LMG020-0010	122	✓	✓	✓	✓	✓					
WL-SL	LMG020-0014	123	✓	✓	✓	✓						
GCR-34	UMC050-0002	124	✓	✓	✓	✓						✓

Fixed Station Site	L-Site	Site #	GC	Nutrients	Metals	$TBOD_5$	Pesticides	*E. coli*	DM	DOC	DRP	Cyanide
LCR-13	UMC030-0004	125	✓	✓	✓	✓			✓	✓		✓
GCR-46	LMG020-0001	160	✓	✓	✓	✓						✓
Northwest Central Route												
I-63	UMI050-0006	92	✓	✓	✓		✓					
SD-10	UMK130-0001	93	✓	✓	✓							
KR-68	UMK110-0002	94	✓	✓	✓	✓	✓		✓	✓		
CRC-2	UMK090-0001	95	✓	✓	✓							
KR-91	UMK080-0001	96	✓	✓	✓							
KR-117	UMK030-0020	97	✓	✓	✓	✓						
YR-12	UMK060-0001	98	✓	✓	✓							
TR-56	WTI080-0001	99	✓	✓	✓							
BMC-1	WTI110-0001	100	✓	✓	✓							
South A Route												
SGR-1	WED090-0004	143	✓	✓	✓	✓						
BL-.7	WED050-0001	144	✓	✓	✓	✓						
EW-239	WEF060-0003	145	✓	✓	✓	✓						
EW-168	WEU040-0001	146	✓	✓	✓	✓	✓					
MU-20	WEM090-0002	147	✓	✓	✓	✓						
BLW-57	OBS140-0004	148	✓	✓	✓	✓	✓					
IND-23	OBS100-0004	149	✓	✓	✓							
BLW-10	OBS150-0008	150	✓	✓	✓							
LBR-3	OBS180-0007	151	✓	✓	✓							
South B Route												
TC-MC	WEL020-0001	152	✓	✓	✓	✓						
BSC	WEL100-0001	153	✓	✓	✓	✓						
EW-79	WEL100-0002	154	✓	✓	✓	✓						

Fixed Station Site	L-Site	Site #	GC	Nutrients	Metals	$TBOD_5$	Pesticides	*E. coli*	DM	DOC	DRP	Cyanide
SLT-12	WEL090-0003	155	✓	✓	✓	✓	✓					
EW-94	WEL040-0003	156	✓	✓	✓	✓	✓					
WR-192	WWU160-0004	157	✓	✓	✓	✓	✓		✓	✓		
WLC-2	WWU150-0007	158	✓	✓	✓				✓	✓		
WR-210	WWU140-0003	159	✓	✓	✓	✓			✓	✓		
Southeast Route												
FR-64	WEF020-0002	1	✓	✓	✓							
WHW-47	GMW040-0005	2	✓	✓	✓							
WHW-22	GMW080-0001	3	✓	✓	✓		✓					
LC-12	OML080-0003	4	✓	✓	✓							
LC-54	OML060-0004	5	✓	✓	✓		✓					
VF-38	WEM070-0001	6	✓	✓	✓		✓					
GC-8	WEM020-0002	7	✓	✓	✓							
SND-4	WEU030-0011	8	✓	✓	✓				✓	✓		
FR-17	WEF050-0002	9	✓	✓	✓							
Southwest A Route												
MC-35	WWE060-0004	126	✓	✓	✓	✓						
MC-18	WWE060-0002	127	✓	✓	✓	✓						
WR-162	WWL020-0003	128	✓	✓	✓	✓						
EEL-1	WWE090-0001	129	✓	✓	✓	✓			✓	✓		
WR-134	WWL030-0003	130	✓	✓	✓							
BU-7	WBU160-0002	131	✓	✓	✓				✓	✓		
WR-81	WWL070-0003	132	✓	✓	✓	✓	✓					
WB-130	WBU200-0003	133	✓	✓	✓	✓						
WR-19	WWL-10-0006	134	✓	✓	✓	✓						
WB-94	WLW-03-0001	166	✓	✓	✓		✓					

Fixed Station Site	L-Site	Site #	GC	Nutrients	Metals	$TBOD_5$	Pesticides	*E. coli*	DM	DOC	DRP	Cyanide
Southwest B Route												
WR-46	WEL170-0001	135	✓	✓	✓	✓						
EW-1	WPA060-0002	136	✓	✓	✓	✓	✓					
P-35	OHP040-0004	137	✓	✓	✓	✓	✓					
PIG-3	OLP150-0007	138	✓	✓	✓				✓	✓		
LPC-5	WPA040-0003	139	✓	✓	✓							
P-76	WEL160-0003	140	✓	✓	✓	✓						
LST-2	WEL110-0002	141	✓	✓	✓							
IN-2	WWL100-0005	142	✓	✓	✓							
West Route												
SC-57	WSU020-0003	76	✓	✓	✓							
WB-303	WLV030-0003	77	✓	✓	✓	✓	✓					
PC-21	WLV040-0003	78	✓	✓	✓	✓						
WB-284	WLV080-0003	79	✓	✓	✓							
SC-39	WSU050-0002	80	✓	✓	✓							
RC-46	WLV160-0001	81	✓	✓	✓							
SC-25	WSU050-0005	82	✓	✓	✓	✓						
WB-256	WLV140-0001	83	✓	✓	✓	✓						
V-0.8	WVE100-0001	84	✓	✓	✓	✓						
SC-2	WSU060-0004	85	✓	✓	✓							
WB-240	WLV-16-0001	86	✓	✓	✓	✓						
RC-5	WLV190-0012	87	✓	✓	✓							
WB-230	WLV200-0001	88	✓	✓	✓	✓						
WB-172	WBU-13-0001	89	✓	✓	✓	✓	✓					
EEL-38	WWE080-0001	90	✓	✓	✓							
BWC-4	WWE040-0001	91	✓	✓	✓							

[1] $TBOD_5$ is sampled at these sites every other month, see Table 38.

Table 44. Fixed Station Sites Sampled for Dissolved Metals and Dissolved Organic Carbon

Site #	Waterbody	Site Location
32	Salamonie River	SR 124, South of Lancaster
37	Mississinewa River	N Walnut St, west of Eaton
50	Maumee River	Landin Rd bridge, New Haven/Fort Wayne
51	St Marys River	Bostick Rd Walk Bridge
38	Wabash River	SR 3 Bridge, Markle, IN
125	Little Calumet River	Hohman Ave, Hammond
94	Kankakee River	SR 55, Shelby
158	White Lick Creek	CR 600 N, Near Centerton
8	Sand Creek	CR 600 E, east of Reddington
129	Eel River	SR 67 Bridge, Worthington
131	Busseron Creek	SR 58, Carlisle
138	Pigeon Creek	First Ave, Evansville, Center Park

Table 45. Fixed Station Sites Sampled for Pesticides

Site #	Waterbody	Site Location
3	Whitewater River	Old SR 1, S of US 52, Cedar Grove
5	Laughery Creek	SR 350, east of Osgood
6	Vernon Fork Muscatatuck River	CR 60 South, Vernon
15	West Fork White River	Memorial Dr, Muncie
20	Fall Creek	Keystone Ave and IWC Intake
21	Indianapolis Waterway Canal	Guilford Ave, Broad Ripple
23	Eagle Creek	86th St, south of Zionsville
29	Wildcat Creek	SR 931/S Reed Rd/Old US 31, Kokomo
31	Mississinewa River	Off of CR 380 W
32	Salamonie River	SR 124, south of Lancaster
43	St Marys River	Wells Street Bridge in Fort Wayne
44	Saint Joseph River	Tennessee St Bridge, Fort Wayne
49	Maumee River	SR 101 Bridge, 3 Miles north of Woodburn
52	St Marys River	SR 101 Bridge, north of Pleasant Mills
60	Saint Joseph River	Mishawaka Ave Bridge at Merrifield Park
64	Wildcat Creek	SR 75, near Cutler
66	Tippecanoe River	SR 18, near Delphi

Site #	Waterbody	Site Location
70	Eel River	CR 150 N, northeast of Logansport
72	Wabash River	Business US 31, Peru
77	Wabash River	CR 700 W, south of Lafayette
89	Wabash River	SR 154 near Hutsonville, IL
92	Iroquois River	CR 400 W, north of Kentland
94	Kankakee River	SR 55, Shelby
103	Lake Michigan	Raw Water, Michigan City Waterworks
107	Salt Creek	SR 130 Bridge, Below STP, Near Valparaiso
112	Lake Michigan	Raw Water, Ogden Dunes Treatment Plant
119	Indiana Harbor Canal	Dickey Rd, East Chicago
122	Lake Michigan	Raw Water, Hammond Waterworks
132	West Fork White River	SR 358, Near Edwardsport
136	East Fork White River	SR 57, northeast of Petersburg
137	Patoka River	CR 300 W, north of Oakland City
146	East Fork White River	CR 725 N, above Seymour Waterworks Dam at boat ramp
148	Blue River	US 150, Fredericksburg
155	Salt Creek	Oolitic Rd, Near Oolitic
156	East Fork White River	Public Access Boat Ramp at US 50/SR 37, south of Bedford
157	West Fork White River	SR 39, Martinsville
163	Wabash River	Indiana Ohio Line Rd at State line
166	Wabash River	SR 64, near Mount Carmel
167	School Branch	Maloney Rd
168	School Branch	Noble Dr

Figure 8: Dissolved Metals and Pesticides Monitoring Locations

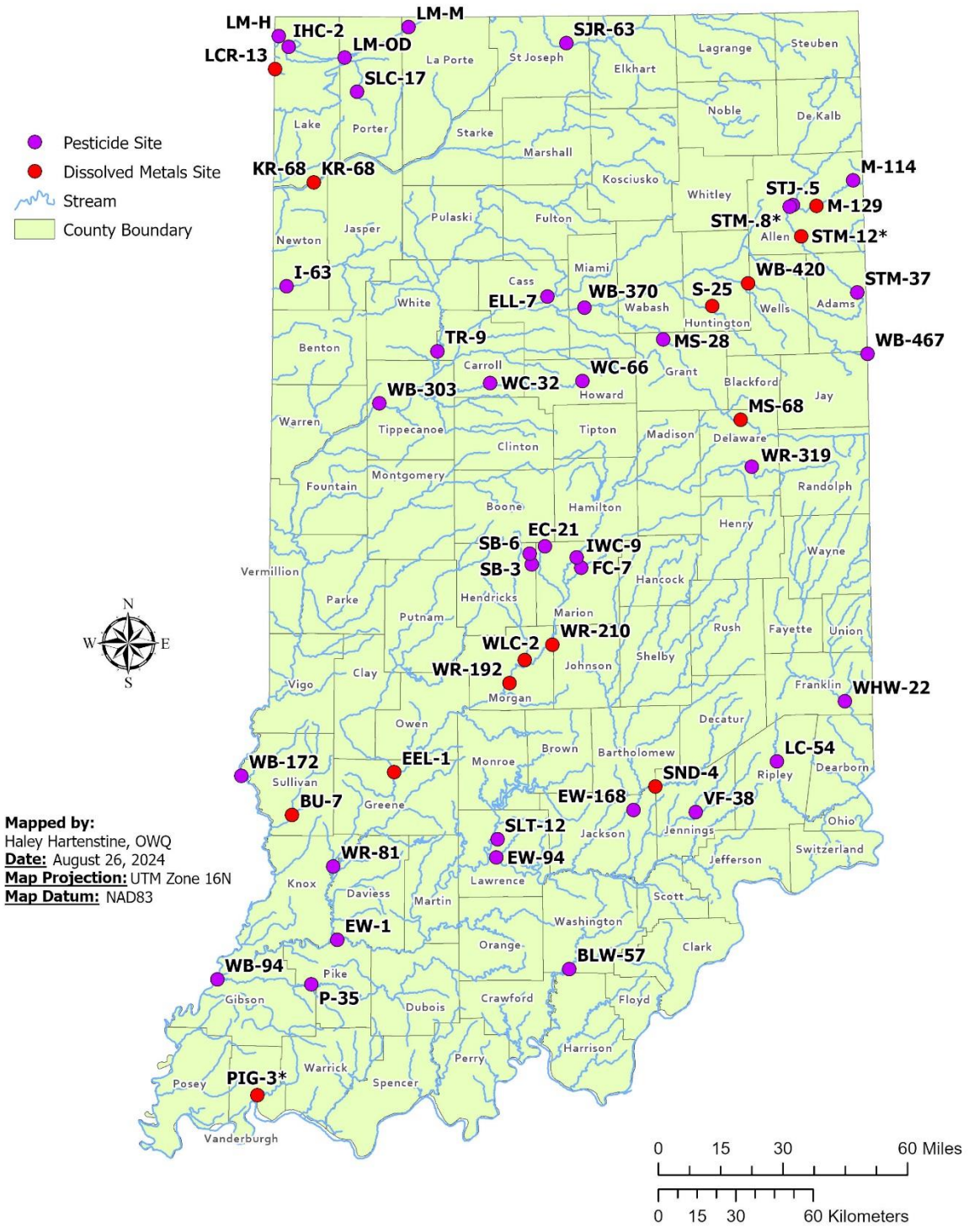

Table 46. Fixed Station Sites Sampled for DRP Sampling on the Northeast Ft Wayne Route

Site #	Waterbody	Site Location
43	St Marys River	Wells Street Bridge in Fort Wayne
44	Saint Joseph River	Tennessee St Bridge, Fort Wayne
45	Cedar Creek	Hursh Rd Bridge
49	Maumee River	SR 101 Bridge, 3 Miles north of Woodburn
50	Maumee River	Landin Rd bridge, New Haven/Fort Wayne
51	St Marys River	Bostick Rd Walk Bridge
161	Saint Joseph River	Shoaff Park boat ramp
162	Maumee River	Tecumseh St.
46	Fish Creek	SR 427 northeast of Hamilton
47	Fish Creek	CR 79, Artic
48	Saint Joseph River	SR 8 bridge, Newville
52	St Marys River	SR 101 Bridge, north of Pleasant Mills

Figure 9: Dissolved Reactive Phosphorus Monitoring Locations in Northeast Fort Wayne Route

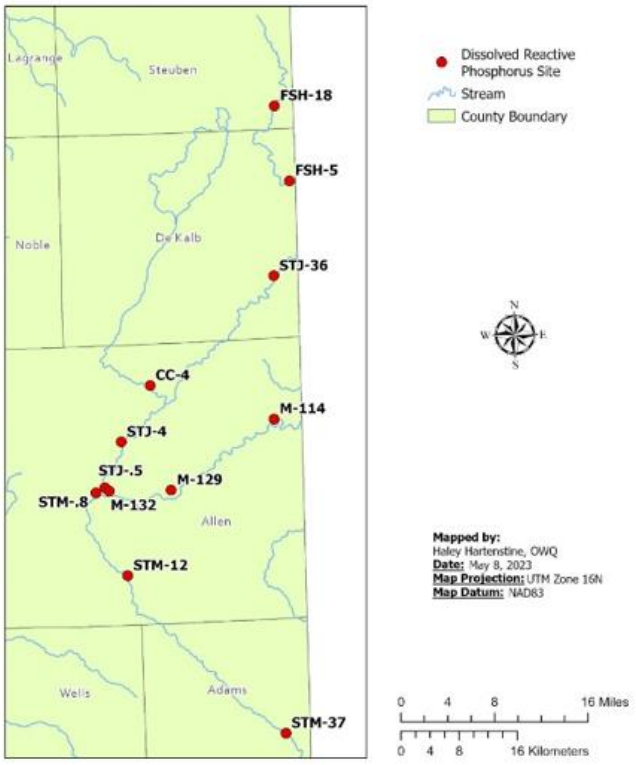

Table 47. Fixed Station Sites Sampled for Biological Oxygen Demand ($TBOD_5$)

Site #	Waterbody	Site Location	Odd Months	Even Months
East Route				
10	Big Blue River	CR 400 S, near Spiceland	✓	
13	East Fork Whitewater River	Potter Shop Rd bridge, East edge of Abington	✓	
14	West Fork White River	US 27, Winchester	✓	
15	West Fork White River	Memorial Dr, Muncie	✓	
16	West Fork White River	Tiger Dr, Canoe Launch at Morrow's Meadow City Park, Yorktown	✓	
17	West Fork White River	Edgewater Park Boat Ramp Near Old Water Works Dam Site, Anderson	✓	
Indianapolis Route				
19	Fall Creek	Stadium Dr, Indianapolis	✓	
20	Fall Creek	Keystone Ave, near 38th St, and IWC Intake, Indianapolis	✓	
21	Indianapolis Waterway Canal	Guilford Ave, Broad Ripple	✓	
22	West Fork White River	86th St, Nora	✓	
23	Eagle Creek	86th St, south of Zionsville	✓	
24	Eagle Creek	Lynhurst Dr, Indianapolis	✓	
25	Eagle Creek	Raymond St, Indianapolis	✓	

Site #	Waterbody	Site Location	Odd Months	Even Months
Northeast Central Route				
26	White River	Boat Ramp east of Perkinsville on Water St	✓	
28	Wildcat Creek	CR 300 W/Malfalfa Rd, 1 mile west of Kokomo	✓	
29	Wildcat Creek	SR 931/S Reed Rd/Old US 31, Kokomo	✓	
30	Mississinewa River	Highland Ave, Marion at boat ramp	✓	
31	Mississinewa River	Off of CR 380 W, bank sample, 500 yards downstream of CR 500 N Bridge, near Jalapa	✓	
32	Salamonie River	SR 124, south of Lancaster	✓	
33	Wabash River	CR 400 W, northeast of Geneva	✓	
35	Salamonie River	CR 75 S, west of Portland	✓	
36	Mississinewa River	CR 100 W, near Ridgeville	✓	
163	Wabash River	Indiana Ohio Line Rd @ Stateline	✓	
Northeast IDEM Route				
38	Wabash River	SR 3 Bridge, Markle 2nd bridge going out of town	✓	
40	Wabash River	Etna Rd, Huntington	✓	
41	Wabash River	SR 105 Bridge, north of Andrews	✓	
52	St Marys River	SR 101 Bridge, north of Pleasant Mills	✓	

Site #	Waterbody	Site Location	Odd Months	Even Months
Northeast Ft Wayne Route				
43	St Marys River	Wells Street Bridge in Fort Wayne	✓	
44	Saint Joseph River	Tennessee St Bridge, Fort Wayne	✓	
49	Maumee River	SR 101 Bridge, 3 Miles north of Woodburn	✓	
50	Maumee River	Landin Rd bridge, New Haven/Fort Wayne	✓	
51	St Marys River	Bostick Rd Walk Bridge	✓	
North Route				
53	Tippecanoe River	CR 200 W Bridge		✓
58	Saint Joseph River	Boat ramp 500yds upstream of N Division St, Bristol		✓
59	Elkhart River	Pedestrian Walk Bridge off of Waterfall Dr		✓
60	Saint Joseph River	Boat ramp 300 ft upstream of Mishawaka Ave Bridge @ Merrifield Pk		✓
61	Saint Joseph River	Boat Ramp at St. Patricks County Park, South Bend, IN		✓
North Central Route				
62	South Fork Wildcat Creek	CR 200 N, east of SR 38, 39, US 421		✓
66	Tippecanoe River	SR 18, near Delphi		✓
67	Wildcat Creek	SR 25, northeast of Lafayette		✓

68	Wabash River	Americus Rd/Grant Rd near SR 25		✓
Site #	**Waterbody**	**Site Location**	**Odd Months**	**Even Months**
69	Wabash River	CR 675 W, west of Georgetown		✓
70	Eel River	CR 150 N, northeast of Logansport		✓
72	Wabash River	Business US 31, Peru		✓
73	Mississinewa River	SR 124, d/s of reservoir, near Peru		✓
74	Eel River	SR 15, Boat ramp 150 ft upstream of SR 15 Bridge, northeast of Roann (Public Access Site)		✓
75	Salamonie River	East Hanging Rock Road Bridge Near Lagro		✓
West Route				
77	Wabash River	CR 700 W, south of Lafayette		✓
78	Big Pine Creek	SR 55 bridge in Pine Village		✓
82	Sugar Cr	SR 234, boat ramp 100 ft downstream Bridge.		✓
83	Wabash River	SR 234, Cayuga		✓
84	Vermillion River	SR 63, Cayuga		✓
86	Wabash River	Boat Ramp in Montezuma Town Park		✓
88	Wabash River	u/s of SR 163, boat ramp @ bottom of the stairs, Clinton		✓
89	Wabash River	SR 154 near Hutsonville, IL		✓

Site #	Waterbody	Site Location	Odd Months	Even Months
Northwest Central Route				
94	Kankakee River	SR 55, Shelby		✓
97	Kankakee River	CR 1000 S Near LaPorte		✓
Northwest A Route				
101	Trail Creek	Kruegar Park Bridge, Michigan City		✓
102	Trail Creek	US 12 Bridge, Michigan City		✓
103	Lake Michigan	Raw Water, Michigan City Waterworks		✓
104	Trail Creek	Franklin St, Michigan City		✓
105	Lake Michigan	Beach Sample, Dunes State Park		✓
106	East Branch Little Calumet River	SR 149, south of US Hwy 12, northwest of Porter		✓
107	Salt Creek	SR 130 Bridge, Below STP, Near Valparaiso		✓
108	Salt Creek	US 20, Portage		✓
109	Burns Ditch	Portage Boat Yard Dock, Portage		✓
110	Burns Ditch	Crisman Rd near SR 249, Portage		✓
111	Burns Ditch	US 12, Portage Public Marina		✓
112	Lake Michigan	Raw Water, Northwest Indiana Water Company, Ogden Dunes Treatment Plant		✓

Site #	Waterbody	Site Location	Odd Months	Even Months
Northwest B Route				
113	Lake Michigan	Raw Water, Northwest Indiana Water Company (Gary), Borman Pk Treatment Plant		✓
114	Grand Calumet River	Bridge St Near US Steel, Gary		✓
115	Grand Calumet River	Kennedy Ave, East Chicago		✓
116	Indiana Harbor Canal	Columbus Dr, East Chicago		✓
117	Indiana Harbor Canal	Indianapolis Blvd, East Chicago		✓
118	Lake Michigan	Raw Water, E Chicago Waterworks		✓
119	Indiana Harbor Canal	Dickey Rd, East Chicago		✓
120	Indiana Harbor Canal	Mouth at LTV Steel, East Chicago		✓
122	Lake Michigan	Raw Water, Hammond Waterworks		✓
123	Wolf Lake	Culvert at State Line Rd at End of 129th St		✓
124	Grand Calumet River	Hohman Ave, Hammond		✓
125	Little Calumet River	Hohman Ave, Hammond		✓
160	Grand Calumet River	at US Steel		✓
Southwest A Route				
126	Mill Creek	US 40 Bridge at Stilesville	✓	
127	Mill Creek	US 231, near Devore	✓	
128	West Fork White River	South Main St, Spencer	✓	

Site #	Waterbody	Site Location	Odd Months	Even Months
129	Eel River	SR 67 Bridge, Worthington	✓	
132	West Fork White River	SR 358, Near Edwardsport	✓	
133	Wabash River	Vigo St/Old US Hwy 50, Vincennes	✓	
134	White River	Hazleton Public Access Site boat ramp	✓	
Southwest B Route				
135	White River	SR 61, Petersburg	✓	
136	East Fork White River	SR 57, northeast of Petersburg	✓	
137	Patoka River	CR 300 W, north of Oakland City	✓	
140	Patoka River	Old Huntingburg Rd (CR 350W) north of CR 400 S, west of US 231	✓	
South A Route				
143	Sugar Cr	CR 800 S, Bridge to Atterbury, west of US 31, Edinburgh	✓	
144	Big Blue River	US 31, Edinburgh	✓	
145	East Fork White River	SR 46, Columbus	✓	
146	East Fork White River	CR 725 N, above Seymour Waterworks Dam at boat ramp	✓	
147	Muscatatuck River	SR 39, west of Austin	✓	
148	Blue River	US 150, Fredericksburg	✓	
South B Route				

152	Mill Creek	Twin Caves, Spring Mill State Park, Mitchell	✓	

Site #	Waterbody	Site Location	Odd Months	Even Months
153	Mystery River	Bluespring Caverns, Hartleyville, southwest of Bedford	✓	
154	East Fork White River	Williams Dam, Williams	✓	
155	Salt Creek	Oolitic Rd, Near Oolitic	✓	
156	East Fork White River	Public Access Boat Ramp at US 50/SR 37, south of Bedford	✓	
157	West Fork White River	SR 39, Martinsville	✓	
159	West Fork White River	SR 144, near Waverly	✓	

There are two special studies included in the 2024 Fixed Station Project which resulted in the addition of 5 sampling sites. While these sites are not part of the Fixed Station sampling network, evaluation of short-term results may be enough to answer questions and/or indicate whether additional sampling is needed in the future. See Table 49 for site locations. All sites will be sampled for total metals, nutrients and general chemistry parameters.

Lake Michigan Sampling Sites

The 2022 dissolved metals analysis indicated there were three sites along Lake Michigan with dissolved copper exceedances. Upon further review of the sites, all three locations were Lake Michigan drinking water intakes which entail collection of Lake Michigan water samples through an intake pipe. The pipes that transport water are often made from metal materials. To validate whether Lake Michigan proper has a copper exceedance, an additional three locations along Lake Michigan were sampled in 2023. These locations were sampled by Fixed Station program managers and the Lake Michigan DNR field office. Samples were collected in May, August and September which meet the data minimum requirements specified in the CALM. Unfortunately, there was copper contamination in the 2023 field blanks so one additional sampling event will be repeated in 2024.

Patoka River Basin Sampling Sites

Historical WAPB surface water results and land use indicate that South Fork Patoka River and the Patoka River mainstem may be influenced by mining activities. The Patoka River, downstream of the confluence with South Fork Patoka River, has a direct permitted underground mine discharge and the mining influences from Keg Creek impacting the surface water quality. The South Fork Patoka River has been impacted by past mining activities and continues to have some of the highest hardness and sulfate concentrations in the state. The current Fixed Station sampling network sites are not positioned to capture the influence of these potential sources so two new sites were selected to be sampled. The additional site on the Patoka River will be sampled for two years beginning in 2023. Data from this site will help IDEM understand what Patoka is discharging to the Wabash River. The additional site on the South Fork Patoka River was sampled from April through October in 2023. Based on an initial evaluation of the data this site will continue to be sampled through 2024. Both sites are sampled as part of the Southwest B Route.

Table 48. Additional Sampling Locations in the 2024 Fixed Station Project

Fixed Station Site	L-Site	Site #	Waterbody	Site Location	Latitude	Longitude
Lake Michigan Sampling Sites						
LM-G(a)	LMG020-0057	NA	Lake Michigan	Lake Water near, Borman Park - Gary	41.64211563	-87.34185091
LM-OD(a)	LMG020-0058	NA	Lake Michigan	Lake Water near, Ogden Dunes	41.63259701	-87.20276621
LM-H(a)	LMG020-0059	NA	Lake Michigan	Lake Water near, Hammond Waterworks	41.69828	-87.5092
Patoka River Basin Sampling Sites						
P-14	WPA-08-0038	171	Patoka River	CR 400 W	38.39075	-87.63694444
SP-.35	WPA-07-0027	172	South Fork Patoka River	CR 300W in Gibson County	38.3790118	-87.3397241

G. Appendices to the QAPP

Appendix A Menu of Quality Control Sample Types

This table of quality control (QC) sample types (per B.5.) was published in October 2014, in the U.S. EPA Region 9 manual "Laboratory Data Review For Non-chemists".

Blank Contamination

TYPE	DEFINITION	FREQUENCY	PURPOSE	CORRECTIVE ACTION(s) to consider
Equipment or Rinsate Blank	A sample created by rinsing sampling equipment after it has been cleaned.	Usually 1:10 or each day	Help identify contamination due to decontamination procedures, ambient field conditions, storage conditions, or lab problems.	Discount (do not correct) positives; fix decon procedures; check method blank; check w/lab; possible resample.
Field Blank	Field Blank Sample created by adding distilled or deionized water to a container in field. Used when using dedicated or disposable equipment.	Usually 1:10 or each day	Help identify contamination due to ambient field conditions, bottles/storage conditions, or laboratory problems.	Discount (but don't correct) positives, check bottles, check method blank; check w/lab; possible resample.
Trip Blank	Volatile free water placed in VOA vial by lab and sent to field with bottles.	One per shipping container	Identify contamination from transit, bottles, or laboratory conditions.	Re-evaluate shipping protocols, check method blank; check w/lab.
Reagent Blank	Sample generated by laboratory to demonstrate reagents are free of contamination.	Whenever new batch of reagents received; not all labs run, few report to clients.	Identify contamination in common chemicals used in laboratory.	Laboratory should take action with suppliers; reagents should not be used.
Laboratory or Method Blank	Sample generated by laboratory and introduced at beginning of sample processing	1:batch or 1:20 samples	Identify contamination introduced within laboratory.	Discount (but do not correct) positives; check w/lab; redo analysis; resample.
Temperature Blank	A VOA vial containing clean water generated by laboratory and sent to field with bottles.	1 per cooler	Used by the laboratory to check the temperature of the samples upon arrival at the laboratory.	Sample results may be biased low due to losses. Non-detects may be false negative. Note in narrative.

Sensitivity (detection limits)

TYPE	DEFINITION	FREQUENCY	PURPOSE	CORRECTIVE ACTION(s) to consider
Detection Limit (MDL)	Determines lowest concentration of an analyte a laboratory can detect.	Usually once a year.	Used to establish the lowest limit of reliable instrument measurement.	Compare MDL to action levels or regulatory standard to ensure will be able to make required decisions. Consider alternative methods or lab if unable to reach objectives.
Quantitation Limit (QL) (Often used interchangeably with Reporting Limit (RL) and Practical Quantitation Limit (PQL))	MDL "bumped" up to a level where lab feels confident all positives are real. Usually a factor of 2 to 10 times MDL. For a PQL, factor is 5 to 10.	Calculated value after MDL study.	Ensures that the laboratory is reporting only analytes it detects with confidence.	Compare QL to action levels or regulatory standard to ensure will be able to make required decisions. Consider alternative methods or laboratory if unable to reach objectives. Consider having laboratory report at MDL level for some or all analytes.

Accuracy (spike performance samples)

TYPE	DEFINITION	FREQUENCY	PURPOSE	CORRECTIVE ACTION(s) to consider
Field Matrix Spike	Known amounts of representative compounds are added to samples in field. Sample submitted blind. This is effectively a PE sample. Uncommon QC sample.	If run, once per sampling event.	Test laboratory performance and ability to obtain correct results.	Check w/lab to assess whether can perform method, look at other QC (lab MS, LCS).
Laboratory Matrix Spike (MS)	Known amounts of an analyte or representative compounds are added to sample(s) in laboratory.	1:20 or 1:batch	Identify whether lab has performed method properly or if sample matrix is introducing a positive or negative bias.	Check w/lab; determine whether result due to matrix problem or lab problem (look at LCS results, if OK = matrix; see whether a 2nd sample was prepared and run, if 2nd result out = matrix problem, if in = lab problem). Determine if spiked sample representative of all samples.
Laboratory Control Sample (LCS) aka: Blank Spike or Laboratory Fortified Blank	Known amounts of an analyte or representative compounds are added to a "clean" matrix (lab water or clean sand) in laboratory.	1:20 or 1:batch	Identify whether lab has performed method properly.	Request lab reanalyze all samples in batch associated with LCS if haven't already; possible resample at lab cost; use results w/caution
Instrument Spike	Known amounts of an analyte or representative compounds are injected directly in instrument.	As needed when contamination suspected.	Determine losses of material due to instrument.	Nothing. Typically not reported to client.
Post Digestion Spike	Metals spike made after digestion procedure. Used in method of standard additions to correct for matrix effects.	Usually as needed.	Permits calculation of results for metals although a matrix effect exists.	Not a QC sample per se, used for quantitation.
Surrogate Spike.	Known amounts of organic compounds, similar in behavior to target analytes, are added to samples before processing.	In every sample.	Mimic behavior of target compounds. Used to identify either matrix or extraction problems.	If all surrogates out, require re-extraction. If some out, look at similarities to targets. Re-extraction is possible option. If sample all gone, may need to resample.
Single Blind Performance Evaluation (PE) Sample	Known amounts of an analyte or organic compounds provided to lab in a labeled vial or bottle.	Once a quarter, once a sample shipment, or not at all.	Depends on a number of factors. Check laboratory's ability to perform analysis under optimum conditions.	Lab should pass when it knows it is being tested. Consider suspension of work if doesn't pass. At minimum, lab should demonstrate how it will address problem.
Double Blind Performance Evaluation (PE) Sample	Known amounts of an analyte or organic compounds are provided to lab, but are introduced with samples so lab is not aware of presence.	Once a quarter, once a sample shipment, or not at all.	Depends on a number of factors. Check laboratory's ability to perform analysis without it's knowing it is being tested.	Consider suspension of work for that analysis if lab doesn't pass. At minimum, lab should demonstrate how it will address problem.

Precision (Replicates)

TYPE	DEFINITION	FREQUENCY	PURPOSE	CORRECTIVE ACTION(s) to consider
Co-Located Sample	Second sample collected at same location but different time (water, air) or at a nearby location (soil, sediment). Sent blind to laboratory.	Usually 1:10, may not collect if collecting replicates.	Determine heterogeneity of matrix, reproducibility of sample technique and laboratory performance.	Expand number of samples or area sampled in future events or resample. Check laboratory duplicates or matrix spike duplicates to make sure looking at field variability, not laboratory.
Field Replicate (duplicate)	A sample divided into two or more homogeneous parts.	1:10	Determine reproducibility of subsampling technique and laboratory/method performance.	Check laboratory duplicates or matrix spike duplicates to make sure looking at field variability, not lab. Check field sampling procedures. In extreme cases, resample.
Matrix Spike Duplicate (MSD)	A known amounts of an analyte or representative compounds are added in the laboratory to a second aliquot of the sample used for matrix spike.	1:20 or 1:batch	Determine laboratory reproducibility or precision. MSD is used because many samples do not contain organic compounds so no results are available on which to do precision calculations.	Check LCSD results. View results with caution and be sensitive to upper and lower range of concentrations. Check whether your sample was used for QC If samples were batched, although using another client's sample is not as critical as in MS.
Laboratory Control Sample Duplicate (LCSD)	Known amounts of an analyte or representative compounds are added to a second "clean" matrix (lab water or clean sand) in laboratory. Duplicate of LCS.	1:20 or 1:batch	Determine laboratory precision without matrix effects.	Reanalysis of all samples in batch. Resample at lab cost.
Laboratory Duplicate	Second processing and analysis of sample. Usually for general chemistry or metals analyses.	1:20 or 1:batch	Determine laboratory precision.	Check w/lab. Check LCSD results (may not be available for inorganics).View results with caution and be sensitive to upper and lower range of concentrations. Check whether your sample was used for QC if samples were batched, although using another client's sample is not as critical as in MS.
Field Split	A field replicate/duplicate that is sent to a second laboratory.	Seldom, usually only if problems develop in previous work.	Used as a check on laboratories.	Check laboratory QC results. Consider PE samples to determine which lab accurate and should be kept.
Laboratory Split	A laboratory created replicate/duplicate that is sent to a second laboratory.	Seldom, mainly when problem suspected.	Determine interlaboratory precision. Independent assessment of laboratory problems at the primary lab.	Check laboratory QC results. Consider PE samples to determine which lab accurate and should be kept.

Appendix B Current and Historical Fixed Station Program Sampling Locations and Sample Period

Note: Fixed Station Site numbers are derived from river miles, and some sites river miles have been corrected. All site numbers are listed for reference, although some are no longer sampled. Ex. BC-1 is sampled on Buck Creek at river mile 1.

The IDOH Site number was assigned by the analytical laboratory (Ex. 1-175).

Brackets and shading indicate that the stations are the same. The river milage or site location was recalculated due to higher resolution or new technology.

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
-	BC-1	WWU020-0001	1968-1970	Buck Creek	SR 32 Bridge Yorktown	40.174444	-85.492222
-	BD-0	LMG060-0006	1964-1984	Burns Ditch	Midwest Steel Catwalk, Portage	41.631389	-87.176667
111	BD-1	LMG060-0007	1966-Pres	Burns Ditch	US 12, Portage Public Marina	41.6184014	-87.17632693
110	BD-2E	LMG060-0005	1966-Pres	Burns Ditch	Crisman Rd near SR 249, Portage	41.6126122	-87.17404518
109	BD-3W	LMG040-0003	1966-Pres	Burns Ditch	Portage Boat Yard Dock, Portage	41.6024729	-87.19342733
-	BL-.1	WED050-0001	1973-1985	Big Blue River	Edinburg	39.355238	-85.983441
144	BL-.7	WED050-0001	1986-Pres	Big Blue River	US 31, Edinburgh	39.355238	-85.983441
-	BL-17	WED050-0003	1971-1972	Big Blue River	SR 44, south of Shelbyville	39.496389	-85.865278
-	BL-18	-	1957-1970	Big Blue River	Shelbyville	-	-
-	BL-24	WED030-0004	1971-1972	Big Blue River	AT SR 9/US 421, N Edge of Shelbyville	39.529167	-85.777778
-	BL-29	WED020-0002	1964-1970	Big Blue River	Asbury Rd, north of Morristown	39.703611	-85.692222
-	BL-38	WED010-0003	1957-1970	Big Blue River	At 5th St Carthage (900N)	39.743056	-85.575833
-	BL-61	WED010-0004	1971-1972, 1976-1985	Big Blue River	At Henry CR 350 W	39.860278	-85.456667
10	BL-64	WED010-0005	1985-Pres	Big Blue River	CR 400 S, near Spiceland	39.8736726	-85.4390804
150	BLW-10	OBS150-0008	1999-Pres	Blue River	SR 62, near Wyandotte Cave, Bank Sample	38.2203726	-86.2982754
-	BLW-53	-	1973-1985	Blue River	Fredericksburg	-	-
148	BLW-57	OBS140-0004	1986-Pres	Blue River	US 150, Fredericksburg	38.4337882	-86.19169962
-	BLW-65	OBS120-0006	1971-1972	West Fork Blue River	Fort Hill Rd, south of Salem	38.576111	-86.120556
100	BMC-1	WTI110-0001	1998-Pres	Big Monon Ditch	SR 16, north of Monticello	40.8690764	-86.77907671
153	BSC	WEL100-0001	1993-Pres	Mystery River	Bluespring Caverns, Hartleyville, southwest of Bedford	38.7978873	-86.54700997
131	BU-7	WBU160-0002	1999-Pres	Busseron Creek	SR 58, Carlisle	38.9742196	-87.42611565
91	BWC-4	WWE040-0001	1999-Pres	Big Walnut Creek	CR 875 S, Near Reelsville	39.5357771	-86.97639912
45	CC-4	LEJ090-0026	2001-Pres	Cedar Creek	Hursh Rd Bridge	41.215	-85.05138889
-	CC-6	LEJ090-0008	1999-2001	Cedar Creek	SR 427, south of Cedar Shores	41.218889	-85.076667

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
27	CIC-17	WWU080-0002	1999-Pres	Cicero Creek	Mt. Pleasant Rd, east of Arcadia	40.1744444	-86.00055556
95	CRC-2	UMK090-0001	1999-Pres	Crooked Creek	SR 49 south of Kouts	41.2820417	-87.02573392
65	DC-5	WDE050-0002	1998-Pres	Deer Creek	CR 300 N, northeast of Delphi	40.5905028	-86.62139957
25	EC-1	WWU120-0001	1971-Pres	Eagle Creek	Raymond St, Indianapolis	39.7352794	-86.19657553
24	EC-7	WWU120-0002	1986-Pres	Eagle Creek	Lynhurst Dr, Indianapolis	39.7782507	-86.25066696
-	EC-8	WWU120-0003	1971-1977	Eagle Creek	W 21st Street, Speedway	39.794444	-86.268889
23	EC-21	WWU120-0007	1971-Pres	Eagle Creek	86th St, south of Zionsville	39.9102654	-86.28567477
-	EC-38	WWU120-0004	1971-1972	Eagle Creek	CR 200 N, west of Big Springs	40.070019	-86.270253
129	EEL-1	WWE090-0001	1986-Pres	Eel River	SR 67 Bridge, Worthington	39.1243248	-86.97007649
90	EEL-38	WWE080-0001	1999-Pres	Eel River	CR 200 E, southwest of Bowling Green	39.3506834	-87.07277768
70	ELL-7	WAE070-0011	1957-1970, 1976-Pres	Eel River	CR 150 N northeast of Logansport	40.782326	-86.26449731
74	ELL-41	WAE050-0001	1986-Pres	Eel River	SR 15, Boat ramp 150 ft upstream of SR 15 Bridge, northeast of Roann (Public Access Site)	40.9479224	-85.89075519
-	ELL-414	-	1985-1985	Eel River	Roann	-	-
42	ELL-66	WAE040-0002	1998-Pres	Eel River	SR 5 / 14 Bridge at South Whitley	41.0834031	-85.62599248
-	ELW-2	-	1957-1968	Eel River	Worthington	-	-
59	ER-.3	LMJ-19-0002	1973-Pres	Elkhart River	Pedestrian Walk Bridge off of Waterfall Dr	41.685899	-85.970406
56	ER-29	LMJ190-0006	1999-Pres	Elkhart River	Boat ramp 200 ft downstream of US 33 bridge, Benton	41.5077778	-85.75944444
136	EW-1	WEL170-0001	1980-Pres	East Fork White River	SR 57, northeast of Petersburg	38.5390296	-87.22323988
-	EW-56	WEL120-0002	1957-1972	East Fork White River	US 150 Bridge, Shoals	38.6675	-86.792778
-	EW-77	-	1971-1985	East Fork White River	Williams	-	-
154	EW-79	WEL100-0002	1986-Pres	East Fork White River	Williams Dam, Williams	38.7999886	-86.64668236

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
-	EW-93	WEL040-0001	1971-1973	East Fork White River	Bedford Water Plant Intake	38.834722	-86.5225
156	EW-94	WEL040-0003	1957-1970, 1974-Pres	East Fork White River	Public Access Boat Ramp at US 50/SR 37, south of Bedford	38.8250319	-86.51348138
-	EW-167	-	1957-1985	East Fork White River	Seymour	-	-
146	EW-168	WEU040-0001	1986-Pres	East Fork White River	CR 725 N, above Seymour Waterworks Dam at boat ramp	38.9870095	-85.89837206
-	EW-184	WEU020-0001	1971-1972	East Fork White River	Near Walesboro, south of Columbus	39.151111	-85.898889
-	EW-189	WEF-06-0009	1971-1972	East Fork White River	SR 46 bridge, Columbus	39.200833	-85.928056
145	EW-239	WEF060-0003	1986-Pres	East Fork White River	SR 46, Columbus	39.2003685	-85.92662229
19	FC-0.6	WWU110-0001	1986-Pres	Fall Creek	Stadium Dr, Indianapolis	39.7817287	-86.17678786
-	FC-1	WWU-09-0033	1971-1972	Fall Creek	Stadium Drive off W 10th St	39.781111	-86.1775
20	FC-7	WWU110-0002	1971-Pres	Fall Creek	Keystone Ave, near 38th St, and IWC Intake, Indianapolis	39.834341	-86.12189113
18	FC-26	WWU100-0001	1999-Pres	Fall Creek	Southeastern Pkwy (Old SR 238), near Fortville	39.954571	-85.86721387
9	FR-17	WEF050-0002	1999-Pres	Flatrock River	SR 252, near Flat Rock	39.3632004	-85.85632799
1	FR-64	WEF020-0002	1999-Pres	Flatrock River	Gings Road, northeast of Rushville	39.6732765	-85.40109123
47	FSH-5	LEJ050-0007	1999-Pres	Fish Creek	CR 79, Artic	41.465	-84.81416667
46	FSH-18	LEJ050-0006	1999-Pres	Fish Creek	SR 427 northeast of Hamilton	41.5586111	-84.83555556
-	GC-2	WEM020-0001	1998-1999	Muscatatuck River	SR 3 near Paris Crossing	38.825833	-85.640556
7	GC-8	WEM020-0002	1999-Pres	Graham Creek	At CR 75 W, ford, near Commiskey	38.8631961	-85.6272643
169	GCR-7	LMG020-0056	2009, 2022	Grand Calumet River	Virginia St Bridge	41.6076	-87.329742
170	GCR-7.5	LMG020-0055	2009, 2022	Grand Calumet River	Tennessee St Bridge	41.607556	-87.321939

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
124	GCR-34	UMC050-0002	1958-Pres	Grand Calumet River	Hohman Ave, Hammond	41.6243717	-87.51783346
-	GCR-36	UMC050-0001	1964-1977	Grand Calumet River	Indianapolis Blvd, E Chicago	41.614444	-87.480833
115	GCR-37	LMG020-0011	1964-1979, 1981-Pres	Grand Calumet River	Kennedy Ave, East Chicago	41.6140953	-87.46160001
-	GCR-41	LMG020-0007	1964-1985	Grand Calumet River	US 12 bridge, Gary	41.608056	-87.394167
114	GCR-42	LMG020-0012	1986-Pres	Grand Calumet River	Bridge St Near US Steel, Gary	41.6091529	-87.37201882
160	GCR-46	LMG020-0001	1999-Pres	Grand Calumet River	at US Steel	41.6114401	-87.2950184
11	GF-2	GMW020-0001	1999-Pres	Greens Fork	S Jacksonburg Rd - east of Milton at Kirlin R.	39.7723359	-85.1086882
-	I-62	UMI-04-0026	1957-1970	Iroquois River	Iroquois River near Foresman Drainage Area	40.870236	-87.306335
92	I-63	UMI050-0006	1999-Pres	Iroquois River	CR 400 W, north of Kentland	40.8201436	-87.4640273
120	IHC-0	LMM010-0001	1973-1976, 1978-Pres	Indiana Harbor Canal	Mouth at LTV Steel, East Chicago	41.6726427	-87.44234612
-	IHC-1	-	1964-1985	Indiana Harbor Canal	East Chicago	-	-
119	IHC-2	LMG020-0003	1986-1991, 1993-Pres	Indiana Harbor Canal	Dickey Rd, East Chicago	41.655114	-87.45928619
116	IHC-3S	LMG020-0004	1964-Pres	Indiana Harbor Canal	Columbus Dr, East Chicago	41.6393929	-87.47129468
117	IHC-3W	LMG020-0005	1964-Pres	Indiana Harbor Canal	Indianapolis Blvd, East Chicago	41.6466558	-87.48077892
142	IN-2	WEL110-0002	1999-Pres	Indian Creek	SR 450, near Trinity Springs	38.7557439	-86.75669293
149	IND-23	OBS100-0004	1999-Pres	Indian Creek	City Park south of Corydon, SR 135	38.2013889	-86.145
-	IWC-6.6	-	1973-1985	Indianapolis Waterway Canal	Indianapolis	-	-

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
21	IWC-9	WWU090-0004	1986-Pres	Indianapolis Waterway Canal	Guilford Ave, Broad Ripple	39.8713112	-86.14294359
-	KC-.2	WAW010-0080	1974-1977	Kokomo Creek	Park Ave Bridge	40.471111	-86.148333
-	KC-1	WWU040-0001	1968-1970	Killbuck Creek	SR 9 Bridge, northeast Side of Anderson	40.138333	-85.661944
-	KR-65	-	1957-1970, 1976-1985	Kankakee River	Shelby	-	-
94	KR-68	UMK110-0002	1986-Pres	Kankakee River	SR 55, Shelby	41.1826966	-87.34058233
96	KR-91	UMK080-0001	1999-Pres	Kankakee River	CR 500 E, Dunns Bridge	41.2200109	-86.96907992
97	KR-117	UMK030-0020	2001-Pres	Kankakee River	CR 1000 S Near LaPorte	41.4616585	-86.61399251
-	KR-118	UMK030-0002	1986-2000	Kankakee River	US 6 Bridge, south of Kingsbury	41.477222	-86.604444
-	KR-125	-	1978-1985	Kankakee River	Kingsbury Area	-	-
151	LBR-3	OBS180-0007	1999-Pres	Little Blue River	S Beechwood Rd, northeast of Alton, southeast of Deuchers	38.1669419	-86.41577594
4	LC-12	OML080-0003	1998-Pres	Laughery Creek	Rd Ford Downstream of SR 262, Near Milton	38.9841803	-85.00102243
-	LC-28	OML-05-0052	1957-1970	Laughery Creek	E CR 450 N, west of Osgood	39.140025	-85.249447
5	LC-54	OML060-0004	1998-Pres	Laughery Creek	SR 350, east of Osgood	39.1485747	-85.25349032
125	LCR-13	UMC030-0004	1958-Pres	Little Calumet River	Hohman Ave, Hammond	41.5775661	-87.52236553
106	LCR-39	LMG060-0008	1971-Pres	East Branch Little Calumet River	SR 149, S of US Hwy 12, northwest of Porter	41.6168181	-87.12622159
-	LKC-1	WWU130-0001	1971-1972	Lick Creek	Harding St, Indianapolis	39.708611	-86.187222
105	LM-DSP	LMM010-0002	1997-Pres	Lake Michigan	Beach Sample, Dunes State Park	41.6626639	-87.0659104

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
118	LM-EC	LMG020-0008	1969-Pres	Lake Michigan	Raw Water, E Chicago Waterworks	41.6524177	-87.43812602
113	LM-G	LMG020-0009	1969-Pres	Lake Michigan	Raw Water, Northwest Indiana Water Company (Gary), Borman Pk Treatment Plant	41.5997955	-87.34295552
173	LM-G(a)	LMG020-0057	2023	Lake Michigan	Borman Park - Gary	41.642116	-87.341851
122	LM-H	LMG020-0010	1969-Pres	Lake Michigan	Raw Water, Hammond Waterworks	41.6923205	-87.50540236
175	LM-H(a)	LMG020-0059	2023	Lake Michigan	Lake Water near, Hammond Waterworks	41.698284	-87.509199
103	LM-M	LMG070-0004	1957-Pres	Lake Michigan	Raw Water, Michigan City Waterworks	41.7250768	-86.9016515
112	LM-OD	LMG020-0013	1997-Pres	Lake Michigan	Raw Water, Northwest Indiana Water Company, Ogden Dunes Treatment Plant	41.6183462	-87.19906122
174	LM-OD(a)	LMG020-0058	2023	Lake Michigan	Lake Water, Ogden Dunes Waterworks	41.632597	-87.202766
121	LM-W	LMG020-0006	1957-2010	Lake Michigan	Raw Water, Whiting Waterworks	41.678056	-87.486944
139	LPC-5	OLP150-0007	1999-Pres	Little Pigeon Creek	Yankeetown Rd	37.9101404	-87.29566434
39	LR-7	WUW120-0002	1998-Pres	Little River	CR 200 E, near Huntington	40.8984104	-85.41311283
141	LST-2	WEL160-0003	1999-Pres	Lost River	Simmons Creek Rd	38.538163	-86.80462447
-	M-95	-	1965-1985	Maumee River	Woodburn	-	-
49	M-114	LEM010-0013	1986-Pres	Maumee River	SR 101 Bridge, 3 Miles north of Woodburn	41.1697222	-84.84916667
-	M-116	-	1971-1985	Maumee River	Fort Wayne	-	-
-	M-110	-	1957-1985	Maumee River	New Haven	-	-
50	M-129	LEM010-0014	1986-Pres	Maumee River	Landin Rd bridge, New Haven/Fort Wayne	41.0844444	-85.02055556
-	M-132	LEM010-0012	1971-2017	Maumee River	Anthony Blvd, Fort Wayne	41.081944	-85.114722
162	M-132	LEM-01-0014	2018-Pres	Maumee River	Tecumseh St.	41.084796	-85.122275
-	MC-17	-	1974-1985	Mill Creek	Devore	-	-
127	MC-18	WWE060-0002	1986-Pres	Mill Creek	US 231, near Devore	39.4335282	-86.76358544

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
126	MC-35	WWE060-0004	1974-Pres	Mill Creek	US 40 Bridge at Stilesville	39.6367352	-86.64039749
73	MS-1	WMI060-0006	1971-Pres	Mississinewa River	SR 124, d/s of reservoir, near Peru	40.749368	-86.0120578
-	MS-23	WMI060-0002	1968-1970	Mississinewa River	SR 15, north of Marion	40.611944	-85.692778
-	MS-27	WMI060-0003	1965-1967	Mississinewa River	SR 9/37, north of Marion	40.584444	-85.660833
-	MS-28	-	1957-1970	Mississinewa River	Marion	-	-
31	MS-28	WMI060-0004	1986-Pres	Mississinewa River	Off CR 380 W, bank sample, 500 yards downstream of CR 500 N Bridge, near Jalapa	40.6280556	-85.73583333
-	MS-28R	-	1971-1985	Mississinewa River	Jalapa	-	-
-	MS-35	-	1971-1985	Mississinewa River	Marion	-	-
30	MS-36	WMI060-0005	1986-Pres	Mississinewa River	Highland Ave, Marion at boat ramp	40.5761111	-85.65972222
37	MS-68	WMI030-0001	1998-Pres	Mississinewa River	N Walnut St, west of Eaton	40.3438889	-85.38833333
36	MS-99	WMI020-0002	1986-Pres	Mississinewa River	CR 100 W, near Ridgeville	40.28	-84.99527778
-	MS-100	-	1979-1985	Mississinewa River	Ridgeville	-	-
147	MU-20	WEM090-0002	1975-Pres	Muscatatuck River	SR 39, west of Austin	38.7549727	-85.93434383
-	MU-25	-	1977-1985	Muscatatuck River	Austin	-	-
-	MU-27	WEM090-0001	1971-1972	Muscatatuck River	SR 256, west of Austin	38.742222	-85.900278
-	MU-29	-	1959-1970	Muscatatuck River	Austin	-	-

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
-	MU-34	WEM030-0002	1971-1972	Muscatatuck River	At SR 256, west of Austin	38.742778	-85.843333
-	MU-37	WEM030-0004	1973-1976	Muscatatuck River	US 31, north of Austin	38.770278	-85.8225
12	NF-1	GMW030-0001	1999-Pres	Nolands Fork	CR 440, near Waterloo	39.7035198	-85.10457916
-	OR-189	OHP-04-0001	1957-1958	Ohio River	Evansville	37.956783	-87.573025
-	OR-489	OML-08-0001	1957-1972	Ohio River	Aurora	39.05695	-84.897862
171	P-14	WPA-08-0038	2023-Pres	Patoka River	CR 400 W	38.39075	-87.63694444
-	P-18	WPA080-0005	1971-1972	Patoka River	Old US 41 Bridge, south side Patoka	38.402222	-87.586111
-	P-19	WPA080-0002	1957-1970	Patoka River	SR 65, north of Princeton	38.389722	-87.548889
-	P-33	WPA080-0004	1973-1985	Patoka River	Miller Road (CR 1050 E)	38.377222	-87.370556
137	P-35	WPA060-0002	1986-Pres	Patoka River	CR 300 W, north of Oakland City	38.3828823	-87.33812904
140	P-76	WPA040-0003	1971-Pres	Patoka River	Old Huntingburg Rd (CR 350W) north of CR 400 S, west of US 231	38.3294488	-86.96684716
-	P-86	WPA020-0001	1963-1970	Patoka River	SR 162/164, east side of Jasper	38.3875	-86.927778
78	PC-21	WLV040-0003	1984-Pres	Big Pine Creek	SR 55 bridge in Pine Village	40.4523877	-87.25451699
-	PGN-37	LMJ120-0010	1985-1989	Pigeon River	Near Mongo, CR at Curtis Creek Rearing Station	41.700278	-85.351667
57	PGN-54	LMJ120-0009	1999-Pres	Pigeon River	Scott Game Preserve Boat Ramp off of CR 675	41.74	-85.55694444
-	PGR-0	WWU130-0002	1971-1972	Pouges Run Creek	Outlet to White River	39.756111	-86.1725
138	PIG-3	OHP040-0004	1999-Pres	Pigeon Creek	First Ave, Evansville, Center Park	37.9956109	-87.5747795
71	PIP-5	WUW170-0002	1998-Pres	Pipe Creek	CR 925 E, north of Onward	40.7218446	-86.19874928
-	PLR-1	WWU130-0003	1971-1972	Pleasant Run Creek	Bluff Rd, Indianapolis	39.727222	-86.168333
87	RC-5	WLV190-0012	1999-Pres	Big Raccoon Creek	Wabash Street, Mecca	39.7292413	-87.32463687
-	RC-10	WLV170-0002	1957-1970	Big Raccoon Creek	SR 59 Bridge, south of Mansfield	39.670833	-87.104722
-	RC-13	WLV190-0003	1999, 2003	Big Raccoon Creek	CR 325 West, Coxville	39.6525	-87.293889

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
81	RC-46	WLV160-0001	1999-Pres	Big Raccoon Creek	CR 625 W bridge, northwest of Morton	39.7901003	-86.958799
75	S-0	WSA040-0001	1971-Pres	Salamonie River	East Hanging Rock Road Bridge Near Lagro	40.8296612	-85.71873431
-	S-2	-	1957-1970	Salamonie River	Lagro	-	-
-	S-15	-	1969-1970	Salamonie River	Lancaster	-	-
32	S-25	WSA040-0005	1971-1979, 1986-Pres	Salamonie River	SR 124, south of Lancaster	40.7416667	-85.50888889
34	S-50	WSA020-0002	1998-Pres	Salamonie River	CR 500 E, Montpelier	40.5591667	-85.27861111
-	S-51	WSA-02-0005	1973	Salamonie River	Fireman's Park, Montpelier	40.558889	-85.273611
-	S-52	WSA020-0001	1974-1979	Salamonie River	SR 18, west of Montpelier	40.554722	-85.261667
35	S-71	WSA010-0002	1989-Pres	Salamonie River	CR 75 S, west of Portland	40.4275	-85.03888889
-	S-72	-	1986-1988	Salamonie River	Portland	-	-
-	S-75	WSA010-0001	1979-1985	Salamonie River	SR 67, southwest side of Portland	40.425278	-85.022778
168	SB-3	WWU-11-0009	2014-Pres	School Branch	Noble Dr	39.847356	-86.346527
167	SB-6	WWU-11-0007	2014-Pres	School Branch	Maloney Rd	39.885829	-86.355542
85	SC-2	WSU060-0004	1999-Pres	Sugar Creek	Tow Path Rd, West Union	39.8549219	-87.33636049
-	SC-16	WSU050-0003	1957-1970	Sugar Creek	CR 1220 N, north of Byron	39.930556	-87.126111
82	SC-25	WSU050-0005	1986-Pres	Sugar Creek	SR 234, boat ramp 100 ft downstream Bridge.	39.9464557	-87.05911819
-	SC-30	-	1973-1985	Sugar Creek	Shades State Park	-	-
80	SC-39	WSU050-0002	1971-1972, 1999-Pres	Sugar Creek	US 136, Crawfordsville	40.050058	-86.92268622
76	SC-57	WSU020-0003	1999-Pres	Sugar Creek	Boone-Montgomery Co Line, CR 1100 E bridge	40.1433709	-86.69579875

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
93	SD-10	UMK130-0001	1999-Pres	Singleton Ditch	Parrish Ave. Bridge, north of Schneider	41.2120654	-87.44846907
143	SGR-1	WED090-0004	1986-Pres	Sugar Creek	CR 800 S, Bridge to Atterbury, west of US 31, Edinburgh	39.3609228	-85.99775593
-	SJR-46	LMJ240-0006	1958-1985	St. Joseph River	Darden Rd, South Bend	41.73	-86.268889
61	SJR-50	LMJ240-0024	2003-Pres	St. Joseph River	Boat Ramp at St. Patricks County Park, South Bend, IN	41.7577778	-86.27166667
-	SJR-51	LMJ240-0008	1986-2002	St. Joseph River	Auten Rd Bridge, South Bend	41.744444	-86.272778
-	SJR-61	LMJ240-0007	1971-1972, 1976-1979	St. Joseph River	SR 219 Osceola	41.68	-86.061111
60	SJR-63	LMJ240-0026	2002-Pres	St. Joseph River	Boat ramp 300 ft upstream of Mishawaka Ave Bridge @ Merrifield Pk	41.6663889	-86.16777778
-	SJR-64	LMJ240-0009	1986-2002	St. Joseph River	Eberhart-Petro Golf Course	41.671111	-86.153611
-	SJR-65	LMJ220-0004	1973-1974	St. Joseph River	Boat Dock, D/S of STP	41.677778	-86.010556
-	SJR-73	LMJ150-0003	1958-1970	St. Joseph River	CR 17, Elkhart	41.706667	-85.888611
-	SJR-78	-	1971-1985	St. Joseph River	Bristol	-	-
58	SJR-87	LMJ150-0004	1986-Pres	St. Joseph River	Boat ramp 500 yds upstream of N Division St, Bristol	41.7227778	-85.81472222
108	SLC-1	LMG050-0006	1986-Pres	Salt Creek	US 20, Portage	41.59968	-87.1463997
-	SLC-7	LMG050-0005	1971-1972	Salt Creek	US 6, northwest of Valparaiso	41.55	-87.121111
-	SLC-12	-	1973-1985	Salt Creek	Valparaiso	-	-
107	SLC-17	LMG050-0007	1986-Pres	Salt Creek	SR 130 Bridge, Below STP, Near Valparaiso	41.4987989	-87.14125894
-	SLT-11	-	1973-1985	Salt Creek	Oolitic	-	-
155	SLT-12	WEL090-0003	1986-Pres	Salt Creek	Oolitic Rd, Near Oolitic	38.888438	-86.50861111
8	SND-4	WEU030-0011	1998-Pres	Sand Creek	CR 600 E, East of Reddington	39.0683781	-85.79875897

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
172	SP-.35	WPA-07-0027	2023-Pres	South Fork Patoka River	CR 300W in Gibson County	38.3790118	-87.3397241
-	STJ-0	-	1973-1985	St. Joseph River	Fort Wayne	-	-
44	STJ-.5	LEJ100-0003	1986-Pres	St. Joseph River	Tennessee St Bridge, Fort Wayne	41.0891667	-85.12916667
161	STJ-4	LEJ-08-0005	2011-Pres	St. Joseph River	Shoaff Park boat ramp	41.1455694	-85.10073056
-	STJ-8	-	1957-1972	St. Joseph River	Fort Wayne	-	-
48	STJ-36	LEJ060-0006	1999-Pres	St. Joseph River	SR 8 bridge, Newville	41.3475	-84.84388889
-	STM-.2	-	1986-2011	St. Mary's River	Portage	-	-
43	STM-.8	LES-06-0003	2011-Pres	St. Mary's River	Old Wells Street Walk Bridge in Fort Wayne	41.0828185	-85.14402956
-	STM-11	-	1986-2014	St. Mary's River	-	-	-
51	STM-12	LES-06-0009	1957-1985, 2015-Pres	St. Mary's River	Bostick Rd Walk Bridge	40.979239	-85.094727
-	STM-33	-	1979-1985	St. Mary's River	Pleasant Mills	-	-
52	STM-37	LES040-0007	1986-Pres	St. Mary's River	SR 101 Bridge, north of Pleasant Mills	40.7791667	-84.84222222
-	TC-.3	-	1973-1985	Trail Creek	Michigan City	-	-
104	TC-.5	LMG070-0007	1986-Pres	Trail Creek	Franklin St, Michigan City	41.7227821	-86.90467667
102	TC-1	LMG070-0008	1969-1972, 1977-Pres	Trail Creek	US 12 Bridge, Michigan City	41.72122	-86.89638607
-	TC-1.3	LMG070-0006	1973-1976	Trail Creek	Walker St, Michigan City	41.716944	-86.889444
101	TC-2	LMG070-0005	1986-Pres	Trail Creek	Kruegar Park Bridge, Michigan City	41.722838	-86.8753611
152	TC-MC	WEL020-0001	1993-Pres	Mill Creek	Twin Caves, Spring Mill State Park, Mitchell	38.7243474	-86.40920377

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
-	TR-6	-	1957-1970, 1976-1985	Tippecanoe River	Delphi	-	-
66	TR-9	WTI150-0011	1986-Pres	Tippecanoe River	SR 18, near Delphi	40.5938229	-86.77070859
-	TR-48	WTI060-0003	1957-1972	Tippecanoe River	CR 700 E, Near Ora	41.156667	-86.563333
-	TR-53	WTI060-0001	1971-1972	Tippecanoe River	US 35 S of Winamac	41.024117	-86.584298
99	TR-56	WTI080-0001	1998-Pres	Tippecanoe River	SR 119, South of Winamac	41.006522	-86.60290718
53	TR-105	WTI050-0036	2009-Pres	Tippecanoe River	CR 200 W Bridge	41.1047222	-86.28027778
-	TR-107	-	1986-2009, 2018	Tippecanoe River	Rochester	-	-
54	TR-139	WTI030-0001	1998-Pres	Tippecanoe River	Kosciusko CR 700 W Bridge, Near Atwood	41.2438889	-85.9775
-	TR-145	WTI030-0002	1971-1972	Tippecanoe River	Old US 30, northwest side of Warsaw	41.2475	-85.9075
55	TR-164	WTI010-0001	1998-Pres	Tippecanoe River	SR 13, North Webster	41.3163889	-85.69222222
84	V-0.8	WVE100-0001	1973-Pres	Vermillion River	SR 63, Cayuga	39.9617786	-87.45084556
6	VF-38	WEM070-0001	1998-Pres	Vernon Fork Muscatatuck River	CR 60 South, Vernon	38.9763615	-85.61982644
-	WB-52	-	1962-1968	Wabash River	New Harmony	-	-
166	WB-94	WLW-03-0001	2011-Pres	Wabash River	SR 64, near Mount Carmel	38.3979841	-87.75532178
-	WB-95	WLW040-0002	1957-1961	Wabash River	Boat Dock, east side of Mt Carmel	38.398056	-87.754722
-	WB-128	-	1957-1985	Wabash River	Vincennes	-	-
133	WB-130	WBU200-0003	1986-Pres	Wabash River	Vigo St/Old US Hwy 50, Vincennes	38.6814725	-87.53525865
89	WB-172	WBU-13-0001	2011-Pres	Wabash River	SR 154 near Hutsonville, IL	39.1102028	-87.65476111
-	WB-175	-	1978-1985	Wabash River	West of Fairbanks	-	-
-	WB-183	-	1986-2010	Wabash River	Fairbanks	-	-

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
-	WB-194	-	1971-1977, 1986-1987	Wabash River	Terre Haute	-	-
-	WB-205	WBU070-0001	1971-1992	Wabash River	Dresser Power Plant	39.401944	-87.494167
-	WB-207	-	1973-1985	Wabash River	Terre Haute	-	-
-	WB-218	WBU040-0002	1986-1993	Wabash River	Fort Harrison Boat Club	39.506667	-87.413889
-	WB-214	WBU020-0001	1957-1970	Wabash River	Raw Water at Terre Haute	39.642222	-87.418889
-	WB-219	-	1976-1985	Wabash River	Clinton	-	-
88	WB-230	WLV200-0001	1986-Pres	Wabash River	U/S of SR 163, boat ramp @ bottom of the stairs, Clinton	39.6576736	-87.39582084
-	WB-228	-	1971-1985	Wabash River	Montezuma	-	-
86	WB-240	WLV-16-0001	1950-1970, 1986-Pres	Wabash River	Boat Ramp in Montezuma Town Park	39.786217	-87.373321
-	WB-245	-	1973-1985	Wabash River	Cayuga	-	-
83	WB-256	WLV140-0001	1986-Pres	Wabash River	SR 234, Cayuga	39.9517925	-87.41964283
-	WB-260	WLV080-0004	1971-1972	Wabash River	US 136 Bridge, Covington	40.140833	-87.405833
-	WB-271	-	1957-1970	Wabash River	Covington	-	-
79	WB-284	WLV080-0003	1999-Pres	Wabash River	CR 200 W, south of Williamsport	40.2550918	-87.29966552
-	WB-288	WLV030-0002	1971-1976	Wabash River	Black Rock Nature Preserve	40.366389	-87.097222
-	WB-292	-	1973-1985	Wabash River	Granville Bridge	-	-
77	WB-303	WLV030-0003	1986-Pres	Wabash River	CR 700 W, south of Lafayette	40.4118191	-87.03623668
-	WB-301	WLV010-0003	1971-1985	Wabash River	Main St. (SR 26) Bridge in Lafayette	40.419444	-86.8975
-	WB-312	-	1957-1970	Wabash River	Lafayette	-	-
-	WB-316	WDE070-0006	1985-2000	Wabash River	SR 225 Near Battleground	40.495556	-86.823333
68	WB-320	WDE060-0001	2001-Pres	Wabash River	Americus Rd/Grant Rd near SR 25	40.5288636	-86.76001791
-	WB-331	WAW030-0028	1989	Wabash River	US 421 Bridge W Delphi	40.591225	-86.698275
-	WB-336	-	1971-1972, 1977-1985	Wabash River	Georgetown	-	-
69	WB-347	WDE010-0007	1985-Pres	Wabash River	CR 675 W, west of Georgetown	40.7363591	-86.50488174
-	WB-342	WDE010-0002	1973-1976	Wabash River	SR 35 By-Pass, west of Logansport	40.747222	-86.393611
-	WB-344	WDE010-0003	1971-1979	Wabash River	SR 25 Bridge (Cicott St)	40.747222	-86.377222

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
-	WB-354	WDE-01-0006	1957-1970	Wabash River	Cicott St. Bridge in Logansport	40.7475	-86.377222
-	WB-360	-	1971-1985	Wabash River	Peru	-	-
72	WB-370	WUW160-0006	1957-1970, 1986-Pres	Wabash River	Business US 31, Peru	40.7427616	-86.09621705
-	WB-362	WUW160-0002	1971-1977	Wabash River	Wayne St. Power Plant Intake	40.753611	-86.056944
-	WB-377	WUW150-0001	1971-1977	Wabash River	S Wabash St, Wabash	40.790278	-85.820278
-	WB-390	-	1977-1985	Wabash River	Andrews	-	-
41	WB-402	WUW140-0001	1986-Pres	Wabash River	SR 105 Bridge, N of Andrews	40.8686614	-85.6017086
-	WB-395	WUW140-0002	1971-1976	Wabash River	N Rangeline Rd, W of Huntington	40.879722	-85.543056
-	WB-399	WUW090-0003	1971-1986	Wabash River	Huntington Water Works	40.855277	-85.498333
-	WB-409	WUW090-0001	1957-1970	Wabash River	Huntington Water Works	-	-
40	WB-409	WUW090-0001	1986-Pres	Wabash River	N. Etna Rd Bridge	40.8583635	-85.50737389
-	WB-409	-	1973-1985	Wabash River	Markle	-	-
38	WB-420	WUW070-0002	1986-Pres	Wabash River	SR 3 Bridge, Markle 2nd bridge going out of town	40.8194444	-85.3425
-	WB-425	-	1973-1974	Wabash River	Bluffton	-	-
-	WB-426	WUW070-0001	1974-1979	Wabash River	SR 316 (CR 450 E), east of Bluffton	40.728333	-85.136111
-	WB-432	WUW-06-0006	1971-1972	Wabash River	US 27, north of Ceylon	40.618889	-84.954444
33	WB-449	WUW060-0007	2003-Pres	Wabash River	CR 400 W, northeast of Geneva	40.6311111	-85.01277778
-	WB-452	WUW060-0002	1979-2002	Wabash River	S 150 W, Geneva	40.616667	-84.965
163	WB-467	WUW040-0005	2004-Pres	Wabash River	Indiana Ohio Line Rd @ Stateline	40.5636111	-84.80277778
-	WC-1	-	1980-1985	Wildcat Creek	Lafayette	-	-
67	WC-3	WAW050-0005	1980-Pres	Wildcat Creek	SR 25, northeast of Lafayette	40.4537798	-86.85139234
-	WC-3 old	WAW050-0006	1957-1970, 1988-1989	Wildcat Creek	Eisenhower Rd, northeast side of Lafayette	40.440556	-86.829444
-	WC-24	WAW020-0041	1998	Wildcat Creek	US 421 and SR 39	40.464444	-86.636667
64	WC-32	WAW020-0039	1998-Pres	Wildcat Creek	SR 75, near Cutler	40.4817866	-86.53009831
-	WC-44	-	1957-1970	Wildcat Creek	Kokomo	-	-
-	WC-63	WAW020-0003	1971-1985	Wildcat Creek	S Dixon Rd	40.476389	-86.165
-	WC-50	WAW-04-0005	1971-1972	Wildcat Creek	Stellite Park (CR 950 W)	40.471667	-86.310556
28	WC-60	WAW020-0004	1986-Pres	Wildcat Creek	CR 300 W/Malfalfa Rd, 1 mile west of Kokomo	40.4736111	-86.18416667

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
29	WC-66	WAW010-0063	1986-Pres	Wildcat Creek	SR 931/S Reed Rd/Old US 31, Kokomo	40.4861111	-86.1075
-	WC-69	-	1971-1985	Wildcat Creek	Kokomo	-	-
63	WCM-7	WAW030-0022	1998-Pres	Middle Fork Wildcat Creek	SR 26 at Edna Mills	40.4171336	-86.66357948
165	WCS-4	WAW040-0043	2008-2009	South Fork Wildcat Creek	SR 26	40.418064	-86.768062
164	WCS-29	WAW040-0021	2008-2009	South Fork Wildcat Creek	Gas Line Rd	40.317911	-86.599206
62	WCS-34	WAW040-0001	1986-Pres	South Fork Wildcat Creek	CR 200 N, east of SR 38, 39, US 421	40.3150116	-86.54361852
-	WCS-35	WAW040-0055	1971-1985	South Fork Wildcat Creek	SR 75, north of Frankfort	40.314722	-86.515556
13	WHE-27	GMW070-0006	1971-1972, 1976-Pres	East Fork Whitewater River	Potter Shop Rd bridge, east edge of Abington	39.7331951	-84.95936344
3	WHW-22	GMW080-0001	1986-Pres	West Fork Whitewater River	Old SR 1, south of US 52, Cedar Grove	39.3532051	-84.94291345
-	WHW-24	GMW080-0002	1957-1972, 1976-1985	West Fork Whitewater River	Blue Creek Rd at Brookville	39.406667	-85.012778
2	WHW-47	GMW040-0005	1999-Pres	Whitewater River	Laurel Rd, east of SR 121, north of US 52	39.4983384	-85.18266352
-	WLC-1	WWU150-0008	1968-1970	White Lick Creek	Centerton Rd	39.514112	-86.379867
158	WLC-2	WWU150-0007	1999-Pres	White Lick Creek	CR 600 N, Near Centerton	39.5140765	-86.37999234
123	WL-SL	LMG020-0014	1966-Pres	Wolf Lake	Culvert at State Line Rd at End of 129th St	41.661739	-87.52520402
-	WR-19	WWL100-0001	1957-1972, 2002-2011	White River	Old US 41 Bridge	38.49	-87.55
134	WR-19	WWL-10-0006	2011-Pres	White River	Hazleton Public Access Site boat ramp	38.4908518	-87.54297815

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
135	WR-46	WWL100-0005	1986-Pres	White River	SR 61, Petersburg	38.5112545	-87.28854767
-	WR-48	-	1971-1985	White River	Petersburg	-	-
-	WR-80	-	1971-1985	White River	Edwardsport	-	-
132	WR-81	WWL070-0003	1986-Pres	West Fork White River	SR 358, Near Edwardsport	38.7950463	-87.24186646
-	WR-84	-	1957-1970	White River	Edwardsport	-	-
-	WR-130	WWL-04-0010	1957-1970	White River	W St Rd 54, east of Elliston	39.027316	-86.96683
130	WR-134	WWL030-0003	1999-Pres	West Fork White River	SR 157, Worthington	39.1100986	-86.96337893
128	WR-162	WWL020-0003	1986-Pres	West Fork White River	South Main St, Spencer	39.2805083	-86.76238014
-	WR-166	-	1957-1985	White River	Spencer	-	-
-	WR-185	WWU180-0001	1978-1985	White River	W Paragon Rd, south of Paragon	39.373056	-86.558611
157	WR-192	WWU160-0004	1971-1977, 1986-Pres	West Fork White River	SR 39, Martinsville	39.4337962	-86.44942161
-	WR-197	WWU160-0001	1957-1970	White River	PSI Generating Station, Centerton	39.486111	-86.419167
-	WR-205	WWU140-0002	1978-1985	White River	Henderson Ford Rd Bridge, Centerton	39.499167	-86.355278
159	WR-210	WWU140-0003	1986-Pres	West Fork White River	SR 144, near Waverly	39.5668659	-86.25514777
-	WR-227	WWU130-0008	1957-1970	White River	W Southport Rd, south of Indianapolis	39.663056	-86.236389
-	WR-230	WWU130-0009	1971-1972	White River	W Raymond St, Indianapolis	39.736944	-86.170556
22	WR-248	WWU090-0002	1986-Pres	West Fork White River	86th St, Nora	39.9103666	-86.10503468
-	WR-249	-	1971-1985	White River	Nora	-	-
-	WR-251	WWU-10-0055	1957-1970	White River	E 86th St Bridge	39.91	-86.105278
-	WR-265	WWU070-0001	1957-1970	White River	Logan St, Noblesville	40.046944	-86.016667
-	WR-279	-	1971-1985	White River	Perkinsville	-	-
26	WR-280	WWU040-0038	1971-1985, 2009-Pres	White River	Boat Ramp east of Perkinsville on Water St	40.1421111	-85.85491667

IDOH Site #	Fixed Station Site	L-Site	Years	Waterbody	Site Location	Latitude	Longitude
17	WR-293	WWU030-0003	1957-1970, 1986-Pres	West Fork White River	Edgewater Park Boat Ramp Near Old Water Works Dam Site, Anderson	40.1039725	-85.66832673
-	WR-295	WWU030-0001	1971-1985	White River	Anderson Water Works	40.105556	-85.671111
-	WR-301	WWU030-0002	1973-1979	White River	CR 500E, Madison-Delaware	40.119722	-85.575833
-	WR-307	WWU-03-0035	1957-1970	White River	N Walnut St, Muncie	40.203973	-85.386022
-	WR-300	-	1965-1970	White River	Yorktown	-	-
16	WR-309	WWU020-0005	1986-Pres	West Fork White River	Tiger Dr, Canoe Launch at Morrow's Meadow City Park, Yorktown	40.178812	-85.49491813
-	WR-310	-	1971-1985	White River	Yorktown	-	-
-	WR-317	WWU020-0004	1971-1972	White River	Walnut St Bridge, Muncie	40.204167	-85.386111
15	WR-319	WWU010-0001	1973-Pres	West Fork White River	Memorial Dr, Muncie	40.1783333	-85.34222222
-	WR-334	WWU-01-0042	1966-1970	White River	N Old Hwy 27, Winchester	40.185695	-84.981607
-	WR-347	WWU010-0002	1971-1977	White River	CR 100 W, northeast of Winchester	40.189722	-84.995278
14	WR-348	WWU010-0006	1986-Pres	West Fork White River	US 27, Winchester	40.1820446	-84.96885353
-	WR-350	-	1978-1985	White River	Winchester	-	-
-	YC-5	WED090-0001	1971-1972	Youngs Creek	CR 250 S, west of US 31	39.441389	-86.03
-	YC-9	WED090-0003	1957-1970	Youngs Creek	CR 400, south of Amity	39.418889	-86.004722
98	YR-12	UMK060-0001	1999-Pres	Yellow River	CR 500 East, east of Knox	41.3022884	-86.60153629
-	YR-28	UMK-05-0045	1957-1970	Yellow River	US Highway 35 bridge, north edge of Knox	41.302829	-86.620854
-	YR-43	UMK060-0003	1971-1972	Yellow River	W 12th St Rd, south of Plymouth	41.302222	-86.326111
-	-	LMJ150-0008	2008	Pine Creek	CR 27 E, Jefferson Township	41.638194	-85.806944

Appendix C Definitions

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

Definitions

IDEM Definition	Cross Ref	Type	Description
Accuracy			Accuracy is the degree to which an observed value and an accepted reference value agree. Percent recovery (%R) of reference standards is calculated as indicated below: $$\%R = \frac{(A - B) \times 100}{C}$$ where: A = Analyte concentration determined experimentally with known quantity of reference material added. B = Background determined by separate (unspiked) analysis of sample, or in the field, a blank. C = True value of reference standard added.

Definitions

IDEM Definition	Cross Ref	Type	Description
Batch			A group of samples extracted, digested, diluted, or treated and analyzed at the same time and in the same manner. Refer to the relevant method for defining the size of a batch. When no batch size is specified, a batch is comprised of 10 or less samples. Reagents, reagent water and solid phase disks or cartridges (SP's), used for sample prep, internal standards, spike solutions, surrogates, etc., must be prepared or drawn from the same source or lot. A new batch must be started with any change in lot or solution. If a solution of reagents, e.g., fortification solution or CCC solution, is changed, a new batch must be created, even if the individual lot numbers of reagents, in the new solution, are the same as used in the old solution. If reagent water is exhausted before reaching the limit of a batch, a new batch must be created. If a new lot of SPs are used, a new batch must be created.
BOD			Biochemical Oxygen Demand.
Bubbler Blank			The process of analyzing water in the bubbler, including purging Hg from the water, trapping the Hg purged on a sample trap, desorbing the Hg onto an analytical trap, desorbing the Hg from the analytical trap, and determining the amount of Hg present. The blank is somewhat different between days, and the average of a minimum of the results from three bubbler blanks must be subtracted from all standards and samples before reporting the results for these standards and samples.
CALM			Consolidated Assessment Listing Methodology

Definitions

IDEM Definition	Cross Ref	Type	Description
CAS Number	CAS RN	CAS Registry Number	A unique identification number assigned by the Chemical Abstracts Service (CAS) in the US to every chemical substance described in scientific literature.
Case			A case consists of a finite number of samples collected over a given time period from a particular site. This is also referred to as a sample set.
CB		Calibration Blank	A volume of ASTM type I water or reagent water fortified with the same matrix as the calibrations standards, but without the analytes, internal standards, or surrogate analytes. The calibration blank is a zero standard and is used to define the baseline of the instrument.
CCC		Continuing Calibration Check	Used to demonstrate acceptable initial calibration and confirm continued acceptable analytical performance. The CCC is ran immediately after initial calibration, recalibration and periodically throughout an analysis. With methods that utilize procedural standards (see PSC), analysis of the LFB may be used as a CCC, unless prohibited by the method.
CCC	CCV	Continuing Calibration Verification	See Continuing Calibration Check (CCC).
COC			Chain of Custody
COD			Chemical Oxygen Demand.

Definitions

IDEM Definition	Cross Ref	Type	Description
Completeness			Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained for that measurement. The percent completeness for the project is stated for both field and laboratory analyses as follows: % Completeness = (number of valid measurements) x 100 (number of measurements planned) where: "valid measurements" refers to numbers of investigational samples obtained or to be obtained for a specific purpose, or in order to satisfy a particular project objective.
CRQL			Contract Required Quantitation Limits. CRQLs listed are the higher values of laboratory reported MDL= s or method MDL= s times a factor of 3.18 as recommended in USEPA wastewater compliance guidance. Typically, the resulting values are rounded to number nearest to (1, 2, or 5) x 10^n, where n is an integer. CRQLs are equivalent to PQLs, MLs, RLs, or Method Reporting Limits (MRLs) in various methods and EPA guidance documentation.

Definitions

IDEM Definition	Cross Ref	Type	Description
CWA			Clean Water Act
Data reduction			The process of converting raw analytical data into final results in proper reporting units. In most instances an equation is used to calculate both field and laboratory results.
Dissolved			The concentration of analyte that will pass through a 0.45 µm membrane filter assembly, prior to sample acidification.
DOC			Dissolved Organic Carbon
DQA		Data Quality Assessment	Quality Assurance/Control assessment level. Dictates QA/QC and reporting requirements.
DQI			Data Quality Indicator
DQO			Data Quality Objective
DRP			Dissolved Reactive Phosphorus
Duplicate			One sample split into two laboratory samples and analyzed separately with identical procedures.
EDI			Electronic Data Import – Format Specification developed by IDEM WAPB for import of lab data and lab QC to the AIMS database.

Definitions

IDEM Definition	Cross Ref	Type	Description
Equipment Blank			An aliquot of reagent water that is subjected in the lab or field to all aspects sample collection and analysis, including contact with all sampling devices and apparatus for sample collection have been adequately cleaned before shipment to the field site. An acceptable equipment blank must be achieved before the sampling devices and apparatus are used for sample collection. In addition, equipment blanks should be run on random, representative sets of gloves, storage bags, and plastic wrap for each lot to determine if these materials are free from contamination before use.
Field Duplicates			Two separate samples collected at the same time and place under identical circumstances and treated exactly the same throughout field and laboratory procedures. Analyses of field duplicates give a measure of the precision associated with sample collection, preservation, and storage, as well as with laboratory procedure.
Field Blank			Quality control blanks prepared on-site during sampling by pouring analyte-free water into appropriate sample containers for each analyte group of interest. Field blanks are chemically preserved, stored, transported and analyzed with the collected field samples.

Definitions

IDEM Definition	Cross Ref	Type	Description
FRB		Field Reagent Blank	An aliquot of reagent water or other blank matrix that is placed in a sample container in the laboratory and treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FRB is to determine if method analytes or other interferences are present in the field environment.
FRB	TB	Trip Blank	See Field Reagent Blank (FRB).
GC			Gas Chromatography
GC/MS			Gas Chromatography/Mass Spectroscopy
Holding Time			The holding time for a sample starts at the time a grab sample is collected or when the last grab sample component of a composite sample is collected during a collection event. Holding time ends when either the sample is prepared for an analysis (if applicable) or is analyzed for a parameter. In addition, the maximum time between a sample preparation step (such as a distillation or extraction) and the analysis step may be specified in the test method(s).
HPLC			High Pressure Liquid Chromatography

Definitions

IDEM Definition	Cross Ref	Type	Description
IC		Initial Calibration	Instrument Calibration performed using a series of calibration standards in accordance with method specifications. Instrument should be operational in accordance with manufacturers specifications and any additional tuning or performance checks must be completed and verified. Calibration curves used for subsequent analyses are generated.
IC			Ion Chromatography
ICP			Inductively Coupled Plasma
IR			Infrared Spectroscopy
IS		Internal Standard	A pure analyte(s) added to a sample, extract, or standard solution in known amount(s) and used to measure the relative responses of other method analytes and surrogates that are components of the same sample or solution. The internal standard must be an analyte that is not a sample component.
LCS		Laboratory Control Standard	A standard usually certified by an outside agency that is used to measure the bias in a procedure. For certain constituents and matrices, use National Institute of Standards and Technology (NIST) or other national or international traceable sources (Standard Reference Materials), when available.

Definitions

IDEM Definition	Cross Ref	Type	Description
LD1 and LD2		Laboratory Duplicates	Two aliquots of the same sample taken in the laboratory from the same sample bottle and analyzed separately using the referenced method. Analyses of LD1 and LD2 indicate precision associated with laboratory procedures, but not with sample collection, preservation, transportation, or storage procedures.
LDR	LCR	Linear Calibration Range	See Linear Dynamic Range
LFB		Laboratory Fortified Blank	An aliquot of reagent water or other blank matrix to which known quantities of the method analytes are added in the laboratory. The LFB is analyzed exactly like a sample. Its purpose is to determine whether the methodology is in control and to assure that the results produced by the laboratory remain within the limits specified in the referenced methods for precision and accuracy.
LFM	MS and MSD	Laboratory Fortified Sample Matrix	An aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for the concentrations found.

Definitions

IDEM Definition	Cross Ref	Type	Description
LLD	LOD	Lower Level of detection	[also called detection level and level of detection (LOD)]—the constituent concentration in reagent water that produces a signal 2(1.645)s above the mean of blank analyses (where s is the estimate of standard deviation). This establishes both Type I and Type II errors at 5%.
LRB	MB	Method Blank	See Laboratory Reagent Blank (LRB).
LRB		Laboratory Reagent Blank	An aliquot of reagent water that is treated exactly as a sample including exposure to all glassware, equipment, reagents, and acids that are used with other samples. The LRB is used to determine if method analytes or other interferences are present in the laboratory environment, the reagents or apparatus.
LRB	PB	Preparation Blank	See Laboratory Reagent Blank (LRB).
Maximum Holding Time			The maximum time a sample may be stored before analysis.

Definitions

IDEM Definition	Cross Ref	Type	Description
MDL		Method Detection Limit	The minimum concentration of an analyte that can be identified, measured and reported with 99% confidence that the analyte concentration is greater than zero. For seven replicates of the sample, the mean must be 3.14*s* above the blank result (where *s* is the standard deviation of the seven replicates). Compute MDL from replicate measurements of samples spiked with analyte at concentrations more than one to five times the estimated MDL. The MDL will be larger than the LLD because typically 7 or less replicates are used. Additionally, the MDL will vary with matrix. MDL's must be determined in accordance with 40 CFR, Part 136
ML		Minimum Level	The lowest level at which the entire analytical system gives a recognizable signal and acceptable calibration point.

Definitions

IDEM Definition	Cross Ref	Type	Description
MRL	CRQL	Method Reporting Limit	MRLs listed are the higher values of laboratory reported MDL= s or method MDL= s times a factor of 3.18 as recommended in USEPA wastewater compliance guidance. Typically, the resulting values are rounded to number nearest to (1, 2, or 5) x 10^n, where n is an integer. Method Reporting Limits (MRLs) are equivalent to PQLs, MLs, RLs, or in various methods and EPA guidance documentation. This defined concentration is no lower than the concentration of the lowest calibration standard for that analyte and can only be used if acceptable QC criteria for this standard are met.
MS and MSD	LFM	Matrix Spike & Matrix Spike Duplicate	Aliquots of an environmental sample to which known quantities of the analytes are added in the laboratory. The MS and MSD are analyzed exactly like a sample. Their purpose is to quantify the bias and precision caused by the sample matrix. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the MS and MSD corrected for background concentrations.
MS			Matrix Spike.
NPDES			National Pollution Discharge Elimination System

Definitions

IDEM Definition	Cross Ref	Type	Description
Out-of-Control			A condition which exists when a single analytical or instrumental evaluation measure fails to meet the criteria specified an analytical method, IDEM/OWQ contract, or instrument manufacturer's specification.
OWM			Office of Water Management
OWQ			Office of Water Quality.
OWQ Analysis Set			See Case
PQL	CRQL	Practical Quantitation Limit	See Contract Required Quantitation Limit (CRQL)
QA			Quality Assurance - A definitive plan for laboratory operations that specifies the measures used to produce data with known precision and bias.
QAO			Quality Assurance Officer. The person responsible for all QA/QC and technical aspects of the contract. He/she manages all aspects of the laboratory program, including sampling.
QC			Quality Control - A set of measures used during an analytical method to ensure that the process is within specified control parameters.

Definitions

IDEM Definition	Cross Ref	Type	Description
QCS		Quality Control Sample	A solution of method analytes of known concentrations which is used to fortify an aliquot of LRB matrix. The QCS is obtained from a source external to the laboratory and different from the source of calibration standards. It is used to check laboratory performance with test materials prepared external to the normal preparation process.
RPD		Relative Percent Difference	The RPD is a measure of precision and the degree to which two or more measurements are in agreement. Relative percent difference (RPD) is calculated for each pair of duplicates as indicated below: $RPD = \frac{\lvert (S - D) \rvert \times 100}{(S + D) / 2}$ where: S = First sample value (original or matrix spike value) D = Second sample value (duplicate or matrix spike duplicate value)
Replicate			A repeated operation during an analytical procedure. Two or more analyses for the same constituent in an extract of one sample constitute replicate extract analyses.
RF			Response Factor.

Definitions

IDEM Definition	Cross Ref	Type	Description
RL			Reporting level — the lowest quantified level within an analytical method's operational range deemed reliable enough, and therefore appropriate, for reporting by the laboratory. RLs may be established by regulatory mandate or client specifications, or arbitrarily chosen based on a preferred level of acceptable reliability. Examples of RLs typically used (besides the MDL) include: Level Of Quantitation (LOQ) Minimum Quantifiable Level (MQL) Minimum Reporting Level (MRL)
RRF			Relative Response Factor
S.C.			Specific Conductance.

Definitions

IDEM Definition	Cross Ref	Type	Description
SA	SS	Surrogate Analyte	A pure analyte(s), which is extremely unlikely to be found in any sample, and which is added to a sample aliquot in known amount(s) before extraction or other processing and is measured with the same procedures used to measure other sample components. The purpose of the SA is to monitor method performance with each sample.
Sample Set			See Case
Specificity			The qualitative measure of degree of separation of an analyte from other analytes and the sensitivity of the response of an analyte to an analytical procedure. A procedure with a high degree of specificity for an analyte would be able to resolve the analyte in a complex mixture and provide a sufficient detector response to quantify the analyte.
Targeted site			A sampling site intentionally selected based on specific monitoring objectives or decisions to be made.
TCLP			Toxicity Characteristic Leachate Procedure - as defined in the Federal Register, Vol 55, No. 61, Thursday, March 29, 1990.
TDS			Total Dissolved Solids
TKN			Total Kjeldahl Nitrogen.
TOC			Total Organic Carbon.

Definitions

IDEM Definition	Cross Ref	Type	Description
Total Coliforms			Total coliform is a term used to measure the amount of coliform bacteria in drinking water and other substances consumed by humans. Coliforms are a large class of micro-organisms that are found in human and animal fecal matter and are used to determine whether the drinking water or other substance may have other disease-causing organisms in it. Water with a high total coliform level has a high probability of contamination by protozoa, viruses and bacteria that may be pathogenic.
Total Metals			Metals determined on an acid extracted sample as (OWQ per "Methods for Chemical Analysis of Water and Methods) -Wastes", EPA-600 4-79-020.
TP			Total Phosphorus
TPL			Target Parameter List.
Trip Blank			Trip blanks are only used for VOC samples. Blanks of VOC-free water are prepared by the organization providing sample containers for VOC collection. These blanks are transported to the site with the empty VOC sample containers and shipped to the analyzing laboratory in the same transport containers as the VOC samples. They remain unopened for the entire trip and are analyzed at the laboratory with the environmental VOC samples.
TS			Total Solids
TSS			Total Suspended Solids

Definitions

IDEM Definition	Cross Ref	Type	Description
WAPB			Watershed Assessment and Planning Branch in the IDEM Office of Water Quality
WWTP			Wastewater Treatment Plant