

Greater Lansing Regional Committee for Stormwater Management

Wet-Weather E. coli Monitoring QAPP & Sampling Protocol



May 2020

1. Project Background:

Keeping residents and visitors to Michigan safe while pursuing their recreational interests in Michigan's waters is a Michigan Department of Environment, Great Lakes and Energy (EGLE) priority, but surface water testing has shown E. coli levels in many water bodies are above the State's water quality standard. These levels increase the risk of illness upon contact or incidental ingestion of the water. To help attain the goal of enhancing recreational waters, Michigan continues to expand its efforts to reduce E.coli contamination of its surface waters through the establishment of the Total Maximum Daily Loading (TMDL) for E.coli. The TMDL represents the maximum loading that can be assimilated by a water body while still achieving its designated Water Quality Standard (WQS).

The TMDL requirements established for water bodies in the Greater Lansing region are the same as those established for all other surface waters in the State of Michigan that are impaired by E.coli. The ultimate goal of the TMDL as established in Michigan is to identify problem areas, address sources of E. coli statewide, and provide guidance to restore these waters.

The E. coli TMDLs that apply to the member communities of the Great Lansing Regional Committee for Stormwater Management (GLRC) are the Grand and Red Cedar rivers and their watersheds. However, the TMDL requirement for E. coli will be extended to the Looking Glass River Watershed in the MS4 permit cycle expected to begin in 2024.

The National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (NPDES, MS4) Permit issued by EGLE to GLRC member communities requires permittees to implement a Stormwater Management Program to reduce the discharge of pollutants, including E. coli, to the maximum extent practicable.

1.1 Legal Requirements for Establishing a TMDL

Section 303(d) of the federal Clean Water Act (CWA) and the United States Environmental Protection Agency's (USEPA) Water Quality Planning and Management Regulations (Title 40 of the Code of Federal Regulations, Part 130) requires states to develop TMDLs for water bodies that are not meeting WQS. The list of water bodies that are not meeting their designated uses are listed in the 303(d), 305(b), and 314 Integrated Report which partially fulfills Michigan's requirement to assess the designated uses of its waters. Michigan's Integrated Report (EGLE 2016a) is updated every two years. In addition to containing a list of impaired bodies, it also contains the causes of the impairment and a schedule for TMDL development.

A TMDL establishes the allowable level of pollutants for a water body based on the relationship between pollution sources and in-stream water quality conditions. TMDLs provide a basis for determining the pollutant reductions necessary from both point and nonpoint sources to restore and maintain the quality of water resources.

1.2 Numeric Limits for the E. coli TMDL

Water bodies are evaluated for the Total Body Contact (TBC) and Partial Body Contact (PBC) recreation designated uses using E.coli as an indicator for other harmful pathogens. This is consistent with USEPA recommendations for fresh water recreational water quality criteria for protecting human health.

Michigan's designated use rule (Rule 100 {R323.1100} of the Part 4 Rules, WQS, promulgated under Part 31, Water Resources Protection of the Natural Resources and Environmental Protection Act (NREPA), 1964 PA 451, as amended) states that water bodies be protected for TBC recreation from May 1 through October 31 and PBC recreation year-round. The target levels for these designated uses are the ambient E.coli WQS established in Rule 62.

The State of Michigan has officially established the limits for its E.coli TMDL to be a concentration based standard as follows: "For this TMDL, the WQS of 130 E.coli per 100mL as a 30-day geometric mean and 300 E.coli per 100mL as a daily maximum to protect the TBC use are the target levels for the TMDL reaches for May 1 through October 31, and 1,000 E.coli per 100mL as a daily maximum year-round to protect the PBC use."

1.3 Potential sources of E. coli

The TMDL report lists potential point sources of E. coli to include untreated sewage overflows from wastewater treatment plants (WWTPs), National Pollutant Discharge Elimination System (NPDES) discharges, and storm sewer discharges. It lists potential non-point sources of E. coli to include wildlife and pet waste, contaminated overland run-off, agricultural operations, illicit discharges of raw sewage, failing septic systems, dumping of trash, contaminated groundwater, biosolids and septage land applications, and wildlife living in sewers (EGLE, 2013c). Pollution presence during certain weather can be indicative of the source of the pollution. Dry weather sources of E. coli can be attributed to such things as leaking septic tanks and wildlife. Wet weather sources of E. coli are often associated with E. coli that is carried with overland runoff, such as contaminated stormwater from storm sewers, illicit discharges to storm water conveyances, wildlife, pet waste, and livestock.

A full account of E. coli sources in the Red Cedar and Grand River watersheds are detailed in their respective 319 watershed management plans.

2. GLRC Approach to TMDL

The members of the GLRC collaborate on most areas of the MS4 program and have developed shared Public Education Plan implementation plans, Pollution Prevention/Good Housekeeping guidance documents, and Post-Construction design manuals. But due to the varying size, type, and land use of the MS4 programs within the membership, it was determined that a shared implementation plan was not suitable for addressing the E. coli TMDL. Instead, members with TMDL requirements developed community specific plans for submittal to EGLE.

Though TMDL implementation plans are specific to each member, this QAPP will serve to guide the wet-weather monitoring process, inform sampling and follow-up protocol, and house relevant documentation. Sampling locations, timelines, and other permit specifics are in the permittees' SWMP. ***This QAPP is not to be considered an official permit document and permittees are not bound to the processes outlined within. Rather the intent is to provide a general framework to serve as guidance to members.***

3. Sample Collection

3.1 Overview

The objective of performing wet-weather monitoring is to identify discharges with elevated E. coli levels, determine the sources of bacteria, and implement strategies to address and eliminate those sources. The following types of data may be collected in this effort:

- E. coli analytical data
- BST data (Human Enterococcus ID and Human Bacteroides ID)
- Rainfall data (from www.weather.com and/org www.accuweather.com)

Staff or agents of GLRC member communities will sample MS4 outfalls/points of discharge during wet weather. Per EGLE, wet weather sampling should capture the first flush, which occurs within the first 30 minutes if possible but not longer than the first 60 minutes. Samples must be delivered to a laboratory within six (6) hours of collection to allow the laboratory to begin testing within the specified U.S. EPA hold time criteria (8 hours from time of collection).

At each site, one sample will be collected for E. coli. While optional, it is also recommended to collect a split sample for potential Microbial Source Tracking (MST) analysis. The sample can be held frozen at the lab for \$15. If elevated levels of E. coli are found in the sample, the split sample will be available for DNA biomarker analysis if desired, ensuring the MST data is representative of the E. coli sample and negating the need for a resample event (and associated staff time costs).

E. coli analysis will be performed by the EGLE Drinking Water Laboratory in Lansing, MI. If the EGLE lab cannot accommodate sample submittal, WaterTech in Howell will perform the analysis. Samplers will call EGLE's lab prior to sampling to determine availability and notify them of incoming samples. ***Note: communities with wastewater treatment plants may choose to perform E coli analysis internally.***

Microbial Source Tracking (MST) (also known as Bacterial Source Tracking (BST)), will be performed by the Michigan State University Water Quality and Environmental Microbiology Laboratory.

Sampling will be accomplished according to procedures outlined in Appendix A and in the Laboratory SOPs found in Appendix B. Laboratory hours and supplemental information is also located in Appendix B.

3.2 Laboratory Contact and Location

EGLE Drinking Water Laboratory

3350 N. Martin Luther King Jr Blvd.
Lansing, MI 48906-2933
Phone: (517) 335-9800
Fax: (517) 335-9600

Watertech

718 S. Michigan Ave.
Howell, MI 48843
T:517-548-2505
F: 517-548-3434

MSU Environmental and Molecular Microbiology Laboratory

1066 Bogue Street
Room A559 Plant and Soil Sciences Building
Department of Plant, Soil and Microbial Sciences
Michigan State University
East Lansing, MI 48824

3.3 Sample Collection

All sampling techniques will adhere to the GLRC End of Pipe Sampling Protocol for Wet-Weather Events SOP, which is included in Appendix A. Staff collecting a water sample will not touch the inside of the container, will not rinse the container, will not contaminate the container cap, and will not disturb sediment in the outfall while sampling.

E. coli samples will be collected directly from the outfall using a 150mL sterilized container provided by the laboratory. An additional sample may be collected in a 1 Liter sterile Nalgene bottle or equivalent wide mouth polypropylene bottle from each sampling point for potential MST analysis. E. coli samples will be stored in a cooler on ice until transport to EGLE's Drinking Water Lab or at WaterTech. The 1L bottle will be delivered to MSU to be frozen/held in storage for possible analysis based off E. coli results. Sample containers will not be totally immersed in water from melted ice during transit and/or storage.

***EGLE will accept a geometric mean, so permittees can opt to collect 3 samples at each site. Project managers may choose this to account for potential large fluctuations in bacteria presence within wet-weather discharge. If opting for the geometric mean, ensure you budget for and collect three 150ml samples per site.**

3.4 Sample Custody

Chain-of-Custody (COC) Procedures will be followed to provide documentation of the handling of each sample from time of collection through receipt by the laboratory. COC forms are to be filled out by the sampler/sample team to accompany each sample through transit from the field to the lab. This form is used by both the field sampler and the lab to verify the contents of each shipment of samples. When transferring possession of the samples, both the individual relinquishing the container(s) and the receiver are required to sign and date the COC. The COC may have a column for indicating with the sample was a grab sample or a composite sample. All samples are grab samples and are to be indicated as such.

An EGLE laboratory "Request for Surface Water Analysis" form (Appendix B.1) will be filled out by the sampler or sampling team. Samples will be delivered to the EGLE Drinking Water Lab at 3350 North M.L.K Blvd., Lansing MI 48909, within 6 hours of being collected. Samples must be submitted to the EGLE Drinking Water Lab by 3pm the day of sample collection (Monday – Thursday), though the lab schedule and number of sample containers may necessitate an earlier drop off time. Calling ahead for availability prior to sampling is mandatory for samples destined for the EGLE lab. No samples can be submitted on Friday. The laboratory can be contacted at 517-335-9814. Once delivered to EGLE lab, EGLE assumes responsibility for the samples and is to follow all approved laboratory practices for sample handling.

If the EGLE Drinking Water Lab cannot accommodate sample analysis, samples will be submitted to WaterTech. WaterTech's chain of custody (COC) is located in Appendix B.3. They accept forms from other labs (such as EGLE's), but EGLE will only accept their own. MSU's COC is located in Appendix B.2.

4. Analysis

At the EGLE Drinking Water Lab, E coli samples will be analyzed for the presence of E coli colony forming units (CFUs) in either the 10-1,000,000 CFU range (NPEC_HIGH) or 10-10,000 range (NPEC_LOW). Lab fees for the higher range of analysis are an additional \$10 compared to the lower range, so defaulting to NPEC_LOW analysis is recommended as the WQS is within this range. However, if current land use, historical analytical data, or other reasons are grounds to anticipate very high (>10,000 CFU/100ml) E coli presence, the higher range may provide insight on the extent of the issue that could help inform site prioritization and BMP selection. In these cases, the project manager may request NPEC_HIGH analysis.

If utilizing WaterTech, E. coli samples will be analyzed for the presence of E. coli CFUs in the 1-2400 range. They can also dilute up to 10x if a higher range is needed.

E. coli sample data will be reviewed and compared against historical data and against the respective WQS. The daily maximum standards for Total Body Contact (TBC) and Partial Body Contact (PBC), 300 CFU/100mL and 1,000CFU/100mL respectively, will be the WQS used in this data analysis.

The 1L sample delivered to MSU will be held in storage until *E. coli* results are returned. Future action will take place at the discretion of the project manager. It is recommended to collect this volume initially in order to save on costs and time associated with resampling a location that returned an

elevated *E. coli* sample. Land use of the catchment area and near-by features should be accessed to make initial assumptions regarding the source of *E. coli* and determine proper biomarker analysis.

It is assumed that the laboratories meet testing, inspection and maintenance requirements as an EGLE laboratory or EGLE certified laboratory.

4.1 Follow Up

Through implementation of the EGLE-approved TMDL Plans, GLRC members will be generating monitoring data for levels of *E. coli* in their municipal, “first-flush” stormwater runoff. The primary question associated with this data and implementation of the TMDL Plans is at what level is there an apparent in-stream water quality concern relative to *E. coli* levels in the runoff; thus, triggering the required corrective, follow-up efforts on the part of the NPDES permittee / GLRC member.

As per the TMDL document itself, the “purpose of the TMDL is to identify the allowable levels of *E. coli* that will result in the attainment of the applicable WQS in portions of the Grand River, Red Cedar River, and tributaries.” Regarding “applicable WQS”, Rule 62 of the Part 4 Water Quality Standards and its in-stream maximum levels of *E. coli* (as cited in Section 1.2 of this QAPP and Sampling Protocol) are applicable to all of the streams regulated by this TMDL. However, GLRC members were aware of field studies using data from typical urban stormwater runoff that yielded first-flush concentrations of *E. coli* averaging approximately 1,000 CFU/100 mL in lieu of any identifiable, controllable contaminant source.

Since this average concentration exceeds the maximum in-stream levels required by Rule 62, the GLRC and its members sought to discuss with EGLE the establishment of an appropriate level of *E. coli* in the runoff data for use during implementation of the NPDES-required TMDL Plans. Specifically, it was necessary to determine at what level monitoring data seemed to indicate the presence of a controllable pollutant source (or sources) and, therefore, when follow-up, corrective actions were necessary.

During review and approval of application submittals for reissuance of GLRC members’ permits, EGLE indicated that during the initial TMDL cycle, permittees may limit corrective action and BMP implementation to the sites failing to meet the partial body contact standard (1,000CFU/100ml). Consequently, any exceedances of that level are to be viewed as requiring corrective actions and efforts consistent with the NPDES permittee’s / GLRC member’s approved TMDL Plan.

Regarding corrective measures, they can be implemented (consistent with an approved TMDL Plan) using any manner or combination of control measures, including:

- improved good housekeeping activities (such as more frequent street sweeping activities);
- installation of a pet waste station to encourage proper disposal at parks as a BMP;
- implementation of new or better best-management practices (such as biofiltration); and
- improved public education efforts (such as additional pet waste signs).

Specific triggers and follow-up requirements are detailed in each permittee’s approved TMDL plan, but the overall goal of any corrective measures is to ensure the *E. coli* partial body contact and full body contact water quality standard is met in both wet and dry conditions. Additional information on follow up efforts will be compiled based on the GLRC member’s experiences and “lessons learned”, while implementing the approved TMDL Plans.

Greater Lansing Regional Committee for Stormwater Management

Appendix A

End of Pipe Sampling Protocol for Wet-Weather Events

Appendix A.1 – When to Sample

Appendix A.2 – Set-up Procedures

Appendix A.3 – Sampling Protocol



April 2020

1. When To Sample

Staff involved in wet weather sampling will need to keep apprised of the daily weather forecast to be aware of approaching weather. Check the radar online (www.weather.com and/or www.accuweather.com) or on television as the storm approaches to get a sense of its intensity and size. Keep in mind the EGLE lab schedule: all samples must be received at the lab as soon as possible after collection but no later than 3pm (Monday through Thursday). No samples are accepted on Friday.

If using EGLE's lab, you must provide notification to Paula Crawford at 517-335-9814 prior to bringing samples to the lab. Preferably this notification would take place the day before if wet weather sampling is anticipated or as early as possible on the day of the projected event. She will let you know if they can accommodate you or not. If they cannot, plan to submit samples to WaterTech in Howell. They can accept samples 800am-430pm Monday through Friday and before 11am on Saturday and Sunday (utilizing a drop box on weekends). Samples must be submitted to the lab within 6 hours of collection.

Proceed to the site with enough time to arrive prior to or shortly after initial rainfall. Per EGLE, wet weather sampling should capture the first flush, which occurs within the first 30 minutes if possible but not longer than the first 60 minutes. Sampling wet weather should occur only after it has been dry for at least 72 hours.

2. Set-Up Procedures

Bottle Orders: EGLE Surface Water Sample Kits can be obtained by calling 517-335-8184. Indicate that you need Surface Water Test kits.

The day before or morning of the sampling event:

- 1. Notification:** Contact the EGLE Drinking Water Lab (517-335-9814) and let them know you plan to submit samples and provide a drop-off time estimate. If they cannot accommodate you, plan to submit samples to WaterTech in Howell.
- 2. Bottles and Laboratory Containers:** Organize sample bottles and laboratory containers. EGLE lab will only accept bottles provided from their lab (order form is located in Appendix B.1). If using WaterTech, contact their lab for bottle orders.
- 3. Ice:** Prepare a cooler and plan for/pack with with a bag of ice or a freezer "ice pack."
- 4. Paperwork:** Fill out as much of your notebook entry and data sheet as possible, including date and location. The more you can fill out the night before, the easier your task will be in the morning.
- 5. Equipment Check:** Check through your equipment to be sure that you have everything and that it is all in good working order. Place all equipment, including the sample bottles and labels, data sheets, notebook, contact information, etc., in a large container to facilitate carrying it all.

Safety Equipment: The following is a list of items needed for monitoring:

- Boots or waders
- Walking stick of known length for balance, probing, and measuring
- Long sleeves and pants that are thorn-resistant
- Protective gloves
- Insect repellent
- Sunscreen and hat
- Flashlight and extra batteries
- Whistle in case of an emergency
- Drinking water and snack
- Information with location and numbers to call in case of emergency
- First aid kit
- Rope
- Dog/animal repellent
- Weather radio (if necessary)
- Life jacket (if necessary)

Sampling Equipment and Forms:

- 150mL bottles from EGLE Drinking Water Lab (order form is in Appendix B.1)
- 1L sterile Nalgene or equivalent wide mouth polypropylene container (if collecting for MST)
- Sterile latex gloves
- Sample pole
- Bottle labels
- Pen
- Clipboard
- Black Sharpie pen
- Cooler and freezer pack/ice

Data Sheets

- Field Data sheet
- Chain of Custody Form

Safety recommendations:

1. Always sample in pairs
2. Carry 2-way radios or cell phones
3. Have personal information on you that includes:
 - Emergency contact information
 - Identification
 - Medical alerts
4. Try to collect all samples from land, especially if during heavy rains.
5. If you must enter the water, do so cautiously and be prepared to make a quick exit
6. Never enter a stream where footing is unstable
7. Never enter a stream where the water is too deep (about 2 feet)

8. Never enter a stream where the water is too fast (more than 2.5 ft/sec)
9. Use common sense

3. Sampling Protocol

1. Put on new latex gloves.
2. Label laboratory and sample bottles.
3. Attach a sterilized 150mL sampling bottle to sampling device (if applicable).
4. Fill 150mL bottle from the flow stream for E coli analysis. Fill bottle to the “fill line” (or to the shoulders if no fill line). Overfull bottles will not be accepted due to contamination risk in the lab. **Collect 3 150ml samples if opting to calculate geometric mean.*
- 5a. Attached a sterilized 1L Nalgene bottle to sampling device (if applicable)
- 5b. Fill 1L bottle from flow stream for potential source tracking analysis.
6. Store bottles in a cooler on ice for delivery to laboratories.
7. Fill out chain of custody and field data forms.
8. Do not allow sample containers to be totally immersed in water from melted ice during transit and/or storage.
- 9a. **If using EGLE Lab-** The EGLE laboratory is a secure facility. Call the laboratory at 517-335-8184 to notify the lab of your estimated time of arrival. Indicate that you have surface water samples when you arrive at the lab. A laboratory staff member will meet you in the lobby to check your samples when you arrive.
- 9b.- **If using WaterTech-** drop off samples to lab in Howell before 4:30pm (or 11am on Saturdays and Sundays).
12. If using, call MSU lab to notify them of an incoming sample. Deliver to lab.

Greater Lansing Regional Committee for Stormwater Management

Appendix B

Laboratory Supplementals

Appendix B.1 – EGLE Drinking Water Lab Supplementals

Appendix B.2 – Michigan State University Water Lab Supplementals

Appendix B.3 – WaterTech Supplementals



May 2020



REQUEST FOR SURFACE WATER ANALYSIS

FOR LAB USE ONLY

Complete all parts of this form legibly in ink to ensure your sample is accepted for testing.

Date Collected / /	Time Collected :	<input type="checkbox"/> AM <input type="checkbox"/> PM	Sample Collector's Name
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Samples not meeting EPA requirements will not be tested

SAMPLE COLLECTION INFORMATION

Sampling Source 7 - Surface Water includes: bathing beach, pools, ditches, streams and lakes)	Sample Purpose 0 - Routine monitoring 3 - Repeat Sample 5 - Water Quality Problem	Sample Point 2 - Public System Surface Water 9 - Other
7	Enter Selection <input type="checkbox"/>	Enter Selection <input type="checkbox"/>

Water Supply/Owner/ Business Name			
Address		City	State Zip
County	Township	Section	Site Code/ Permit Number
Sampling Point			

REPORT RESULTS TO

Name	Phone Number
Address	City State Zip
Send Report to E-mail	

BILLING INFORMATION

<input type="checkbox"/> Check here if billing name/address is same as report results to name/address.	Billing Name
Billing Address	City State Zip
Drinking Water Lab Acct #	Check # (payable to State of Michigan) Amount

TESTING INFORMATION

Check	Test Code	Sample Container	Test Description	Fee	Test Request Instructions
<input type="checkbox"/>	NPEC-LO	30	E.coli (Counts 10 - 10,000)	\$15.00	
<input type="checkbox"/>	NPEC-HI	30	E.coli (Counts 10 - 1,000,000)	\$25.00	
Total of all fees				\$	

1. Check box for test code request.
 2. Check container label to ensure correct sample container.
 3. Add total of all fees.
 4. See reverse side for sample collection instructions.

*** This test code requires thermal preservation and MUST be returned to the laboratory within 6 hours.**

This test MUST be scheduled with the laboratory. Call 517-335-8184 to schedule testing prior to sample collection and delivery.

*****FOR LAB USE ONLY*****

*****FOR LAB USE ONLY*****

Sample Receipt Temperature: °C

Received on Ice: Yes No



TESTING FEE SCHEDULE

- **This Fee Schedule is effective January 1, 2016.**
- See reverse side for description of sample units and unit ordering information.
- **TEST CODE must be indicated in the TESTING REQUEST INFORMATION section of the form submitted with the sample.**

MICROBIOLOGY			
TEST DESCRIPTION	FEE	UNIT NUMBER	TEST CODE
Water Coliforms (total & E. coli)	\$16.00	30	BPTC
Heterotrophic Plate Count (MPN/ml)	\$12.00	30	BSPC
Fecal Coliform (Counts 10 - 10,000)	\$15.00	30	NPFC-LO
Fecal Coliform (Counts 10 - 1,000,000)	\$25.00	30	NPFC-HI
E. coli (Counts 10 - 10,000)	\$15.00	30	NPEC-LO
E. coli (Counts 10 - 1,000,000)	\$25.00	30	NPEC-HI
Iron Bacteria	\$40.00	30	BIRON
LT2 E. coli for EPA ESWTR	\$16.00	LT2	BLT2

NOTE: Surface water bacteriology is intended only to estimate bacterial group populations.

ORGANIC CHEMISTRY			
TEST DESCRIPTION	FEE	UNIT NUMBER	TEST CODE
Disinfection Byproducts Rule (TTHM & Haloacetic Acids)	\$175.00	36VO/HA	CXTM CXHA
Volatiles (VOC)			
Volatile Organic Compounds by GC/MS	\$100.00	36VO	CXVO
Total Trihalomethanes (TTHM)	\$ 65.00	36VO	CXTM
1,4 Dioxane by GC/MS	\$115.00	36VO-NP	CXPD
Methane, Ethane, Ethylene	\$ 90.00	36VO-MEE	CXMEE
EDB and DBCP by GC (call to schedule)	\$ 70.00	36EN	CXEV
Semi-Volatiles (SOC)			
Carbamates by HPLC	\$120.00	36LP	CXLP
Chlorinated Acid Herbicides	\$120.00	36HB	CXHB
Pesticides by GC/MS	\$125.00	36PT	CXPT
Dalapon & Haloacetic Acids	\$130.00	36HA	CXHA
Aromatic Compounds by GC/MS	\$110.00	36PT	CXPA

NOTE: Generally each test procedure requires **separate sample unit**. Where possible, all detected substances will be identified by mass spectral examination. Names of specific compounds of concern should be provided with sample and test request(s).

INORGANIC CHEMISTRY			
TEST DESCRIPTION	FEE	UNIT NUMBER(S)	TEST CODE
Automated Partial Chemistry (Fluoride, Chloride, Hardness, Nitrate, Nitrite, Sulfate, Sodium, Iron)	\$ 18.00	32, 33	R
Calcium/Magnesium/Sodium	\$ 18.00	33	CPM2
CCON, CTALK, CPO4, Calcium	\$ 51.00	33	CORR
Complete Minerals (TALK, Cl, F, NO3, NO2, SO4, Si, CA, MG, NA, K, CON, PH, Hardness)	\$104.00	33	CMIN
Total Alkalinity as CaCO3	\$ 16.00	32,33	CTALK
Ammonia as N	\$ 30.00	36AC	CNH3
Specific Conductance (µmhos)	\$ 12.00	32,33	CCON
Cyanide (available) (unchlorinated water)	\$ 25.00	36CN	CCN
Cyanide (available) (chlorinated water)	\$ 25.00	36CNa	CCN
Total Organic Carbon	\$ 35.00	36TO	CTOC
Ortho Phosphate as P	\$ 17.00	32,33	CPO4
pH Determination	\$ 13.00	32,33	CPH
Potassium	\$ 13.00	32,33	CK
Silica as SiO2	\$ 14.00	33	CSI

NOTE: Do not request more than **two test procedures** for each unit 32. Unit 33 may be used for more extensive requests.

METALS CHEMISTRY			
TEST DESCRIPTION	FEE	UNIT NUMBER	TEST CODE
Aluminum	\$ 18.00	36ME	CAL
Antimony	\$ 18.00	36ME	CSB
Arsenic	\$ 18.00	36ME	CAS
Barium	\$ 18.00	36ME	CBA
Beryllium	\$ 18.00	36ME	CBE
Boron	\$ 18.00	36ME	CB
Cadmium	\$ 18.00	36ME	CCD
Chromium	\$ 18.00	36ME	CCR
Cobalt	\$ 18.00	36ME	CCO
Lead	\$ 18.00	36ME	CPB
Lead/Copper for corrosion control	\$ 26.00	36CC	CCUB
Lead - First draw sample	\$ 18.00	36CC	CPB
Lithium	\$ 18.00	36ME	CLI
Mercury	\$ 18.00	36ME	CHG
Molybdenum	\$ 18.00	36ME	CMO
Nickel	\$ 18.00	36ME	CNI
Selenium	\$ 18.00	36ME	CSE
Strontium	\$ 18.00	36ME	CSR
Thallium	\$ 18.00	36ME	CTL
Titanium	\$ 18.00	36ME	CTI
Uranium	\$ 18.00	36ME	CU
Vanadium	\$ 18.00	36ME	CV
Iron/Manganese/Copper/Zinc	\$ 28.00	36ME	CPM1
Complete Metals for Private Wells (AS,SE,BA,CD,CR,HG,PB,FE,MN,Copper,ZN)	\$ 92.00	36ME	CMET
Complete Metals for Public Supplies (SB,AS,BA,BE,CD,CR,HG,PB,SE,NI,TL)	\$102.00	36ME	CMET2

For questions regarding testing visit the Drinking Water Laboratory website:
www.michigan.gov/deqlab
 click Drinking Water
 or
 call (517) 335-8184 - Lansing

Laboratory Hours:
 Monday - Friday: 8:00 am - 5:00 pm
 Closed Saturday - Sunday
 and major Holidays

Form is emailed to Drinking Water Bottle Email for processing.



MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

ORDER FORM FOR REQUIRED BOTTLES

By authority of PA 368, 1978

Laboratory Hours:
Monday – Thursday 8:00AM to 4:30PM
Friday - 8:00AM - 3:30PM
CLOSED WEEKENDS AND HOLIDAYS

****Use our Fillable form online and electronically submit your Bottle Order****
michigan.gov/eglelab click on Drinking Water
Orders may be
e-mailed: **EGLE-RRD-DW-Bottles@michigan.gov** or
Telephone: 517-335-8184

Complete all parts of this form to ensure your order is processed correctly.

ORDER INFORMATION

Date	WSSN (public supply)	Name		
Email Address		Mailing Address		
Area Code & Phone Number	City	State	Zip Code	

Order only what you will use within 1 month. Orders may take up to 3 days to process and mail.

For samples requiring a cooler - If you will not be returning all of the bottles in your order at one time, specify the number of sampling/shipping events so that the correct number of coolers can be sent with the bottles.

Quantity of Containers	Required Containers	# of Sampling Shipping/Events
2	30, 32, 36VO	2

Example order is shown in table (Two coolers would be shipped)

Maximum of 10 coolers may be ordered at one time.

The following units require cooler with frozen ice packs for return shipment to the lab within 24 hours of sampling: 32, 33, 36AC, 36CN, 36CNA, 36EN, 36HA, 36HB, 36LP, 36PT, 36TO, and 36VO.

Small orders may be picked up at the laboratory with a 24 hours notice.

You **MUST** call ahead to gain access to the laboratory



GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING



LIESL EICHLER CLARK
DIRECTOR

Guidance for Surface Water Testing Procedures

The Department of Environment, Great Lakes, and Energy (EGLE) has made some significant changes to how Surface Water samples will be accepted for submission to the laboratory.

- 1) The laboratory will only test Surface Water samples for E. coli. Samples submitted for general fecal testing or surface water chemical testing will not be analyzed.
- 2) The laboratory will offer two dilution levels. Please call your local County Sanitarian to determine which dilution level will be appropriate for your sampling needs.
- 3) Samples submitted for E. coli testing must be scheduled in advance by calling the laboratory at 517-335-8184. Indicate to customer service staff that you are bringing in a Surface Water sample for E. coli analysis. Samples submitted without an advance call may not be analyzed by the laboratory.
- 4) Samples for E. coli testing can only be submitted Monday through Thursday during the hours of 8:00 a.m. – 3:00 p.m.
- 5) Samples **must** be delivered to the laboratory within 6 hours of collection in order to allow for analysis completion by the laboratory. Samples received outside of the 6 hours but before the 8-hour EPA hold time for this analysis **may** be analyzed by the laboratory if it has the ability to do so. Samples received by mail, UPS, FEDEX will not be analyzed.
- 6) Samples must be delivered to the laboratory **in a cooler on ice or with frozen ice packs**. Samples received without ice, a cooler or with unfrozen ice packs will be rejected for analysis.
- 7) Samples that are frozen or contain ice will be rejected for analysis.
- 8) Samples with improperly completed forms will be rejected for analysis.
- 9) The laboratory has a new form to be used for Surface Water submissions. Please call 517-335-8184 to order the sampling kits or other materials needed for submission.

**If you have any questions, please call the laboratory at 517-335-8184
Monday through Friday from 8:00 a.m. – 5:00 p.m.**

Appendix B.2 – Michigan State University Water Lab

CHAIN OF CUSTODY RECORD

480 Wilson Rd
 Dept. of Fisheries & Wildlife
 3 Natural Resources Bldg.
 Michigan State University
 East Lansing, MI 48824
 (517) 432-8185

Client _____

Sample by (PRINT) _____

Address _____

Sampler Signature _____

Phone _____

Cell: _____

Sample					Preservation (check one)		Analyses Request			
#	Sample Description	Date	Time	Type	4C (on ice)	Not preserved	Bacteroides marker (human/bovine) ddPCR	Pig marker ddPCR		
1				grab						
2				grab						
3				grab						
4				grab						
5				grab						
6				grab						

Relinquished By (signature)	Date	Time	Accepted By (signature)	Date	Time



To: INSERT ADDRESSEE
INSERT RD
INSERT ST, ZIP CODE

April 21, 2017

Growth Based Testing

Sample Analysis	Analysis Unit	Cost per Sample
Coliphage (PFU/ml) (somatic)	1 sample	\$38
Coliphage (PFU/ml) (F-specific)	1 sample	\$38
<i>Enterococcus</i> (Enterolert) MPN/ml	1 sample	\$22.00
<i>Enterococcus</i> (Enterolert) positive and negative controls	1 per analysis batch	\$50.00
<i>E. coli</i> (Colilert) MPN/ml	1 sample	\$22.00
<i>E. coli</i> (Colilert) positive and negative controls	1 per analysis batch	\$50.00
<i>Salmonella</i> (MPN/100ml)	1 sample	\$350.00
Infective adenovirus (cell culture)	1 sample	\$700.00
<i>Campylobacter</i> (culture & qPCR)	1 sample	\$600.00

Molecular Testing (non-culture based)

Sample Analysis	Analysis Unit	Cost per Sample
<i>Campylobacter</i> (PCR)	1 sample	\$252.00
Adenovirus (qPCR)	1 sample	\$360.00

Microbial Source Tracking (non-culture based)

Analysis Unit	Analysis Unit	Cost per Sample
Sample filtration, freezing and storage at -80°C	1 sample	\$15.75
Presence /Absence methods:		
Human and bovine bacteroides (multiplex marker) ddPCR assay	1 sample	\$84.25
Pig bacteroides marker (single marker) ddPCR assay	1 sample	\$84.25
Goose bacteroidales (single marker) ddPCR assay	1 sample	\$84.25
Bird (general) <i>Lactobacillus</i> (single marker) ddPCR assay	1 sample	\$84.25
Dog bacteroidales (single marker) ddPCR assay	1 sample	\$84.25

All costs include 26% University F&A (overhead) rate of 26%

Costs for analysis are described on a per sample basis.

Thank you for your interest in working with the Water Quality Laboratory at Michigan State University.

Joan B. Rose
Michigan State University
Department of Fisheries & Wildlife
Natural Resources Building
East Lansing, MI 48824-1325
Tel: 517-432-4412
Fax: 517-432-1699



To: **Cliff Walls**
Tri-County Regional Planning Commission
3135 Pine Tree Rd, Ste. 2C
Lansing, MI 48911

March 3, 2018

Expiration date:
 12/31/2018

Microbial Source Tracking (non-culture based)

Analysis Unit	Analysis Unit	Cost per Sample
Sample filtration, freezing and storage at -80°C	1 sample	\$15.75
Targets:		
Human and bovine bacteroides (multiplex marker) ddPCR assay	1 sample	\$84.25
Pig bacteroides marker (single marker) ddPCR assay	1 sample	\$84.25

All costs include 26% University F&A (overhead) rate of 26%

Costs for analysis are described on a per sample basis.

Thank you for your interest in working with the Water Quality Laboratory at Michigan State University.

Joan B. Rose
 Michigan State University
 Department of Fisheries & Wildlife
 Natural Resources Building
 East Lansing, MI 48824-1325
 Tel: 517-432-4412
 Fax: 517-432-1699

Water Sample collection for Microbial Source Tracking

Materials Needed:

1. 1 Liter sterile Nalgene bottles, or equivalent wide mouth polypropylene bottles
2. Cooler
3. Ice / frozen coolant materials
4. Gloves
5. Bleach
6. Reagent grade water (e.g. autoclaved Milli-Q water)
7. Permanent ink marking pen for labeling
8. Chain of Custody document
9. Field sample collection sheet

Equipment Sterilization

1. Rinse water sampling bottles using 10% v/v bleach
2. Rinse three times with reagent-grade water
3. Close and autoclave at 120 degrees for 15 minutes

Water sample collections

- **Collect a minimum of 1 Liter sample of water at each site**
1. Wear gloves, get 1L sterile Nalgene bottle
 2. Place label tape on bottle and label with sample identification in permanent marker.
 3. Record sample collection date, time, and site identification on the chain of custody document
 4. Collect water samples by grab method
 5. Wear gloves for sampling and do not touch the rim or inside of the cap or bottle.
 6. Place the bottle into the flow of water.
 7. After filling bottle, replace the cap and tighten the cap to prevent leakage.
 8. Place the bottle in the cooler with ice pack
 9. Change gloves at each sample collection site
 10. Repeat sample collection procedure until all samples have been collected
 11. Put samples on a cooler with ice packs and transport them to the laboratory for filtration
 12. **Ideally, samples arrive at the laboratory on the same day as collection.** However, for distant sites that must be shipped to the laboratory, use overnight shipping option so that sample arrives at the laboratory within 24 hours of sample collection
 - If shipping via UPS/FEDEX/USPS, **sign and date** the chain of custody form in the “Sample relinquished” box at the bottom of the form. Place the form in a plastic ziplock bag or waterproof envelope and enclose it with the samples to be shipped

Appendix B.3 – WaterTech Supplementals

SUBMITTING SAMPLES

GENERAL:

OFFICE AND SAMPLE DROP HOURS:

9 a.m. to 5:30 p.m. Weekdays. Other times by appointment. An after hours sample drop is available for certain sample types (call in advance for instructions).

SAMPLE CONTAINERS:

Prepared sample containers are provided for pickup. Shipping of containers may be subject to a shipping and handling fee. Please provide advance notice to allow us time to prepare your request for bottles. Sample containers not returned with samples will be invoiced at our cost including preparation, shipping, and handling.

NORMAL TURN AROUND TIMES (TAT):

Most testing is completed and reports issued within 5 business days. However TAT can vary from 1 day to 2 weeks and sometimes longer depending on the test(s) requested.

We urge you to check with us on the projected TAT if you are under a deadline. It is our goal to perform work in an efficient manner while maintaining proper controls and accuracy. Expedited work involves additional effort and consumable supplies. Consequently, rush orders are subject to an expedite fee to cover the additional costs involved.

PAYMENT TERMS:

Residential customers and new commercial customers: Payment is due when sample is sent in for testing, or when a home sample kit is ordered for shipment.

Approved account customers in good standing: Net 30 days. Past due balances are subject to a carrying fee and loss of account privileges on new work.

[^ top](#)

COMMERCIAL & MUNICIPAL CUSTOMERS:

Contact us by telephone at 517-548-2505 to obtain sample bottles and any particular instructions for your request. Please have your list of tests at hand when you call. We will try to assist you if you are unsure what your test requirements are.

[^ top](#)

HOME SAMPLING CUSTOMERS:

1. Determine the test(s) needed from the table below. Call us at 517-548-2505 to obtain sample kits using the test codes noted. Please have your credit card and shipping information ready.

2. Collect samples following the instructions provided and accurately fill out the chain-of-custody order form.
3. Submit samples and order form using the best method of delivery. We need to receive samples within the holding time specified in the table below.

That's it! We do the rest.

RESIDENTIAL WATER SERVICE SELECTION GUIDE:

Water Tech offers singular test and test packages to address your specific needs and keep testing fees to a minimum. (Condensed List)

TEST DESCRIPTION - SINGLE TESTS	TESTS PERFORMED	TEST CODE	LAB FEE°	HT°° TAT°°°
BACTERIOLOGICAL POTABILITY Required for new and repaired wells. Suggested as annual check of potability. Often required for mortgage purposes and home sales.	TOTAL COLIFORM	TC	\$22	HT 30 HOURS TAT 2 DAYS
NITRATE CONTAMINATION High levels often caused by influence from septic leachate. Often required for new wells, mortgage purposes, and home sales.	NITRATE	NO3	\$15	HT 48 HOURS TAT 2 DAYS
ARSENIC Arsenic is a naturally occurring contaminant. The US EPA reduced the level considered safe from 50 parts per billion (PPB) down to 10 PPB due to health effects.	ARSENIC	AS	\$25	HT 14 DAYS TAT 5 DAYS
LEAD Lead is a common metal that often enters the water supply by the corroding away of plumbing materials in contact with the water. Children and pregnant woman are most at risk of high levels due to the ill effects with the brain, red blood cells, and kidneys.	LEAD	PB	\$25	HT 14 DAYS TAT 5 DAYS

PACKAGE TESTS				
INTERNET SPECIAL MOST FOR THE LEAST Coliform, Nitrate, Iron, Hardness, Fluoride, Sodium, Chloride, Sulfate, Lead, and Arsenic Includes all of these tests to describe your water's suitability for home use and healthy living.	PT-7		\$135	HT 30 HOURS TAT 5 DAYS
FHA MORTGAGE APPROVAL Package test includes Total Coliform (bacteria), E. coli, Nitrate, Nitrite, Nitrate + Nitrite, and Lead	FHA		\$75	HT 30 HOURS TAT 5 DAYS
LEAD DOUBLE SAMPLE A first draw sample to determine the lead concentration caused by corroding pipes and plumbing fixtures and a second sample to determine the lead concentration from the water source.	PB2		\$50	HT 14 DAYS TAT 5 DAYS

VOLATILE ORGANIC CHEMICALS Request when there is suspicion of machine tool solvents or petroleum fuel contamination due to leaking fuel tanks, spillage, or unlawful disposal practices. This package includes Benzene, Toluene, Xylene, Tetrachloroethene, plus 55 other volatile chemicals.	VOC	\$120	HT 5 DAYS TAT 7- 10 DAYS
HARDNESS, IRON, PH These test results will determine whether you need a water softener or use the test results for adjusting a water softener or determining its performance.	WS	\$37	TAT 3 DAYS

° A Shipping and handling fee of \$8.00 will be added to the lab fee above per order for sample kits shipped out within Michigan, Ohio, Illinois, and Wisconsin and \$12.00 for other areas within the continental US.
°° HT: Holding Time. Customer needs to submit sample to us so it is received 4 hours prior to the expiration of this time. Otherwise test results may be qualified and not accurately represent the water.
°°°TAT: Turn-Around-Time. The approximate length of time to complete the test(s) and issue the report. Request to expedite orders requires advanced approval and is subject to surcharge.

[^ top](#)

Greater Lansing Regional Committee for Stormwater Management

Appendix C

Field Data Sheet

Appendix C.1 -- Field Data Sheet



May 2020

WET WEATHER MONITORING FIELD DATA SHEET



OUTFALL ID: _____ **SAMPLE DATE (MM/DD/YYYY):** _____

CONVEYANCE TYPE (material/size): _____ WATERSHED: GR RC
 GPS INFO: Lat _____ Long _____ GPS Unit: _____ PERMITTEE/MUNICIPALITY: _____
 PRINTED NAMES of Sampling Team: _____
 SIGNATURE of lead sampler: _____ Sampling AGENCY (consultant/permittee): _____

SAMPLE INFORMATION VISITED, NOT SAMPLED (TIME: _____)

SAMPLE ID(s) [# of Bottles]: _____

FLOW ESTIMATION:

- USGS Gauge height/stage _____ ft Q (cfs) = _____
 [Gauge Name/No.: _____]
- Calculation by visual measurement: Q (cfs) = _____

SITE CONDITIONS

PRECIPITATION:
NOW: None Drizzle/Sprinkle Rain Hail/Snow
(A measurable rainfall event is an event with >0.1 inch of rain)
 [~ Storm Start Time: _____]
 [~ Storm End Time: _____]
 Total Rainfall Estimate: _____

ODOR: None Sulfides Sewage Smoke
 Petroleum Other: _____
 Floatables _____ Settleables _____
 Vegetation _____ Staining _____

COLOR: Colorless Green Yellow Brown Other

CLARITY: Clear Cloudy Murky
Sheen Present: Yes No

TRASH: Yes No
 From: Flows Litter Dumping Other _____

Observations/Notes: Photograph(s)