



# Northeast Ohio Regional Sewer District

## Level 3 Project Study Plan

### *2024 East Side Tributaries Environmental Monitoring*

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2024 East Side Tributaries Environmental Monitoring  
February 29, 2024

List of Acronyms

|       |                                                 |
|-------|-------------------------------------------------|
| ALU   | Aquatic Life Use                                |
| AOC   | Area of Concern                                 |
| BUI   | Beneficial Use Impairment                       |
| CSO   | Combined Sewer Overflow                         |
| ECT   | Euclid Creek Tunnel                             |
| DST   | Dugway Storage Tunnel                           |
| EMSC  | Environmental Maintenance Service Center        |
| EPA   | Environmental Protection Agency                 |
| GPS   | Global Positioning System                       |
| HUC   | Hydrologic Unit Code                            |
| IBI   | Index of Biotic Integrity                       |
| ICI   | Invertebrate Community Index                    |
| MIwb  | Modified Index of Well-Being                    |
| NEORS | Northeast Ohio Regional Sewer District          |
| NPDES | National Pollution Discharge Elimination System |
| QDC   | Qualified Data Collectors                       |
| QHEI  | Qualitative Habitat Evaluation Index            |
| RM    | River Mile                                      |
| TMDL  | Total Maximum Daily Load                        |
| USGS  | United States Geological Survey                 |
| WQS   | Water Quality Standards                         |
| WQIS  | Water Quality & Industrial Surveillance         |
| WWTP  | Wastewater Treatment Plant                      |

## (1) Objectives

The objective of this study is to conduct water quality monitoring on Euclid Creek and Nine-Mile Creek as part of the Northeast Ohio Regional Sewer District (NEORS) general watershed monitoring program. This study will assess fish and macroinvertebrate community biology, fish habitat, and water chemistry at three sites in the Euclid Creek watershed and two sites in the Nine-Mile Creek watershed.

Water quality improvements in both streams have been long-term targets of the NEORS "Project Clean Lake" infrastructure projects. The specific infrastructure projects that have anticipated impacts on streams in this study include the Euclid Creek Tunnel (ECT), the Dugway Storage Tunnel (DST), and the East 140<sup>th</sup> Street Relief and Consolidation Sewer, among other associated relief sewer and regulator upgrades.

The four mainstem sampling locations on Euclid Creek and Nine-Mile Creek are required to be monitored as part of the Ohio EPA National Pollution Discharge Elimination System (NPDES) permit # 3PA0002\*JD. This study will track potential water quality improvements due to NEORS combined sewer overflow (CSO) control measures and the completion of the ECT and the DST. RM 1.00 of the Euclid Creek East Branch Tributary at River Mile (RM) 1.55 is being evaluated to document baseline conditions prior to a potential stream restoration project. Tentative plans may include the removal and/or retrofitting of an in-line stormwater retention pond.

The ECT and DST were completed in 2016 and 2020, respectively, with a total CSO storage capacity of 105 million gallons. During heavy rain events, flows that would normally enter the receiving waterbody through CSO discharges are now re-directed into the ECT or DST to store combined sewage until flows recede at the Easterly Wastewater Treatment Plant (WWTP). This combined sewage is then pumped to the Easterly WWTP via NEORS interceptor sewers for full treatment before discharging into Lake Erie. Three NEORS CSOs tributary to Euclid Creek and two CSOs tributary to Nine-Mile Creek are now controlled by the completion of the ECT and DST, which will reduce the number and volume of discharges from these outfalls. The results of this study will be compared to water chemistry and biological data collected prior to ECT and DST completion to evaluate how a reduction of CSO volumes may impact the water quality and biological communities in the receiving waters.

In addition, the NEORS partnered with the Chagrin River Watershed Partners and provided \$435,000 in matching funds, as well as in-kind services for a \$274,273 Ohio EPA section 319 (nonpoint source program) grant funded project on Nine-Mile Creek. The upstream watershed is highly urbanized and causing severe bank erosion due to the altered flow regime. This project, completed on July 1, 2023, used a natural channel design and bioengineering methods to stabilize the streambanks and improve floodplain connectivity, while replacing one stormwater outfall. In total, 2,200 linear feet of stream bank and 3.2 acres of riparian enhancement were completed. The Nine-Mile Creek RM 0.40 sampling location is located within the restored stream reach and will

assess direct benefits of the project. More information on this project is available at <https://crwp.org/projects/nine-mile-creek/>.

Biological assessments on Nine-Mile Creek RM 0.40 will also document the effects of multiple biosolids releases at the Quasar Bioenergy facility in 2023. Biosolids released from Quasar entered Nine-Mile Creek and lowered dissolved oxygen concentrations below the chemical Water Quality Standards (WQS) Aquatic Life Use (ALU) criteria. At least one incident resulted in a fish kill documented by the Ohio Department of Natural Resources. The 2024 water quality assessment on Nine-Mile Creek will assess the effects of the biosolids release on the aquatic life, approximately one year after the incident occurred.

Sampling will be conducted by the NEORSD's Environmental Assessment group in the Water Quality and Industrial Surveillance (WQIS) Division. Samples will be collected by NEORSD Level 3 Qualified Data Collectors (QDC) certified by the Ohio Environmental Protection Agency (EPA) in Fish Community Biology, Benthic Macroinvertebrate Biology, Chemical Water Quality, and Stream Habitat Assessment. Sampling will occur from June 15 through September 30, 2024 (through October 15 for fish sampling assessments), as required in the Ohio EPA Biological Criteria for the Protection of Aquatic Life Volume III (1987b)<sup>1</sup>.

Fish and macroinvertebrate community health will be evaluated using Ohio EPA's Index of Biotic Integrity (IBI), Modified Index of Well-Being (MIwb), and Invertebrate Community Index (ICI). An examination of the biological communities will be used in conjunction with water quality data, the NEORSD Macroinvertebrate Field Sheet, and Qualitative Habitat Evaluation Index (QHEI) results to identify impacts to biological communities. Water chemistry sampling will be collected per methods outlined by the Ohio EPA *Surface Water Field Sampling Manual for water quality parameters and flows* (Ohio EPA 2023a). Both water chemistry and biological data will be compared to the Ohio EPA Water Quality Standards to determine attainment of applicable uses (Ohio EPA 2023b). All stream locations in this study are also part of the larger Cuyahoga Area of Concern (AOC) and data may be compared to beneficial use impairment (BUI) removal criteria.

The NEORSD has a Yellow Springs Instruments EXO2 water quality sonde station at Euclid Creek RM 0.65 that records water quality data every 15 minutes. The water quality sonde data will evaluate diel measurements of dissolved oxygen, pH, temperature, and conductivity and may supplement other water quality data.

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<sup>1</sup> See Appendix H for a list of references.

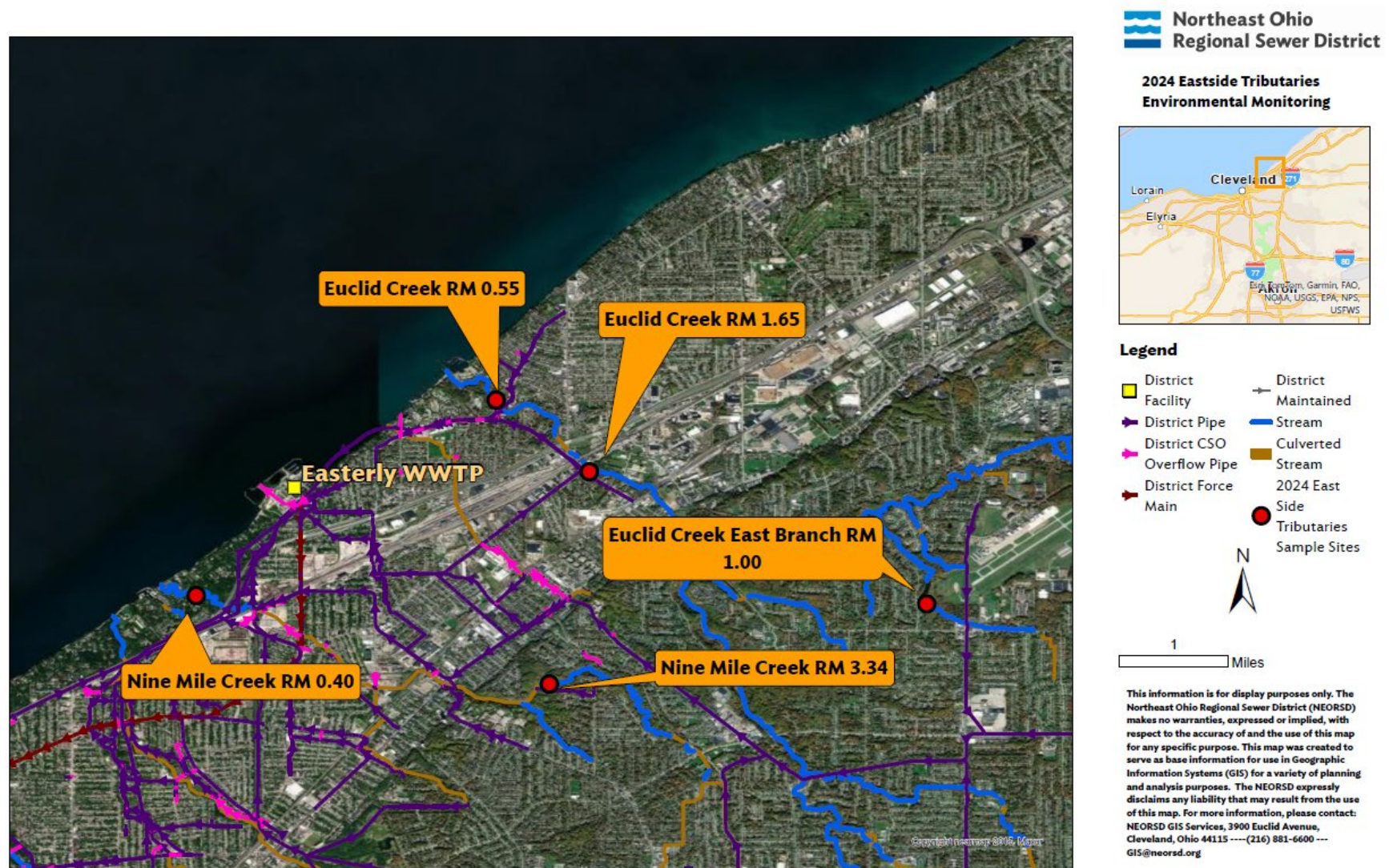
(2) Non-Point/Point Sources

| <b>Table 1. Potential Sources of Pollution</b> |                         |
|------------------------------------------------|-------------------------|
| Point Sources                                  | Nonpoint Sources        |
| Combined Sewer Overflows                       | Agricultural runoff     |
| Storm Sewer Outfalls                           | Golf courses            |
| Home Septic Systems                            | Highway runoff          |
| Other NPDES permitted facilities               | Sedimentation           |
|                                                | Spills                  |
|                                                | Urban stormwater runoff |

A map has been provided below (Figure 1) to show the wastewater collection system that may be influencing the water quality at each sample location. These sources, along with the ones listed in the table above, may be impacting the health of the fish, benthic macroinvertebrate communities, and water chemistry in the Cuyahoga River watershed.

(6) Sampling Locations

The following electrofishing and macroinvertebrate sampling locations will be surveyed during the 2024 field season and are summarized in Table 2 below. Benthic macroinvertebrate and water chemistry collection sites are located near the midpoint of each electrofishing zone, indicated by river mile, unless otherwise noted. GPS coordinates are recorded at the downstream end of each sampling zone.



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| Table 2. 2024 East Side Tributaries Water Quality Monitoring Locations |            |            |          |           |                                |                                              |                                                                                                                                       |
|------------------------------------------------------------------------|------------|------------|----------|-----------|--------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Description                                                            | Station ID | River Mile | Latitude | Longitude | Drain. Area (mi <sup>2</sup> ) | HUC-12                                       | Purpose                                                                                                                               |
| Euclid Creek East Branch Tributary at River Mile 1.55 (19-041-002)     |            |            |          |           |                                |                                              |                                                                                                                                       |
| Upstream of Mayfair Lake                                               | 200145     | 1.00       | 41.5563  | -81.7116  | 0.88                           | 041100030503<br>Euclid Creek                 | Evaluate water chemistry, fish, habitat, and macroinvertebrates prior to stream restoration project.                                  |
| Euclid Creek (19-041-000)                                              |            |            |          |           |                                |                                              |                                                                                                                                       |
| Upstream of St. Clair Ave.*                                            | 504250     | 1.65       | 41.5738  | -81.5470  | 21.80                          | 041100030503<br>Euclid Creek                 | Evaluate water chemistry, fish, habitat, and macroinvertebrates.                                                                      |
| Downstream of Lakeshore Blvd.*                                         | F01A47     | 0.55       | 41.5833  | -81.5470  | 23.00                          |                                              |                                                                                                                                       |
| Nine-Mile Creek (19-040-000)                                           |            |            |          |           |                                |                                              |                                                                                                                                       |
| Upstream of Belvoir*                                                   | 301435     | 3.34       | 41.5457  | -81.5531  | 0.70                           | 041100030504<br>Doan Brook-Frontal Lake Erie | Evaluate water chemistry, fish, habitat, and macroinvertebrates (qual only).                                                          |
| Upstream of Lakeshore Blvd.*                                           | 301432     | 0.40       | 41.5573  | -81.5991  | 11.80                          |                                              | Evaluate water chemistry, fish, habitat, and macroinvertebrates after stream restoration completion and the Quasar Biosolids release. |
| *Sampling locations are required by Ohio EPA Permit 3PA0002*JD         |            |            |          |           |                                |                                              |                                                                                                                                       |

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## 2024 NEORSD Watershed Monitoring Study Plan

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### List of Acronyms

|        |                                                 |
|--------|-------------------------------------------------|
| DELTs  | Deformities, Eroded Fins, Lesions & Tumors      |
| EPA    | Environmental Protection Agency                 |
| GPS    | Global Positioning System                       |
| HD     | Hester-Dendy                                    |
| HUC    | Hydrologic Unit Code                            |
| IBI    | Index of Biotic Integrity                       |
| ICI    | Invertebrate Community Index                    |
| LIBI   | Lacustrary Index of Biotic Integrity            |
| LICI   | Lacustrary Invertebrate Community Index         |
| L-QHEI | Lacustrary Qualitative Habitat Evaluation Index |
| MIwb   | Modified Index of Well-Being                    |
| NEORSD | Northeast Ohio Regional Sewer District          |
| ODNR   | Ohio Department of Natural Resources            |
| PVC    | Polyvinyl Chloride                              |
| PVDF   | Polyvinylidene Fluoride                         |
| QDC    | Qualified Data Collector                        |
| QHEI   | Qualitative Habitat Evaluation Index            |
| RM     | River Mile                                      |
| RPD    | Relative Percent Difference                     |
| SOP    | Standard Operating Procedure                    |
| USGS   | United States Geological Survey                 |
| WQIS   | Water Quality & Industrial Surveillance         |

(3) Parameters Covered

Fish specimens will be identified to species level, weighed, counted and examined for the presence of external anomalies including DELTs (deformities, eroded fins, lesions and tumors). An Ohio EPA Fish Data Sheet (Appendix A) will be completed during each assessment. Quantitative fish sampling is expected to be conducted at all locations.

Macroinvertebrate community assemblages will be collected from each location. An external Level 3 Qualified Data Collector for Benthic Macroinvertebrate Biology Identification will identify and enumerate the specimens collected from each site<sup>1</sup>. All specimens will be identified to the lowest practical taxonomic level as recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987b)<sup>2</sup>. The NEORSD Macroinvertebrate Field Sheet (Appendix A) will be completed at each site during sample retrieval or when qualitative sampling is conducted.

Stream habitat will be measured by scoring components of the QHEI at all locations, including the substrate, instream cover, channel morphology, riparian zone, bank erosion, pool/glide and riffle/run quality and gradient. The Lacustrary QHEI (L-QHEI) will be performed at sites that are affected by the water level of Lake Erie. Examples of the Ohio EPA field sheets for the QHEI and the L-QHEI can be found in Appendix A.

Water chemistry samples will be collected at each electrofishing/macroinvertebrate sampling site included in the study. Water chemistry samples will be analyzed by NEORSD's Analytical Services Division. Appendix B lists the parameters to be tested along with the detection limits and practical quantitation limits. Field measurements for dissolved oxygen, pH, temperature, conductivity and turbidity will also be performed. A Surface Water Condition Sampling Field Data Form will be completed at each site during each sampling event (Appendix A).

Benthic and water column chlorophyll *a* samples may be collected from stream locations. Chemical and physical water quality parameters to be measured in conjunction with the chlorophyll *a* samples include total phosphorus, dissolved reactive phosphorus, nitrate+nitrite, ammonia, alkalinity, turbidity and suspended solids. In the Cuyahoga River, YSI EXO2 data sondes may be installed around the time that this sampling is conducted to more frequently monitor dissolved oxygen, temperature, conductivity, specific conductance and pH.

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<sup>1</sup> The contractor responsible for doing this work as not been identified yet. Once this contract is awarded, their contact information will be submitted.

<sup>2</sup> See Appendix H for a list of all references.

(4) Field Collection and Data Assessment Techniques

Field collections for fish will be conducted at all stream locations unless noted in the sample location table for each study. Sampling will be conducted using longline, tote barge, backpack, or boat electrofishing techniques and will consist of shocking all habitat types within a sampling zone. Headwater and wading sites, which are 0.15 and 0.20 kilometers in length, respectively, will be surveyed by moving from downstream to upstream. Boat sites, which are 0.50 kilometers in length, will be surveyed by moving from upstream to downstream. The stunned fish will be collected and placed into a live well for later identification. The longline, tote barge, backpack, and boat electrofishing zones will be assessed one to three times during the field season (June 15 - October 15).

Fish will be identified to the species level, weighed, counted, and examined for the presence of external anomalies including DELTs. Fish easily identified (commonly collected from year to year) will be returned to the site from which they are collected. Fish species that are difficult to identify will be brought back to the laboratory for verification by NEORSD Level 3 Fish Qualified Data Collectors (QDC). If necessary, vouchers will be sent to The Ohio State University Museum of Biological Diversity for verification by the Curator and/or Associate Curator of Fish. Voucher specimens will be collected as described in section (14). Endangered species and those too large for preservation will not be collected as voucher specimens but will instead be photographed. Photographed vouchers will include features that permit definitive identification of the particular species.

Fish will be preserved in 10 percent formalin in the field, soaked in tap water for 24 to 48 hours after 5 to 7 days, then transferred to solutions of 30 and 50 percent ethanol for 5 to 7 days each and, finally, to 70 percent ethanol for long-term storage. Specimens larger than six inches will be slit along the right side and then soaked in formalin for approximately 10 to 14 days before being transferred to water and solutions of 30, 50 and 70 percent ethanol. Label information will include location (description and coordinates), date, time, collectors' names and sample identification code for each specimen collected.

Macroinvertebrate sampling will be conducted using quantitative and qualitative sampling techniques. Quantitative sampling will be done using a modified Hester-Dendy multi-plate artificial substrate sampler (HD) that is colonized for a six-week period. Multiple HD samplers may be installed at one or all sampling locations in case samplers are lost due to vandalism, burial, etc. or for the purposes of providing a replicate sample. Qualitative sampling will be conducted using a D-frame dip net when HD samplers are retrieved. The NEORSD Macroinvertebrate Field Sheet will be completed during each HD retrieval.

Macroinvertebrate voucher specimens for both quantitative and qualitative sampling will be collected as described in section (14). Macroinvertebrate community assemblages collected will be shipped to an external Level 3 Qualified Data Collector for Benthic Macroinvertebrate Biology Identification for identification and enumeration. The Level 3

QDC will identify specimens to the lowest practical taxonomic level as recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987b).

A detailed description of the sampling and analysis methods utilized in the fish community and macroinvertebrate surveys, including calculations of the IBI, MIwb, and ICI, can be found in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volumes II* (1987a) and *III* (1987b). Methods for assessing fish and macroinvertebrate communities in lacustrine zones can be found in Ohio EPA's draft *Biological Criteria for the Protection of Aquatic Life, Volume IV* (2024).

The QHEI, as described in Ohio EPA's *Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)* (2006) will be used to assess aquatic habitat conditions at each sample location. The L-QHEI will be used where appropriate and will follow Ohio EPA's *Methods of Assessing Habitat in Lake Erie Shoreline Waters Using the Qualitative Habitat Evaluation Index (QHEI) Approach (Version 2.1)* (2010).

Water chemistry sampling may occur across a variety of flow conditions. Techniques used for water chemistry sampling and chemical analyses will follow the *Surface Water Field Sampling Manual for water quality parameters and flows* (Ohio EPA, 2023a). Chemical water quality samples from each site will be collected with at least one 4-liter disposable polyethylene cubitainers with disposable polypropylene lids and two 473-mL plastic bottles. Water samples collected for analysis of dissolved reactive phosphorus will be filtered using a 0.45-µm PVDF syringe filter and will be collected in a 125-mL plastic bottle. Bacteriological samples will be collected in a sterile plastic bottle preserved with sodium thiosulfate. All water quality samples will be collected as grab samples. Duplicates and replicates will together comprise not less than 5% of total samples collected for each study plan. Field blanks will also comprise not less than 5% of the total samples collected for each study plan, for a total frequency of quality control samples of not less than 10% of the total samples collected. With the exception of bacteriological duplicate/replicate samples, the acceptable percent RPD will be based on the ratio of the sample concentration and detection limit (Ohio EPA, 2023b): Acceptable % RPD =  $[(0.9465X^{-0.344}) * 100] + 5$ , where X = sample/detection limit ratio. For bacteriological samples, duplicate/replicate samples more than 5x apart from one another (%RPD > 133.3%) will be rejected in accordance with the Ohio EPA approved method for data validation of bacteriological samples outlined in Section F of the *Ohio 2022 Integrated Water Quality Monitoring and Assessment Report* (Ohio EPA, 2022). Those RPDs that were higher than acceptable may indicate potential problems with sample collection and, as a result, the data will not be used for comparison to the water quality standards. Acid preservation of the samples, as specified in the NEORS D laboratory's standard operating procedure for each parameter, will occur in the field. Appendix B lists the analytical method, method detection limit and practical quantitation limit for each parameter analyzed. Field analyses include the use of either a YSI EXO1 sonde, YSI EXO2 sonde or YSI 600XL sonde to measure dissolved oxygen (DO), water temperature, conductivity and pH; and when necessary, a Hanna HI 98129 meter to

measure pH and a Hach HQ30d meter with LDO101 probe to measure DO. Field turbidity will be measured using a Hach 2100Q Turbidimeter. Specifications for these meters have been included in Appendix C.

Benthic and water column chlorophyll *a* samples may be collected if time and resources allow. Sampling methods will follow those detailed in the NEORSD *Chlorophyll a Sampling and Field Filtering Standard Operating Procedure* (SOP-EA001-02). A Chlorophyll *a* Sampling Field Sheet will be completed for each site where benthic chlorophyll *a* samples are collected (Appendix D). Water chemistry grab samples will be collected at the same time using the methods discussed previously and will be analyzed for nutrients, turbidity, alkalinity and suspended solids. Additionally, in conjunction with chlorophyll *a* sampling events, approximately 24-hours prior to each event, YSI EXO2 data sondes may be deployed at sampling locations. If installed, each data sonde will record, at fifteen-minute intervals, dissolved oxygen concentration, pH, temperature, and conductivity from the time the data sonde is deployed until the time it is retrieved. These data sondes will be placed in the stream by inserting each one into a 4.5-inch PVC pipe with holes drilled into the sides of the lower third of the pipe to allow water to pass through it. The data sondes will remain at the sampling location for approximately 24-hours or longer following collection of the chlorophyll *a* samples.

Where possible, data assessment will include an analysis of temporal and spatial trends in the collected data. Species assemblages and individual metrics will be analyzed. Graphs that show current and historic QHEI, L-QHEI, IBI, LIBI, MIwb, ICI, and LICI scores and how these scores compare to attainment status of biocriteria will be prepared. Water chemistry data collected will be compared to Ohio water quality standards to determine whether any excursions from the applicable water quality criteria have occurred. It will also be used to determine any relationships among individual parameters and chlorophyll *a* concentrations. Comparisons between water quality and biological community health will only be made if at least three water quality samples have been collected from that site.

(5) Stream Flow Measurement

Stream flow will be recorded for all locations during each electrofishing pass utilizing data from the United States Geological Survey (USGS) gauge station nearest the stream location, if applicable.

Stream flow will be measured with a HACH FH950 Flow Meter or Ott MF Pro Meter, which measure flow in feet per second, when HD samplers are installed and retrieved. The specifications for the flow meters can be found in Appendix C.

(7) Schedule

One to three electrofishing surveys will be conducted at each site between June 15 and October 15, 2024. Surveys will be conducted at least three weeks apart. Specific dates

have not been scheduled. River flow and weather conditions will be assessed weekly to determine when each electrofishing pass will be conducted.

Artificial substrate samplers will be installed at stream locations between June 15 and August 19, 2024, and retrieved six weeks later. Qualitative macroinvertebrate sampling will be conducted one time at all sites. Specific dates have not been scheduled. River flow and weather conditions will be assessed weekly to determine when the HD sampler installations and retrievals and qualitative sampling will be conducted.

QHEI, and, if necessary, L-QHEI habitat evaluations will be conducted one time between June 15 and October 15, 2024. QHEI evaluations will be conducted around the same time as one of the electrofishing surveys.

Water chemistry samples will be collected a minimum of three times from stream locations between June 15 and October 15, 2024.

Benthic and water column chlorophyll *a* samples may be collected at least one time from stream locations between June 15 and October 15, 2024. These samples will be collected under low-flow conditions.

(8) QA/QC

Quality assurance and quality control of sampling and analysis methods for habitat, fish, and macroinvertebrate evaluations will follow Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volumes II* (1987a) and *III* (1987b), *Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)* (2006), draft *Biological Criteria for the Protection of Aquatic Life: Volume IV: Fish and Macroinvertebrate Indices for Ohio's Lake Erie Nearshore Waters, Harbors, and Lacustraries* (2024) and *Methods of Assessing Habitat in Lake Erie Shoreline Waters Using the Qualitative Habitat Evaluation Index (QHEI) Approach (Version 2.1)* (2010)

Electrofishing equipment will be used according to the guidelines listed in the operation and maintenance manual provided by Smith-Root, Inc. Malfunctioning equipment will not be used to collect data. Proper steps will be taken to correct any problems as soon as possible, whether by repairing in the field, at the NEORSD Environmental & Maintenance Services Center, or by contacting the supplier or an appropriate service company.

Fish species difficult to identify will be brought back to the laboratory for verification by Level 3 Fish QDC's, and if necessary, sent to The Ohio State University Museum of Biological Diversity for verification by the Curator and/or Associate Curator of Fish. Voucher specimens will be collected as described in section (14). Endangered species and those too large for preservation will not be collected as voucher specimens but will instead be photographed. Photographed vouchers will include features that permit definitive identification of the particular species.

All macroinvertebrate community assemblages from stream locations, except for any replicate samples, will be collected and shipped to an external Level 3 Qualified Data Collector for Benthic Macroinvertebrate Biology Identification for identification and enumeration. All specimens will be identified to the lowest practical taxonomic level as recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987b). All macroinvertebrate specimens will be returned to NEORSD. At least two voucher specimens of each species, when available, will be separated into individual vials and kept as described in section (14). The remaining specimens for each site will be returned in a single container labeled with the site number and collection method and date. All specimens and accompanying chain-of-custody documentation will be retained by NEORSD and stored at the Environmental & Maintenance Services Center for a period not less than ten years.

Water samples obtained for chemical analyses will be collected, preserved (see Section 4), labeled and then placed on ice inside the field truck. The field truck will remain locked at all times when not occupied/visible. Sampling activities, including sample time and condition of surface water sampled, will be entered in a field logbook and on the Surface Water Condition Sampling Field Data Form. The samples will then be delivered immediately to the NEORSD Analytical Services cooler, after which the door to the cooler will be locked, and the samples will be transferred to the custody of Analytical Services. The NEORSD Analytical Services Quality Manual and associated Standard Operating Procedures are provided in Appendix I. Updates, revisions and any information on document control will be sent to Ohio EPA as needed.

For benthic and water column chlorophyll *a* sampling, three filtrations will be performed for each sample. A field filtration blank will be submitted for every 20 samples.

Calibration of YSI 600XL, EXO1, and EXO2 data sondes will be done according to the YSI Environmental Operations Manual. The conductivity will be calibrated first using a 1.413 mS/cm standard. Second, the pH will be calibrated using two different buffers (7 and 10 s.u.). The DO will be calibrated last with an acceptable error of 0.2 mg/L.

If EXO2 sondes are installed in the streams, once they are removed, the accuracy of the data that has been collected will be checked by comparing readings taken by the sondes to known standards. If the measurements taken at this time meet quality control goals, all of the data collected since the last calibration will be considered accurate. The acceptable differences for pH and conductivity will be  $\pm 0.3$  with pH 7 buffer and  $\pm 10\%$  of the conductivity standard, respectively (EPA New England- Region 1, 2005). The acceptable difference for DO will be  $\pm 0.2$  mg/L. If the measurements do not meet quality control goals, best professional judgment will be used to decide if any of the data collected during that period may still be accurate. For example, the data collected from the four locations may be plotted on the same graph, and if it appears that the data points are following similar

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trends, they may be considered accurate. If any data that do not meet quality control goals are used, a rationale for their inclusion will be provided when the data are submitted.

(9) Work Products

Within one year of completion of the project, fish data (species, numbers, weights, pollution tolerances, the incidence of DELT anomalies, IBI or LIBI, MIwb scores), macroinvertebrate data (types and numbers of macroinvertebrates collected and ICI or LICI scores), habitat data (QHEI or L-QHEI raw data and scores) and water chemistry results will be submitted to the Ohio EPA or an Ohio EPA approved data warehouse. Additionally, reports summarizing, interpreting, graphically presenting and discussing the IBI (LIBI, where applicable), MIwb, ICI (LICI, where applicable) and QHEI (L-QHEI, where applicable) scores, chlorophyll *a* results, and any excursions from water quality standards may be prepared for internal use.

(10) Qualified Data Collectors

The following Level 3 Qualified Data Collectors (QDC) will be involved with this study:

| Name                     | Address                                                           | Email Address              | Phone Number | QDC Specialty(s)            |
|--------------------------|-------------------------------------------------------------------|----------------------------|--------------|-----------------------------|
| Seth Hothem <sup>1</sup> | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio<br>44125 | hothems@neorsd.org         | 216-641-6000 | QDC - 00010<br>CWQA/FCB/BMB |
| Brittany Dalton          | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio<br>44125 | daltonb@neorsd.org         | 216-641-6000 | QDC - 01483<br>CWQA         |
| Jeff Harrison            | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio<br>44125 | harrisonj@neorsd.org       | 216-641-6000 | QDC - 01485<br>CWQA         |
| Ron Maichle              | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio<br>44125 | maichler@neorsd.org        | 216-641-6000 | QDC - 00145<br>CWQA/BMB     |
| Mark Matteson            | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio<br>44125 | mattesonm@neorsd.org       | 216-641-6000 | QDC - 01020<br>CWQA/FCB/BMB |
| Christina Miller         | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio<br>44125 | millerchristina@neorsd.org | 216-641-6000 | QDC - 01573<br>CWQA         |
| Denise Phillips          | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio<br>44125 | phillipsd@neorsd.org       | 216-641-6000 | QDC - 01203<br>CWQA         |
| John Rhoades             | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio<br>44125 | rhoadesj@neorsd.org        | 216-641-6000 | QDC - 00008<br>CWQA/FCB/BMB |
| Shawn Robinson           | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio<br>44125 | robinsons@neorsd.org       | 216-641-6000 | QDC - 01486<br>CWQA         |

# 2024 NEORSD Watershed Monitoring Study Plan

March 1, 2024

| Name                                                                                                                                    | Address                                                        | Email Address        | Phone Number | QDC Specialty(s)            |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------|--------------|-----------------------------|
| Eric Soehnlén                                                                                                                           | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | soehnlene@neorsd.org | 216-641-6000 | QDC – 01030<br>CWQA/BMB     |
| Justin Telep                                                                                                                            | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | telepj@neorsd.org    | 216-641-6000 | QDC – 01304<br>CWQA/FCB/BMB |
| Francisco Rivera <sup>2</sup>                                                                                                           | 3900 Euclid Avenue,<br>Cleveland, OH 44115                     | riveraf@neorsd.org   | 216-881-6600 | QDC – 00262<br>CWQA         |
| Kelsey Hickox <sup>2</sup>                                                                                                              | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | hickoxk@neorsd.org   | 216-641-6000 | QDC – 01091<br>CWQA         |
| <sup>1</sup> NEORSD Lead Project Manager<br><sup>2</sup> See acknowledgment letter for conducting water chemistry sampling (Appendix F) |                                                                |                      |              |                             |

The following is a list of persons not qualified as Level 3 QDCs who may be involved in the project. Prior to the start of sampling, the project managers will explain to each individual the proper methods for sampling. Sampling will only be completed under the direct observation of a QDC. The lead project manager will be responsible for reviewing all reports and data analysis prepared by qualified personnel prior to completion.

| Name                    | Address                                                        | Email Address              | Phone Number |
|-------------------------|----------------------------------------------------------------|----------------------------|--------------|
| Chris Abraham           | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | abrahamc@neorsd.org        | 216-641-6000 |
| Laurel Cope             | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | copel@neorsd.org           | 216-641-6000 |
| Laura Ferguson          | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | fergusonl@neorsd.org       | 216-641-6000 |
| Rae Grant               | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | grantr@neorsd.org          | 216-641-6000 |
| Margaret Hodgkiss-Lilly | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | hodgkiss-lillym@neorsd.org | 216-641-6000 |
| Matthew Johnson         | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | johnsonmatthew@neorsd.org  | 216-641-6000 |
| Ryan Parrish            | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | parrishr@neorsd.org        | 216-641-6000 |
| Emma Routh              | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | routhe@neorsd.org          | 216-641-6000 |
| Frank Schuschu          | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | schuschuf@neorsd.org       | 216-641-6000 |
| Wolfram von Kiparski    | 4747 East 49 <sup>th</sup> Street<br>Cuyahoga Hts., Ohio 44125 | vonkiparskiw@neorsd.org    | 216-641-6000 |

## 2024 NEORSD Watershed Monitoring Study Plan

March 1, 2024

| Name                                     | Address                                            | Email Address    | Phone Number |
|------------------------------------------|----------------------------------------------------|------------------|--------------|
| Environmental Compliance Inspector (TBD) | 4747 E. 49th Street,<br>Cuyahoga Heights, OH 44125 | _____@neorsd.org | 216-641-6000 |
| Tyler Sagi                               | 4747 East 49th Street<br>Cuyahoga Hts., Ohio 44125 | sagit@neorsd.org | 216-641-6000 |
| Paraprofessional Intern (TBD)            | 4747 East 49th Street<br>Cuyahoga Hts., Ohio 44125 | _____@neorsd.org | 216-641-6000 |
| Paraprofessional Intern (TBD)            | 4747 East 49th Street<br>Cuyahoga Hts., Ohio 44125 | _____@neorsd.org | 216-641-6000 |
| Paraprofessional Intern (TBD)            | 4747 East 49th Street<br>Cuyahoga Hts., Ohio 44125 | _____@neorsd.org | 216-641-6000 |

### (11) Contract laboratory contact information

All bacteriological and/or chemical sample analysis will be completed by NEORSD's Analytical Services Division. Evidence of NEORSD's Analytical Services current accreditation and method dates can be found in Appendix E. The contact information for NEORSD's Analytical Service Division is:

NEORSD Analytical Services  
Cheryl Soltis-Muth, Manager  
4747 E. 49th Street  
Cuyahoga Heights, Ohio 44056  
soltis-muthc@neorsd.org  
216-641-6000

Any fish that is not positively identified in the field, or at NEORSD, will be sent to The Ohio State University Museum of Biological Diversity for verification by the Curator and/or Associate Curator of Fish. Fish will be identified to the species level.

Mr. Marc Kibbey, Associate Curator of Fish  
1315 Kinnear Road, Columbus, Ohio 43212  
cavender.1@osu.edu / kibbey.3@osu.edu  
614-292-7873

Identification of macroinvertebrates for stream locations will be completed by an external Level 3 Qualified Data Collector for Benthic Macroinvertebrate Biology Identification<sup>3</sup>. Benthic macroinvertebrates will be identified to the lowest practical level as recommended by Ohio EPA (1987b). Contact information for this contractor will be submitted once the contract is awarded.

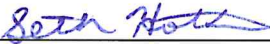
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<sup>3</sup> A letter of acknowledgement of the macroinvertebrate identification responsibilities will be added as an addendum to this study plan, in Appendix F, upon finalization of the macroinvertebrate identification contract.

- (12) Copy of ODNR Division of Wildlife collector's permit  
To be submitted once received from ODNR

(13) Digital Catalog Statement

A digital photo catalog of all sampling locations will be maintained for 10 years and will include photos of the specific sampling location(s), the riparian zone adjacent to the sampling location(s) and the general land use in the immediate vicinity of the sampling location(s).

Print/Signature: Seth Hothem/  Date: 3/1/24

(14) Voucher Specimen Statement

NEORSD will maintain a benthic macroinvertebrate and fish voucher collection which includes two specimens, or appropriate photo vouchers, of each species or taxa collected during the course of biological sampling from any stream within the NEORSD's service area. When benthic macroinvertebrates from multiple surface waters are collected within the same year and identified by the same QDC, one voucher collection will be created to represent the specimens collected from those streams. When fish specimens from multiple surface waters are collected within the same year, one voucher collection will be created to represent the specimens collected from those streams. A separate collection for each sampling event will not be maintained.

NEORSD will provide specimens or photo vouchers to the Director upon request. This collection will be stored at the NEORSD laboratory in the Environmental and Maintenance Services Center.

Print/Signature: Seth Hothem/  Date: 3/1/24

(15) Sample Location Statement

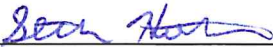
I attest that I will make available any and all sampling location information, including but not limited to; the name of the water body sampled, sampling location latitude and longitude, sampling location river mile where possible, general location information, the U.S. geological survey HUC 8 number and name, and the purpose for data collection at each sampling location.

Print/Signature: Seth Hothem/  Date: 3/1/24

2024 NEORSD Watershed Monitoring Study Plan  
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(16) Additional L3 Data Collector Statement

The Lead Project Manager for all stream locations is approved for all project data types.

Print/Signature: Seth Hothem/  Date: 3/1/24

(17) Trespassing Statement

I have not been convicted or pleaded guilty to a Violation of section 2911.21 of the Revised Code (criminal trespass) or a substantially similar municipal ordinance within the previous five years.

Print/Signature: Seth Hothem/  Date: 3/1/24

Print/Signature: Brittany Dalton/  Date: 3/1/24

Print/Signature: Jeff Harrison/  Date: 3/1/24

Print/Signature: Ron Maichle/  Date: 03-01-24

Print/Signature: Mark Matteson/  Date: 3/1/24

Print/Signature: Christina Miller/  Date: 3/1/24

Print/Signature: Denise Phillips/  Date: 3/1/24

Print/Signature: John W. Rhoades/  Date: 03/01/24

Print/Signature: Shawn Robinson/  Date: 3/1/24

Print/Signature: Eric Soehnen/  Date: 3/01/24

Print/Signature: Justin Telep/  Date: 3/1/24

## Appendix A. Field Forms



FISH DATA SHEET

Sheet ID For Office Use Only

New Station  
(requires lat/long & county)

Mix Zone

Page \_\_\_\_ of \_\_\_\_

Station ID \_\_\_\_\_ River Code \_\_\_\_\_ RM \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

Stream \_\_\_\_\_ Location \_\_\_\_\_

Comments \_\_\_\_\_

Lat \_\_\_\_\_ Long \_\_\_\_\_ County \_\_\_\_\_ ALP \_\_\_\_\_ Time Fished \_\_\_\_\_

Crew \_\_\_\_\_ Netter \_\_\_\_\_ Others \_\_\_\_\_ Sampler Type \_\_\_\_\_

Distance \_\_\_\_\_ Flow \_\_\_\_\_ Temp. C \_\_\_\_\_ Secchi \_\_\_\_\_ Source \_\_\_\_\_ Project \_\_\_\_\_

| Fins Code | Number Weighed | Total Counted | Total Weight | Weights | Counts | DELT ANOMALIES<br>Deformities, Erosions, Lesions, Tumors<br>Multiple DELTs on one fish |   |   |   |   |   |
|-----------|----------------|---------------|--------------|---------|--------|----------------------------------------------------------------------------------------|---|---|---|---|---|
|           |                |               |              |         |        | D                                                                                      | E | L | T | M | * |
| 1         |                |               |              |         |        |                                                                                        |   |   |   |   |   |
|           |                |               |              |         |        |                                                                                        |   |   |   |   |   |
| V         | 10x            |               |              |         |        |                                                                                        |   |   |   |   |   |
| 2         |                |               |              |         |        |                                                                                        |   |   |   |   |   |
|           |                |               |              |         |        |                                                                                        |   |   |   |   |   |
| V         | 10x            |               |              |         |        |                                                                                        |   |   |   |   |   |
| 3         |                |               |              |         |        |                                                                                        |   |   |   |   |   |
|           |                |               |              |         |        |                                                                                        |   |   |   |   |   |
| V         | 10x            |               |              |         |        |                                                                                        |   |   |   |   |   |
| 4         |                |               |              |         |        |                                                                                        |   |   |   |   |   |
|           |                |               |              |         |        |                                                                                        |   |   |   |   |   |
| V         | 10x            |               |              |         |        |                                                                                        |   |   |   |   |   |
| 5         |                |               |              |         |        |                                                                                        |   |   |   |   |   |
|           |                |               |              |         |        |                                                                                        |   |   |   |   |   |
| V         | 10x            |               |              |         |        |                                                                                        |   |   |   |   |   |
| 6         |                |               |              |         |        |                                                                                        |   |   |   |   |   |
|           |                |               |              |         |        |                                                                                        |   |   |   |   |   |
| V         | 10x            |               |              |         |        |                                                                                        |   |   |   |   |   |
| 7         |                |               |              |         |        |                                                                                        |   |   |   |   |   |
|           |                |               |              |         |        |                                                                                        |   |   |   |   |   |
| V         | 10x            |               |              |         |        |                                                                                        |   |   |   |   |   |
| 8         |                |               |              |         |        |                                                                                        |   |   |   |   |   |
|           |                |               |              |         |        |                                                                                        |   |   |   |   |   |
| V         | 10x            |               |              |         |        |                                                                                        |   |   |   |   |   |
| 9         |                |               |              |         |        |                                                                                        |   |   |   |   |   |
|           |                |               |              |         |        |                                                                                        |   |   |   |   |   |
| V         | 10x            |               |              |         |        |                                                                                        |   |   |   |   |   |

\* A-anchor worm; B-black spot; C-licees; F-fungus; N-blind; P-parasites; S-emaciated, W-swirled scales Y-popeye; Z-other

[illegible]

## NEORS Macroinvertebrate Field Sheet

Stream: \_\_\_\_\_ River Mile: \_\_\_\_\_ Year: \_\_\_\_\_  
Location: \_\_\_\_\_ Project: \_\_\_\_\_  
River Code: \_\_\_\_\_ Station ID: \_\_\_\_\_  
Drainage Area (mi<sup>2</sup>): \_\_\_\_\_ Latitude (°N)/Longitude (°W): \_\_\_\_\_  
Site Type: WWH EWH CWH Lacustuary Other: \_\_\_\_\_ Eco-Region: \_\_\_\_\_

### Hester-Dendy Deployment Information

Install Date: \_\_\_\_\_ Crew (QDC Circled): \_\_\_\_\_  
Current at HD (fps): \_\_\_\_\_ Depth (cm): \_\_\_\_\_ Pictures Obtained: Yes No  
Replicate/Reinstall Date: \_\_\_\_\_ Crew (QDC Circled): \_\_\_\_\_  
Current (fps): \_\_\_\_\_ Depth (cm): \_\_\_\_\_ Reason: \_\_\_\_\_

### Sampling/Retrieval Information

Sampling Method: Hester-Dendy Dipnet Ekman (6x6) Other: \_\_\_\_\_  
Sampling Date: \_\_\_\_\_ Crew (QDC Circled): \_\_\_\_\_

OEPA Comment Field Codes: \_\_\_\_\_ Water Temp: \_\_\_\_\_ °C / °F

HD Condition- Current (fps): \_\_\_\_\_ Depth (cm): \_\_\_\_\_ Comments: \_\_\_\_\_

|                                                              |
|--------------------------------------------------------------|
| Minimum<br>Current 0.3 fps.<br>Ideal Current<br>0.7-1.5 fps. |
|--------------------------------------------------------------|

Number of HD Blocks Obtained: \_\_\_\_\_  
Disturbed: Yes No Debris: Yes No  
Silt/Solids: None Slight Moderate Heavy Sample ID: \_\_\_\_\_

Replicate: Current (fps): \_\_\_\_\_ Depth (cm): \_\_\_\_\_ Comments: \_\_\_\_\_

Number of HD Blocks Obtained: \_\_\_\_\_

Disturbed: Yes No Debris: Yes No

Silt/Solids: None Slight Moderate Heavy Sample ID: \_\_\_\_\_

Dipnet- Time Sampled (min): \_\_\_\_\_ X Number of Crew: \_\_\_\_\_ = Total (min): \_\_\_\_\_

Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_ Sample ID: \_\_\_\_\_

Habitats Sampled: Pool Riffle Run Margin Backwater

### River Sampling Conditions

Weather: Clear Partly Cloudy Cloudy Overcast Light Rain Other: \_\_\_\_\_

Canopy (over HD): Open 75 % 50 % 25 % Closed

Flow Condition: Dry Intermittent Interstitial Low Normal Above Normal Flood

Current Velocity: Non-Detect Slow Moderate Fast

Channel Morphology: Natural Channelized Channelized (Recovered) Impounded

Bank Erosion: None Slight Moderate Extensive

Water Clarity: Clear Muddy Tea Milky Other: \_\_\_\_\_

Water Color: None Green Brown Grey Other: \_\_\_\_\_

Evidence of Pollution: \_\_\_\_\_

Potential Pollution Sources: \_\_\_\_\_

Comment Section: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Samples Analyzed By: \_\_\_\_\_ QDC #: \_\_\_\_\_ Date: \_\_\_\_\_

Company/Entity: \_\_\_\_\_

# NEORSD Macroinvertebrate Field Sheet

↓

**Substrate Characteristics**

Cobble is up to 10 in

Gravel Course  
Fine

Sand

Silt

Clay/Hardpan

Detritus

Peat

Muck

Other

Macrophytes

Algae

Artifacts

Compaction (F,M,S)

Depth (Avg)

Width (Avg)

sand

**Physical Characteristics**

*Riffle* Units *Run* Units *Pool* Units

**Predominant Land Use (Left, Right or Both)**

Forest Urban Open Pasture

Shrub Residential/Park Closed Pasture

Old Field Mining/Construction Wetland

Rowcrop Industrial Other \_\_\_\_\_

**Predominant Riparian Vegetation**

*Left* *Right* *Type*

Large Trees

Small Trees

Shrubs

Grass/Weeds

None

Riparian Width

**Margin Habitat**

*Margin Quality:* Good Fair Poor \_\_\_\_\_ %

*Types Present:*

Root Mats Undercut Banks

Tree Roots Shallows Rip Rap

Woody Debris Soft Clay Bulkhead

Macrophytes/Grass Other \_\_\_\_\_

**Riffle Habitat**

*Embedded:* Yes No

*Development:*

Extensive

Moderate

Sparse

Absent

*Quality:*

Good Fair Poor

## Biological Characteristics

| Overall Collection |                                           | Habitat Specific Organisms        |      |          |     |
|--------------------|-------------------------------------------|-----------------------------------|------|----------|-----|
| <i>Est. Amt</i>    | (V= >151; A= 150-101; C= 100-11; R= 10-1) | <i>Riffle:</i>                    |      |          |     |
| /                  | Porifera, Bryozoa                         | Predominant Organism:             |      |          |     |
| / /                | Turbellaria, Oligochaeta, Hirudinea       | Other Common Organisms:           |      |          |     |
| /                  | Isopoda, Amphipoda                        | Density:                          | High | Moderate | Low |
| /                  | Decapoda, Hydracarina                     | Diversity:                        | High | Moderate | Low |
|                    | Baetidae                                  |                                   |      |          |     |
|                    | Heptageniidae                             | <i>Run:</i>                       |      |          |     |
| /                  | Leptohyphidae, Caenidae                   | Predominant Organism:             |      |          |     |
|                    | Other Mayfly                              | Other Common Organisms:           |      |          |     |
| /                  | Zygoptera, Anisoptera                     | Density:                          | High | Moderate | Low |
|                    | Plecoptera                                | Diversity:                        | High | Moderate | Low |
|                    | Hemiptera                                 |                                   |      |          |     |
| /                  | Megaloptera/Neuroptera                    | <i>Pool:</i>                      |      |          |     |
|                    | Hydropsychidae                            | Predominant Organism:             |      |          |     |
| /                  | Philopotamidae/Polycentropodidae          | Other Common Organisms:           |      |          |     |
| /                  | Hydroptilidae, Leptoceridae               | Density:                          | High | Moderate | Low |
|                    | Other Caddisfly                           | Diversity:                        | High | Moderate | Low |
|                    | Lepidoptera                               |                                   |      |          |     |
|                    | Elimidae                                  | <i>Margin:</i>                    |      |          |     |
|                    | Haliplidae                                | Predominant Organism:             |      |          |     |
|                    | Other Beetles                             | Other Common Organisms:           |      |          |     |
|                    | Chironomidae                              | Density:                          | High | Moderate | Low |
| /                  | Tipulidae, Simuliidae                     | Diversity:                        | High | Moderate | Low |
|                    | Other Diptera                             |                                   |      |          |     |
| /                  | Gastropoda, Bivalvia                      | <i>Other Notable Collections:</i> |      |          |     |
|                    | Other                                     |                                   |      |          |     |

V= Very Abundant; A= Abundant; C= Common; R= Rare

**Field Narrative Rating:**

E

VG            G            MG            F            P            VP

**NEORSD Macroinvertebrate Field Sheet**  
**Field Sketch**

Stream: \_\_\_\_\_ River Mile: \_\_\_\_\_ Date: \_\_\_\_\_ QDC Initials: \_\_\_\_\_

**Comment Section (2):** \_\_\_\_\_

\_\_\_\_\_

Stream &amp; Location: \_\_\_\_\_ RM: \_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

Scorers Full Name & Affiliation: \_\_\_\_\_ Northeast Ohio Regional Sewer District  
River Code: \_\_\_\_\_ STORET #: \_\_\_\_\_ Lat./ Long.: \_\_\_\_\_ Office verified location ☐  
(NAD 83 - decimal °) \_\_\_\_\_ 18 \_\_\_\_\_**1] SUBSTRATE** Check ONLY Two substrate TYPE BOXES;  
estimate % or note every type present

Check ONE (Or 2 &amp; average)

| BEST TYPES                                |                                 | OTHER TYPES                             |                                 | ORIGIN                                 |                                          | QUALITY                                 |                                                                                                                                                      |
|-------------------------------------------|---------------------------------|-----------------------------------------|---------------------------------|----------------------------------------|------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> BLDR /SLABS [10] | <input type="checkbox"/> POOL   | <input type="checkbox"/> HARDPAN [4]    | <input type="checkbox"/> POOL   | <input type="checkbox"/> LIMESTONE [1] | <input type="checkbox"/> SILT            | <input type="checkbox"/> HEAVY [-2]     | <div style="border: 1px solid black; border-radius: 10px; width: 40px; height: 40px; margin: 0 auto;"></div> <div>Substrate<br/>Maximum<br/>20</div> |
| <input type="checkbox"/> BOULDER [9]      | <input type="checkbox"/> RIFFLE | <input type="checkbox"/> DETRITUS [3]   | <input type="checkbox"/> RIFFLE | <input type="checkbox"/> TILLS [1]     | <input type="checkbox"/> SANDSTONE [0]   | <input type="checkbox"/> MODERATE [-1]  |                                                                                                                                                      |
| <input type="checkbox"/> COBBLE [8]       |                                 | <input type="checkbox"/> MUCK [2]       |                                 | <input type="checkbox"/> WETLANDS [0]  | <input type="checkbox"/> RIP/RAP [0]     | <input type="checkbox"/> NORMAL [0]     |                                                                                                                                                      |
| <input type="checkbox"/> GRAVEL [7]       |                                 | <input type="checkbox"/> SILT [2]       |                                 | <input type="checkbox"/> HARDPAN [0]   | <input type="checkbox"/> LACUSTURINE [0] | <input type="checkbox"/> FREE [1]       |                                                                                                                                                      |
| <input type="checkbox"/> SAND [6]         |                                 | <input type="checkbox"/> ARTIFICIAL [0] |                                 | <input type="checkbox"/> SANDSTONE [0] | <input type="checkbox"/> SHALE [-1]      | <input type="checkbox"/> EXTENSIVE [-2] |                                                                                                                                                      |
| <input type="checkbox"/> BEDROCK [5]      |                                 |                                         |                                 | <input type="checkbox"/> RIP/RAP [0]   | <input type="checkbox"/> COAL FINES [-2] | <input type="checkbox"/> MODERATE [-1]  |                                                                                                                                                      |
|                                           |                                 |                                         |                                 |                                        |                                          | <input type="checkbox"/> NORMAL [0]     |                                                                                                                                                      |
|                                           |                                 |                                         |                                 |                                        |                                          | <input type="checkbox"/> NONE [1]       |                                                                                                                                                      |

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments \_\_\_\_\_

**2] INSTREAM COVER** Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.**AMOUNT**

Check ONE (Or 2 &amp; average)

|                                                       |                                           |                                                   |                                                |
|-------------------------------------------------------|-------------------------------------------|---------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> UNDERCUT BANKS [1]           | <input type="checkbox"/> POOLS > 70cm [2] | <input type="checkbox"/> OXBOWS, BACKWATERS [1]   | <input type="checkbox"/> EXTENSIVE >75% [11]   |
| <input type="checkbox"/> OVERHANGING VEGETATION [1]   | <input type="checkbox"/> ROOTWADS [1]     | <input type="checkbox"/> AQUATIC MACROPHYTES [1]  | <input type="checkbox"/> MODERATE 25-75% [7]   |
| <input type="checkbox"/> SHALLOWS (IN SLOW WATER) [1] | <input type="checkbox"/> BOULDERS [1]     | <input type="checkbox"/> LOGS OR WOODY DEBRIS [1] | <input type="checkbox"/> SPARSE 5-<25% [3]     |
| <input type="checkbox"/> ROOTMATS [1]                 |                                           |                                                   | <input type="checkbox"/> NEARLY ABSENT <5% [1] |

Comments \_\_\_\_\_

Cover  
Maximum  
20**3] CHANNEL MORPHOLOGY** Check ONE in each category (Or 2 & average)

| SINUOSITY                             | DEVELOPMENT                            | CHANNELIZATION                                     | STABILITY                             |
|---------------------------------------|----------------------------------------|----------------------------------------------------|---------------------------------------|
| <input type="checkbox"/> HIGH [4]     | <input type="checkbox"/> EXCELLENT [7] | <input type="checkbox"/> NONE [6]                  | <input type="checkbox"/> HIGH [3]     |
| <input type="checkbox"/> MODERATE [3] | <input type="checkbox"/> GOOD [5]      | <input type="checkbox"/> RECOVERED [4]             | <input type="checkbox"/> MODERATE [2] |
| <input type="checkbox"/> LOW [2]      | <input type="checkbox"/> FAIR [3]      | <input type="checkbox"/> RECOVERING [3]            | <input type="checkbox"/> LOW [1]      |
| <input type="checkbox"/> NONE [1]     | <input type="checkbox"/> POOR [1]      | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                       |

Comments \_\_\_\_\_

Channel  
Maximum  
20**4] BANK EROSION AND RIPARIAN ZONE** Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

| EROSION                                     |                                               | RIPARIAN WIDTH                                            |                                                    | FLOOD PLAIN QUALITY |  | CONSERVATION TILLAGE |  |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------------------------------------------|---------------------|--|----------------------|--|
| <input type="checkbox"/> NONE / LITTLE [3]  | <input type="checkbox"/> WIDE > 50m [4]       | <input type="checkbox"/> FOREST, SWAMP [3]                | <input type="checkbox"/> CONSERVATION TILLAGE [1]  |                     |  |                      |  |
| <input type="checkbox"/> MODERATE [2]       | <input type="checkbox"/> MODERATE 10-50m [3]  | <input type="checkbox"/> SHRUB OR OLD FIELD [2]           | <input type="checkbox"/> URBAN OR INDUSTRIAL [0]   |                     |  |                      |  |
| <input type="checkbox"/> HEAVY / SEVERE [1] | <input type="checkbox"/> NARROW 5-10m [2]     | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> MINING / CONSTRUCTION [0] |                     |  |                      |  |
|                                             | <input type="checkbox"/> VERY NARROW < 5m [1] | <input type="checkbox"/> FENCED PASTURE [1]               |                                                    |                     |  |                      |  |
|                                             | <input type="checkbox"/> NONE [0]             | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0]        |                                                    |                     |  |                      |  |

Comments \_\_\_\_\_

Indicate predominant land use(s)  
past 100m riparian. 

Riparian  
Maximum  
10

**5] POOL / GLIDE AND RIFFLE / RUN QUALITY****MAXIMUM DEPTH**

Check ONE (ONLY!)

- ☐ > 1m [6]  
☐ 0.7-<1m [4]  
☐ 0.4-<0.7m [2]  
☐ 0.2-<0.4m [1]  
☐ < 0.2m [0]

**CHANNEL WIDTH**

Check ONE (Or 2 &amp; average)

- ☐ POOL WIDTH > RIFFLE WIDTH [2]  
☐ POOL WIDTH = RIFFLE WIDTH [1]  
☐ POOL WIDTH < RIFFLE WIDTH [0]

**CURRENT VELOCITY**

Check ALL that apply

- ☐ TORRENTIAL [-1] ☐ SLOW [1]  
☐ VERY FAST [1] ☐ INTERSTITIAL [-1]  
☐ FAST [1] ☐ INTERMITTENT [-2]  
☐ MODERATE [1] ☐ EDDIES [1]

Indicate for reach - pools and riffles.

**Recreation Potential**

Primary Contact

Secondary Contact

(circle one and comment on back)

Pool /  
Current  
Maximum  
12

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 &amp; average).

☐ NO RIFFLE [metric=0]

| RIFFLE DEPTH                                         | RUN DEPTH                                   | RIFFLE / RUN SUBSTRATE                                          | RIFFLE / RUN EMBEDDEDNESS               |
|------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------|-----------------------------------------|
| <input type="checkbox"/> BEST AREAS > 10cm [2]       | <input type="checkbox"/> MAXIMUM > 50cm [2] | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]     | <input type="checkbox"/> NONE [2]       |
| <input type="checkbox"/> BEST AREAS 5-10cm [1]       | <input type="checkbox"/> MAXIMUM < 50cm [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]   | <input type="checkbox"/> LOW [1]        |
| <input type="checkbox"/> BEST AREAS < 5cm [metric=0] |                                             | <input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0] | <input type="checkbox"/> MODERATE [0]   |
|                                                      |                                             |                                                                 | <input type="checkbox"/> EXTENSIVE [-1] |

Comments \_\_\_\_\_

Riffle /  
Run  
Maximum  
8**6] GRADIENT** (

ft/mi)

**DRAINAGE AREA**(mi<sup>2</sup>)

- ☐ VERY LOW - LOW [2-4]  
☐ MODERATE [6-10]  
☐ HIGH - VERY HIGH [10-6]

%POOL:  %GLIDE:  %RUN:  %RIFFLE:  Gradient  
Maximum  
10

A] SAMPLED REACH

Check ALL that apply

| METHOD                           | STAGE                                                    |
|----------------------------------|----------------------------------------------------------|
| <input type="checkbox"/> BOAT    | 1st-sample pass- 2nd                                     |
| <input type="checkbox"/> WADE    | <input type="checkbox"/> HIGH <input type="checkbox"/>   |
| <input type="checkbox"/> L. LINE | <input type="checkbox"/> UP <input type="checkbox"/>     |
| <input type="checkbox"/> OTHER   | <input type="checkbox"/> NORMAL <input type="checkbox"/> |
|                                  | <input type="checkbox"/> LOW <input type="checkbox"/>    |
|                                  | <input type="checkbox"/> DRY <input type="checkbox"/>    |

DISTANCE

☐ 0.5 Km

☐ 0.2 Km

☐ 0.15 Km

☐ 0.12 Km

☐ OTHER

\_\_\_\_\_

meters

CANOPY

☐ > 85%- OPEN

☐ 55%-<85%

☐ 30%-<55%

☐ 10%-<30%

☐ <10%- CLOSED

CLARITY

| 1st --sample pass--                   | 2nd                      |
|---------------------------------------|--------------------------|
| <input type="checkbox"/> < 20 cm      | <input type="checkbox"/> |
| <input type="checkbox"/> 20-<40 cm    | <input type="checkbox"/> |
| <input type="checkbox"/> 40-70 cm     | <input type="checkbox"/> |
| <input type="checkbox"/> > 70 cm/ CTB | <input type="checkbox"/> |
| <input type="checkbox"/> SECCHI DEPTH | <input type="checkbox"/> |

|           |    |
|-----------|----|
| 1st _____ | cm |
| pass      |    |
| 2nd _____ | cm |

C] RECREATION

AREA DEPTH

POOL: ☐ >100ft<sup>2</sup> ☐ >3ft

B] AESTHETICS

☐ NUISANCE ALGAE

☐ INVASIVE MACROPHYTES

☐ EXCESS TURBIDITY

☐ DISCOLORATION

☐ FOAM / SCUM

☐ OIL SHEEN

☐ TRASH / LITTER

☐ NUISANCE ODOR

☐ SLUDGE DEPOSITS

☐ CSOs/SSOs/OUTFALLS

D] MAINTENANCE

PUBLIC / PRIVATE / BOTH / NA

ACTIVE / HISTORIC / BOTH / NA

YOUNG-SUCCESSION-OLD

SPRAY / SNAG / REMOVED

MODIFIED / DIPPED OUT / NA

LEVEED / ONE SIDED

RELOCATED / CUTOFFS

MOVING-BEDLOAD-STABLE

ARMOURED / SLUMPS

ISLANDS / SCOURD

IMPOUNDED / DESICCATED

FLOOD CONTROL / DRAINAGE

Circle some & COMMENT

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY

HARDENED / URBAN / DIRT&GRIME

CONTAMINATED / LANDFILL

BMPs-CONSTRUCTION-SEDIMENT

LOGGING / IRRIGATION / COOLING

BANK / EROSION / SURFACE

FALSE BANK / MANURE / LAGOON

WASH H<sub>2</sub>O / TILE / H<sub>2</sub>O TABLE

ACID / MINE / QUARRY / FLOW

NATURAL / WETLAND / STAGNANT

PARK / GOLF / LAWN / HOME

ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

$\bar{x}$  width

$\bar{x}$  depth

max. depth

$\bar{x}$  bankfull width

bankfull  $\bar{x}$  depth

W/D ratio

bankfull max. depth

floodprone x<sup>2</sup> width

entrench. ratio

Legacy Tree:

Stream Drawing:

# Lake / Lacustrary (Lentic) QHEI Field Sheet



Environmental  
Protection Agency

QHEI Score:  

RIVERCODE \_\_\_\_\_ RIVERMILE \_\_\_\_\_ WATERBODY \_\_\_\_\_ DISTANCE ASSESSED (m): \_\_\_\_\_

DATE \_\_\_\_\_ LOCATION \_\_\_\_\_

SCORER \_\_\_\_\_ LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ COMMENT \_\_\_\_\_

1) **SUBSTRATE** (Check ONLY Two Substrate TYPE BOXES; Estimate % or note every type present);

LAKE: \_\_\_\_\_ LACUSTRARY: \_\_\_\_\_

| TYPE                                   |  | SHORE   BOTTOM                        |  | SHORE   BOTTOM                            |  | SUBSTRATE ORIGIN                         |  | SUBSTRATE QUALITY                           |  | Substrate<br><div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Max 20 |
|----------------------------------------|--|---------------------------------------|--|-------------------------------------------|--|------------------------------------------|--|---------------------------------------------|--|-------------------------------------------------------------------------------------------------------------|
|                                        |  |                                       |  |                                           |  | Check ONE (or 2 & AVERAGE)               |  | Check ONE (or 2 & AVERAGE)                  |  |                                                                                                             |
| <input type="checkbox"/> BLD/SLABS [7] |  | <input type="checkbox"/> HARDPAN [4]  |  | <input type="checkbox"/> LESTONE [1]      |  | <input type="checkbox"/> SILT HEAVY [-2] |  | <input type="checkbox"/> SILT MODERATE [-1] |  |                                                                                                             |
| <input type="checkbox"/> BOULDER [10]  |  | <input type="checkbox"/> BEDROCK [3]  |  | <input type="checkbox"/> TILLS [1]        |  | <input type="checkbox"/> SILT NORMAL [0] |  | <input type="checkbox"/> SILT FREE [1]      |  |                                                                                                             |
| <input type="checkbox"/> COBBLE [8]    |  | <input type="checkbox"/> DETRITUS [3] |  | <input type="checkbox"/> WETLANDS [1]     |  | <input type="checkbox"/> CLAY [-2]       |  | <input type="checkbox"/> INDUSTRIAL [-1]    |  |                                                                                                             |
| <input type="checkbox"/> GRAVEL [7]    |  | <input type="checkbox"/> SILT [2]     |  | <input type="checkbox"/> LACUSTRARINE [1] |  | <input type="checkbox"/> ORGANIC [1]     |  | <input type="checkbox"/> NONE [1]           |  |                                                                                                             |
| <input type="checkbox"/> SAND [6]      |  | <input type="checkbox"/> MUCK [2]     |  | <input type="checkbox"/> SANDSTONE [1]    |  | <input type="checkbox"/> RIPRAP [1]      |  |                                             |  |                                                                                                             |
|                                        |  |                                       |  |                                           |  | <input type="checkbox"/> HARDPAN [0]     |  |                                             |  |                                                                                                             |
|                                        |  |                                       |  |                                           |  | <input type="checkbox"/> SHALE [-1]      |  |                                             |  |                                                                                                             |
|                                        |  |                                       |  |                                           |  | <input type="checkbox"/> COAL/ORE [-2]   |  |                                             |  |                                                                                                             |

NOTE: Ignore sludge that originates from point-sources, score on natural substrates

NUMBER OF SUBSTRATE TYPES    

☐ 5 or More [2] ☐ 4 or Less [0]

COMMENTS: \_\_\_\_\_

2) **COVER TYPES**

**TYPE:** (Check All That Apply)

**AMOUNT:** (Check ONLY One or check 2 and AVERAGE)

|                                                     |                                              |                                                     |                                                 |
|-----------------------------------------------------|----------------------------------------------|-----------------------------------------------------|-------------------------------------------------|
| <input type="checkbox"/> OFF-SHORE SAND BARS [4]    | <input type="checkbox"/> DEEPWATER > 1 M [1] | <input type="checkbox"/> WETLAND POOLS [1]          | <input type="checkbox"/> EXTENSIVE > 75% [9]    |
| <input type="checkbox"/> OVERHANGING VEGETATION [1] | <input type="checkbox"/> ROOTWADS [1]        | <input type="checkbox"/> SUBMERGED AQUATIC VEG. [4] | <input type="checkbox"/> MODERATE 25-75% [7]    |
| <input type="checkbox"/> SHALLOWS (ON BEACH) [1]    | <input type="checkbox"/> BOULDERS [1]        | <input type="checkbox"/> LOGS OR WOODY DEBRIS [1]   | <input type="checkbox"/> SPARSE 5-25% [3]       |
| <input type="checkbox"/> ROOTMATS [1]               | <input type="checkbox"/> SAND BEACH [1]      | <input type="checkbox"/> GRAVEL BEACH [1]           | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |

COMMENTS: \_\_\_\_\_

Cover  
Max 20

3) **SHORELINE MORPHOLOGY** (Check ONLY one PER category or check 2 and AVERAGE)

**MODIFICATIONS OF SAMPLED SHORELINE**

| SHORE SINUOSITY                       | DEVELOPMENT                            | MODIFICATION                                       | STABILITY                             | MODIFICATIONS OF SAMPLED SHORELINE          |                                               | Shore Line<br><div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Max 20 |
|---------------------------------------|----------------------------------------|----------------------------------------------------|---------------------------------------|---------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> HIGH [2]     | <input type="checkbox"/> EXCELLENT [6] | <input type="checkbox"/> NONE [7]                  | <input type="checkbox"/> HIGH [3]     | <input type="checkbox"/> CEMENTED [-1]      | <input type="checkbox"/> STEEL BULKHEADS [-2] |                                                                                                              |
| <input type="checkbox"/> MODERATE [4] | <input type="checkbox"/> GOOD [5]      | <input type="checkbox"/> RECOVERED [5]             | <input type="checkbox"/> MODERATE [2] | <input type="checkbox"/> RIP RAPPED [1]     | <input type="checkbox"/> ISLANDS [1]          |                                                                                                              |
| <input type="checkbox"/> LOW [3]      | <input type="checkbox"/> FAIR [3]      | <input type="checkbox"/> RECOVERING [3]            | <input type="checkbox"/> LOW [1]      | <input type="checkbox"/> RAILROAD TIES [-1] | <input type="checkbox"/> DIKES [-1]           |                                                                                                              |
| <input type="checkbox"/> NONE [1]     | <input type="checkbox"/> POOR [1]      | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                       | <input type="checkbox"/> DREDGED [-1]       | <input type="checkbox"/> BANK SHAPING [-1]    |                                                                                                              |
|                                       |                                        |                                                    |                                       | <input type="checkbox"/> TWO SIDE CHANNEL   | <input type="checkbox"/> WOOD PILING [1]      |                                                                                                              |
|                                       |                                        |                                                    |                                       | MODIFICATIONS [-1]                          |                                               |                                                                                                              |
|                                       |                                        |                                                    |                                       | <input type="checkbox"/> SHIP CHANNEL [-2]  |                                               |                                                                                                              |

**SHORE to BOTTOM SLOPE MORPHOLOGIES**

|                                              |                                              |
|----------------------------------------------|----------------------------------------------|
| <input type="checkbox"/> SLOPE < 15 deg. [0] | <input type="checkbox"/> SLOPE > 45 deg. [2] |
| <input type="checkbox"/> SLOPE < 25 deg. [1] | <input type="checkbox"/> SLOPE 90 deg. [0]   |
| <input type="checkbox"/> SLOPE > 25 deg. [3] |                                              |

**AVERAGE DEPTH (of 5 measures)**

|                                             |                                             |
|---------------------------------------------|---------------------------------------------|
| <input type="checkbox"/> < 50 cm [0]        | <input type="checkbox"/> > 400 - 500 cm [4] |
| <input type="checkbox"/> 50 - < 100 cm [1]  | <input type="checkbox"/> > 500 - 900 cm [2] |
| <input type="checkbox"/> ≥ 100 - 200 cm [2] | <input type="checkbox"/> > 900 cm [1]       |
| <input type="checkbox"/> > 200 - 400 cm [3] |                                             |

COMMENTS: \_\_\_\_\_

4) **RIPARIAN ZONE AND BANK EROSION** (Check ONE box PER bank or 2 and AVERAGE)

★ Shore Right Looking East or South on Lake ★  
★ Shore Right Looking Toward Lake in Lacustrary ★

| RIPARIAN WIDTH                                 |              | SHORE LINE QUALITY (PAST 100 FOOT RIPARIAN)               |                               | BANK EROSION                                       |                                            | Riparian<br><div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Max 10 |
|------------------------------------------------|--------------|-----------------------------------------------------------|-------------------------------|----------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------|
| L                                              | R (Per Bank) | L                                                         | R (Most Predominant Per Bank) | L                                                  | R (Per Bank)                               |                                                                                                            |
| <input type="checkbox"/> WIDE > 50 m [4]       |              | <input type="checkbox"/> FOREST, WETLAND, LAKE [3]        |                               | <input type="checkbox"/> CONSERVATION TILLAGE [1]  | <input type="checkbox"/> NONE/LITTLE [3]   |                                                                                                            |
| <input type="checkbox"/> MODERATE 10-50 m [3]  |              | <input type="checkbox"/> SHRUB OR OLD FIELD [2]           |                               | <input type="checkbox"/> URBAN OR INDUSTRIAL [0]   | <input type="checkbox"/> MODERATE [-1]     |                                                                                                            |
| <input type="checkbox"/> NARROW 5-10 m [2]     |              | <input type="checkbox"/> VINEYARD, ORCHARD [2]            |                               | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] | <input type="checkbox"/> HEAVY/SEVERE [-3] |                                                                                                            |
| <input type="checkbox"/> VERY NARROW < 5 m [1] |              | <input type="checkbox"/> FENCED PASTURE [1]               |                               | <input type="checkbox"/> MINING/CONSTRUCTION [0]   |                                            |                                                                                                            |
| <input type="checkbox"/> NONE [0]              |              | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] |                               | <input type="checkbox"/> DIKED WETLAND [0]         |                                            |                                                                                                            |

COMMENTS: \_\_\_\_\_

5) **AQUATIC VEGETATION QUALITY: PLANT SPECIES OBSERVED** (Sum All Scores)

(Score all for observed abundance: ABUNDANT = [3]; COMMON = [5]; FEW = [1]; UNCOMMON = [0])

NO AQUATIC VEGETATION = 0

|                                                  |                                             |                                                    |
|--------------------------------------------------|---------------------------------------------|----------------------------------------------------|
| <input type="checkbox"/> Pond Lilies (NYMPHAEA)  | <input type="checkbox"/> Sedge (CYPERACEAE) | <input type="checkbox"/> Wild Celery (VALLISNERIA) |
| <input type="checkbox"/> Pond Weed (POTAMOGETON) | <input type="checkbox"/> Bulrush (SCIRPUS)  | <input type="checkbox"/> Waterweed (ELODEA)        |
| <input type="checkbox"/> Wild Rice (ZIZANIA)     |                                             |                                                    |

(Score all for observed abundance: ABUNDANT = [-2]; COMMON = [-1]; FEW = [0])

|                                             |                                     |                                           |                                   |                                       |                                             |
|---------------------------------------------|-------------------------------------|-------------------------------------------|-----------------------------------|---------------------------------------|---------------------------------------------|
| <input type="checkbox"/> Purple Loosestrife | <input type="checkbox"/> Reed Grass | <input type="checkbox"/> Eurasian Milfoil | <input type="checkbox"/> Cattails | <input type="checkbox"/> Algae (mats) | <input type="checkbox"/> Algae (planktonic) |
|---------------------------------------------|-------------------------------------|-------------------------------------------|-----------------------------------|---------------------------------------|---------------------------------------------|

COMMENTS: \_\_\_\_\_

Vegetation  
Max 30

Is the Sampling Reach Representative of Area Habitat? (Y/N) \_\_\_\_ If Not, Explain: \_\_\_\_\_

Depth measures: \_\_\_\_\_  
Zebra Mussel/Quagga Mussel Coverage ☐ >60% ☐ 60->25% ☐ 25->10% ☐ <10->1% ☐ 1-0%

|                       | Gear  | Distance | Water Clarity | Wave Height |
|-----------------------|-------|----------|---------------|-------------|
| First Sampling Pass:  | _____ | _____    | _____         | _____       |
| Second Sampling Pass: | _____ | _____    | _____         | _____       |
| Third Sampling Pass:  | _____ | _____    | _____         | _____       |



Subjective Rating  
(1-10)



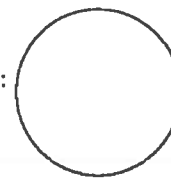
Aesthetic Rating  
(1-10)

Photos: \_\_\_\_\_

WATERBODY MEASUREMENTS: AVERAGE WIDTH: \_\_\_\_\_ AVERAGE DEPTH: \_\_\_\_\_ Maximum Depth: \_\_\_\_\_

**DRAWING OF SITE:**

North Arrow:



## NEORSD Surface Water Condition Sampling Field Data Form

Stream: \_\_\_\_\_ Date: \_\_\_\_\_ Collectors: \_\_\_\_\_

Gage Station and ID: \_\_\_\_\_ Daily Mean Discharge: \_\_\_\_\_ ft<sup>3</sup>/sec

Was this sample taken during or following a wet weather event? YES / NO

Water Quality Meters Used: \_\_\_\_\_

Time (hrs): \_\_\_\_\_ River Mile (Site): \_\_\_\_\_

Weather: Clear Partly Cloudy Overcast Light Rain/Showers Heavy Rain  
Steady Rain Heavy Snow Melt Other: \_\_\_\_\_

Flow: Dry Intermittent Minimal Baseline/Normal Elevated Flood

HD Status: OK Other: \_\_\_\_\_

Color: Clear Muddy Tea Milky Other: \_\_\_\_\_

Odor: Normal Petroleum Anaerobic Sewage Chemical Other: \_\_\_\_\_

Surface Coating: None Foam Oily Scum Other: \_\_\_\_\_

Field Parameters: Conductivity (µmhos/cm): \_\_\_\_\_ Sp. Cond. (µmhos/cm): \_\_\_\_\_

Dissolved Oxygen (mg/L): \_\_\_\_\_ D.O. (%): \_\_\_\_\_

Temperature (°C): \_\_\_\_\_ pH (s.u.): \_\_\_\_\_

Turbidity 1 (NTU): \_\_\_\_\_ Turbidity 2 (NTU): \_\_\_\_\_ Average (NTU): \_\_\_\_\_

General Comments: \_\_\_\_\_

**Reporting sig figs: (Cond and DO% - 1) (pH, DO mg/L, and Chlor/BGA-PC - 0.1) (Temp- 0.01)**

Time (hrs): \_\_\_\_\_ River Mile (Site): \_\_\_\_\_

Weather: Clear Partly Cloudy Overcast Light Rain/Showers Heavy Rain  
Steady Rain Heavy Snow Melt Other: \_\_\_\_\_

Flow: Dry Intermittent Minimal Baseline/Normal Elevated Flood

HD Status: OK Other: \_\_\_\_\_

Color: Clear Muddy Tea Milky Other: \_\_\_\_\_

Odor: Normal Petroleum Anaerobic Sewage Chemical Other: \_\_\_\_\_

Surface Coating: None Foam Oily Scum Other: \_\_\_\_\_

Field Parameters: Conductivity (µmhos/cm): \_\_\_\_\_ Sp. Cond. (µmhos/cm): \_\_\_\_\_

Dissolved Oxygen (mg/L): \_\_\_\_\_ D.O. (%): \_\_\_\_\_

Temperature (°C): \_\_\_\_\_ pH (s.u.): \_\_\_\_\_

Turbidity 1 (NTU): \_\_\_\_\_ Turbidity 2 (NTU): \_\_\_\_\_ Average (NTU): \_\_\_\_\_

General Comments: \_\_\_\_\_

## Appendix B. Parameter Information

| Parameter                               | Additional Name                   | Test                   | Unit | 2024 Minimum Detection Limit | 2024 Practical Quantitation Limit |
|-----------------------------------------|-----------------------------------|------------------------|------|------------------------------|-----------------------------------|
| Alkalinity                              | Alkalinity                        | EPA 310.2              | mg/L | 16                           | 5.076                             |
| Mercury                                 | Hg                                | EPA 245.1              | µg/L | 0.015                        | 0.05                              |
| Ammonia <sup>1</sup>                    | NH <sub>3</sub>                   | EPA 350.1              | mg/L | 0.01                         | 0.05                              |
| Nitrite                                 | NO <sub>2</sub>                   | EPA 353.2              | mg/L | 0.005                        | 0.02                              |
|                                         |                                   | ASTM D7781-14          | mg/L | TBD                          | 0.04                              |
| Nitrite + Nitrate                       | NO <sub>2</sub> + NO <sub>3</sub> | EPA 353.2              | mg/L | 0.02                         | 0.04                              |
|                                         |                                   | ASTM D7781             | mg/L | 0.01                         | 0.04                              |
| Total Kjeldahl Nitrogen                 | TKN                               | EPA 351.2              | mg/L | 0.276                        | 0.75                              |
| Dissolved Reactive Phosphorus           | DRP                               | EPA 365.1              | mg/L | 0.0122                       | 0.025                             |
| Low Level Dissolved Reactive Phosphorus | LLDRP                             | EPA 365.1              | µg/L | 3.01                         | 7.5                               |
| Total Phosphorus                        | Total-P                           | EPA 365.1              | mg/L | 0.0156                       | 0.03125                           |
| Chloride                                | Chloride by IC                    | EPA 300.0              | mg/L | 2.27                         | 5                                 |
| Sulfate                                 | Sulfate by IC                     | EPA 300.0              | mg/L | 1.89                         | 5                                 |
| Silver                                  | Ag                                | EPA 200.8 <sup>3</sup> | µg/L | 0.0239                       | 0.25                              |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 0.0515                       | 0.5                               |
| Aluminum                                | Al                                | EPA 200.8 <sup>3</sup> | µg/L | 1.71                         | 10                                |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 19.3                         | 50                                |
| Arsenic                                 | As                                | EPA 200.8 <sup>3</sup> | µg/L | 0.311                        | 1                                 |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 0.099                        | 1                                 |
| Barium                                  | Ba                                | EPA 200.8 <sup>3</sup> | µg/L | 0.102                        | 0.25                              |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 0.0693                       | 0.5                               |
| Beryllium                               | Be                                | EPA 200.8 <sup>3</sup> | µg/L | 0.0257                       | 0.25                              |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 0.0445                       | 0.5                               |
| Calcium                                 | Ca                                | EPA 200.8 <sup>3</sup> | µg/L | 21.5                         | 125                               |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 63.5                         | 500                               |
| Cadmium                                 | Cd                                | EPA 200.8 <sup>3</sup> | µg/L | 0.0282                       | 0.25                              |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 0.0531                       | 0.5                               |
| Cobalt                                  | Co                                | EPA 200.8 <sup>3</sup> | µg/L | 0.009                        | 0.25                              |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 0.0247                       | 0.5                               |
| Chromium                                | Cr                                | EPA 200.8 <sup>3</sup> | µg/L | 0.469                        | 1.25                              |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 1.97                         | 5                                 |
| Copper                                  | Cu                                | EPA 200.8 <sup>3</sup> | µg/L | 0.177                        | 0.5                               |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 0.113                        | 1.5                               |
| Iron                                    | Fe                                | EPA 200.8 <sup>3</sup> | µg/L | 3.175                        | 12.5                              |
|                                         |                                   | EPA 200.8 <sup>4</sup> | µg/L | 42.4                         | 150                               |

| Parameter               | Additional Name      | Test                              | Unit      | 2024 Minimum Detection Limit                             | 2024 Practical Quantitation Limit |
|-------------------------|----------------------|-----------------------------------|-----------|----------------------------------------------------------|-----------------------------------|
| Potassium               | K                    | EPA 200.8 <sup>3</sup>            | µg/L      | 28.75                                                    | 125                               |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 127                                                      | 1250                              |
| Magnesium               | Mg                   | EPA 200.8 <sup>3</sup>            | µg/L      | 4.095                                                    | 62.5                              |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 3.57                                                     | 100                               |
| Manganese               | Mn                   | EPA 200.8 <sup>3</sup>            | µg/L      | 0.705                                                    | 2.5                               |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 0.147                                                    | 5                                 |
| Molybdenum              | Mo                   | EPA 200.8 <sup>3</sup>            | µg/L      | 0.119                                                    | 0.25                              |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 0.0829                                                   | 0.5                               |
| Sodium                  | Na                   | EPA 200.8 <sup>3</sup>            | µg/L      | 27.25                                                    | 125                               |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 28.3                                                     | 250                               |
| Nickel                  | Ni                   | EPA 200.8 <sup>3</sup>            | µg/L      | 0.0745                                                   | 1                                 |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 0.0942                                                   | 0.5                               |
| Lead                    | Pb                   | EPA 200.8 <sup>3</sup>            | µg/L      | 0.139                                                    | 0.5                               |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 0.0332                                                   | 0.5                               |
| Antimony                | Sb                   | EPA 200.8 <sup>3</sup>            | µg/L      | 0.109                                                    | 2.5                               |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 0.0523                                                   | 0.5                               |
| Selenium                | Se                   | EPA 200.8 <sup>3</sup>            | µg/L      | 0.307                                                    | 1                                 |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 0.141                                                    | 2                                 |
| Tin                     | Sn                   | EPA 200.8 <sup>3</sup>            | µg/L      | 5                                                        | 20                                |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 0.898                                                    | 2                                 |
| Strontium               | Sr                   | EPA 200.8 <sup>3</sup>            | µg/L      | 0.0466                                                   | 0.5                               |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 0.0246                                                   | 0.5                               |
| Titanium                | Ti                   | EPA 200.8 <sup>3</sup>            | µg/L      | 0.059                                                    | 1                                 |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 0.316                                                    | 1                                 |
| Thallium                | Tl                   | EPA 200.8 <sup>3</sup>            | µg/L      | 0.0545                                                   | 0.25                              |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 0.96                                                     | 5                                 |
| Vanadium                | V                    | EPA 200.8 <sup>3</sup>            | µg/L      | 0.258                                                    | 2.5                               |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 6.869                                                    | 15                                |
| Zinc                    | Zn                   | EPA 200.8 <sup>3</sup>            | µg/L      | 2.48                                                     | 5                                 |
|                         |                      | EPA 200.8 <sup>4</sup>            | µg/L      | 1.1                                                      | 5                                 |
| Hardness                | Hardness (calc.)     | SM 2340B <sup>2</sup>             | mg/L      | CaCO <sub>3</sub> mg/L = (2.497*Ca mg/L)+(4.118*Mg mg/L) |                                   |
| <i>Escherichia coli</i> | <i>E. coli</i>       | SM9223 Colilert QT (18 & 24 Hour) | MPN/100mL | 1 MPN                                                    | 1 MPN                             |
| Chlorophyll <i>a</i>    | Chlorophyll <i>a</i> | EPA 445.0                         | µg/L      | 0.21                                                     | 1                                 |
| Chemical Oxygen Demand  | COD                  | EPA 410.4                         | mg/L      | 4.2                                                      | 20                                |

| Parameter                | Additional Name | Test                     | Unit                | 2024 Minimum Detection Limit | 2024 Practical Quantitation Limit |
|--------------------------|-----------------|--------------------------|---------------------|------------------------------|-----------------------------------|
| Biological Oxygen Demand | BOD             | SM 5210 <sup>2</sup>     | mg/L                | 2                            | N/A                               |
| Total Solids             | TS              | SM 2540 B <sup>2</sup>   | mg/L                | 5                            | 10                                |
| Total Suspended Solids   | TSS             | SM 2540 D <sup>2</sup>   | mg/L                | 0.86                         | 2                                 |
| Total Dissolved Solids   | TDS             | SM 2540 C <sup>2</sup>   | mg/L                | 5                            | 10                                |
| Turbidity **             |                 | EPA 180.1                | NTU                 | 0.3                          | 1                                 |
| Field Parameter          | Additional Name | Test                     | (Value Reported in) |                              |                                   |
| pH                       |                 | SM 4500 H+B              | s.u.                |                              |                                   |
| Conductivity             |                 | SM 2510A <sup>2</sup>    | µs/cm               |                              |                                   |
| Specific Conductivity    |                 | SM 2510B <sup>2</sup>    | µs/cm               |                              |                                   |
| Dissolved Oxygen         | DO              | SM 4500-0 G <sup>2</sup> | mg/L                |                              |                                   |
| Temperature              | Temp            | EPA 1701.1 <sup>2</sup>  | °C                  |                              |                                   |
| Turbidity **             |                 | EPA 180.1                | NTU                 |                              |                                   |

<sup>1</sup> Listed MDL/PQL is for undistilled samples. Any samples that require distillation will have a MDL = 0.065 mg/L, PQL = 0.150 mg/L

<sup>2</sup> Standard Methods for the Examination of Water and Wastewater, Method approved by Standard Methods Committee, 1997. Editorial revisions, 2011.

<sup>3</sup> MDLs and PQLs specific to ICP-MS Xseries instrument

<sup>4</sup> MDLs and PQLs specific to ICP-MS qNOVA instrument

\*\* Turbidity will either be completed in the field or at the laboratory.

## Appendix C. Meter Specifications



## YSI 600XL and 600XLM Sondes

### ***Measure multiple parameters simultaneously***

The YSI 600XL and YSI 600XLM compact sondes measure eleven parameters simultaneously:

|                      |                              |
|----------------------|------------------------------|
| Temperature          | TDS                          |
| Conductivity         | pH                           |
| Specific Conductance | ORP                          |
| Salinity             | Depth or Level               |
| Resistivity          | Rapid Pulse™ DO (% and mg/L) |

### ***Connect with Data Collection Platforms***

Either sonde can easily connect to the YSI 6200 DAS (Data Acquisition System), YSI EcoNet™ or your own data collection platform, via SDI-12 for remote and real-time data acquisition applications.

### ***Economical Logging System***

The YSI 600XLM is an economical logging system for long-term, *in situ* monitoring and profiling. It will log all parameters at programmable intervals and store 150,000 readings. At one-hour intervals, the instrument will log data for about 75 days utilizing its own power source. The 600XL can also be utilized in the same manner with user-supplied external power.



The YSI 600XL and 600XLM

- Either sonde fits down 2-inch wells
- Horizontal measurements in very shallow waters
- Stirring-independent Rapid Pulse® dissolved oxygen sensor
- Field-replaceable sensors
- Easily connects to data collection platforms
- Available with detachable cables to measure depth up to 200 feet
- Compatible with YSI 650 Multiparameter Display System
- Use with the YSI 5083 flow cell for groundwater applications

Pure  
Data for a  
Healthy  
Planet.®

*Economical, multiparameter  
sampling or logging in a  
compact sonde*

### **Sensor performance verified\***

The 6820 V2 and 6920 V2 sondes use sensor technology that was verified through the US EPA's Environmental Technology Verification Program (ETV). For information on which sensors were performance-verified, turn this sheet over and look for the ETV logo.





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**ISO 9001**  
**ISO 14001**

Yellow Springs, Ohio Facility

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\*Sensors sold here with the ETV logo were submitted to the ETV  
program on the 1st of 1997. Information on the test or source  
characteristics of YSI water quality sensors can be found in our  
web page or call YSI at 800 897 4151 for the ETV verification  
report. Use of the ETV name or logo does not imply approval  
or certification of this product nor does it make any explicit or  
implied warranty or guarantee as to product performance.

YSI incorporated  
Who's Minding  
the Planet?

## YSI 600XL & 600XLM Sensor Specifications

|                                                               | Range                             | Resolution                                                  | Accuracy                                                                                                |                                                            |
|---------------------------------------------------------------|-----------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Dissolved Oxygen<br>% Saturation<br>6562 Rapid Pulse™ Sensor* | ETV✓<br>0 to 500%                 | 0.1%                                                        | 0 to 200%: ±2% of reading or 2% air saturation,<br>whichever is greater; 200 to 500%: ±6% of<br>reading |                                                            |
| Dissolved Oxygen<br>mg/L<br>6562 Rapid Pulse™ Sensor*         | ETV✓<br>0 to 50 mg/L              | 0.01 mg/L                                                   | 0 to 20 mg/L: ± 0.2 mg/L or 2% of reading,<br>whichever is greater; 20 to 50 mg/L: ±6% of<br>reading    |                                                            |
| Conductivity*<br>6560 Sensor*                                 | ETV✓<br>0 to 100 mS/cm            | 0.001 to 0.1 mS/cm<br>(range dependent)                     | ±0.5% of reading + 0.001 mS/cm                                                                          |                                                            |
| Salinity                                                      | 0 to 70 ppt                       | 0.01 ppt                                                    | ±1% of reading or 0.1 ppt, whichever is greater                                                         |                                                            |
| Temperature<br>6560 Sensor*                                   | ETV✓<br>-5 to +50°C               | 0.01°C                                                      | ±0.15°C                                                                                                 |                                                            |
| pH<br>6561 Sensor*                                            | ETV✓<br>0 to 14 units             | 0.01 unit                                                   | ±0.2 unit                                                                                               |                                                            |
| ORP                                                           | -999 to +999 mV                   | 0.1 mV                                                      | ±20 mV                                                                                                  |                                                            |
| Depth & Level                                                 | Medium<br>Shallow<br>Vented Level | 0 to 200 ft, 61 m<br>0 to 30 ft, 9.1 m<br>0 to 30 ft, 9.1 m | 0.001 ft, 0.001 m<br>0.001 ft, 0.001 m<br>0.001 ft, 0.001 m                                             | ±0.4 ft, ±0.12 m<br>±0.06 ft, ±0.02 m<br>±0.01 ft, 0.003 m |

\* Report outputs of specific conductance (conductivity corrected to 25°C), resistivity, and total dissolved solids are  
also provided. These values are automatically calculated from conductivity according to algorithms found in *Standard  
Methods for the Examination of Water and Wastewater* (ed 1989).

## YSI 600XL & 600XLM Sonde Specifications

|                |                              |                                     |
|----------------|------------------------------|-------------------------------------|
| Medium         | Fresh, sea or polluted water |                                     |
| Temperature    | Operating                    | -5 to +50°C                         |
|                | Storage                      | -10 to +60°C                        |
| Communications | RS-232, SDI-12               |                                     |
| Software       | EcoWatch*                    |                                     |
| Dimensions     | Diameter                     | 1.65 in, 4.19 cm   1.65 in, 4.9 cm  |
|                | Length                       | 16 in, 40.6 cm   21.3 in, 54.1 cm   |
|                | Weight                       | 1.3 lbs, 0.59 kg   1.5 lbs, 0.69 kg |
| Power          | External                     | 12 V DC                             |
|                | Internal (600XLM only)       | 4 AA-size alkaline batteries        |

YSI model 5083  
flow cell and  
600XL. This is an  
ideal combination  
for groundwater  
applications.



# HI 98129

## Combo pH/EC/TDS/Temperature Tester with Low Range EC



### Description

The HI 98129 Combo waterproof tester offer high accuracy pH, EC/TDS and temperature measurements in a single tester! No more switching between meters for your routine measurements. The waterproof Combo (it even floats) has a large easy-to-read, dual-level LCD and automatic shut-off. pH and EC/TDS readings are automatically compensated for the effects of temperature (ATC). This technologically advanced tester has a replaceable pH electrode cartridge with an extendable cloth junction as well as an EC/TDS graphite electrode that resists contamination by salts and other substances. This gives these meters a greatly extended life. Your tester no longer needs to be thrown away when the pH sensor is exhausted.

The EC/TDS conversion factor is user selectable as is the temperature compensation coefficient ( $\beta$ ). Fast, efficient, accurate and portable, the Combo pH, EC/TDS and temperature tester brings you all the features you've asked for and more!

### Specifications

|                          |                                                                                     |                                                                                                             |
|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Range                    | pH                                                                                  | 0.00 to 14.00 pH                                                                                            |
| Range                    | EC                                                                                  | 0 to 3999 $\mu\text{S}/\text{cm}$                                                                           |
| Range                    | TDS                                                                                 | 0 to 2000 ppm                                                                                               |
| Range                    | Temperature                                                                         | 0.0 to 60.0°C / 32 to 140.0°F                                                                               |
| Resolution               | pH                                                                                  | 0.01 pH                                                                                                     |
| Resolution               | EC                                                                                  | 1 $\mu\text{S}/\text{cm}$                                                                                   |
| Resolution               | TDS                                                                                 | 1 ppm                                                                                                       |
| Resolution               | Temperature                                                                         | 0.1°C / 0.1°F                                                                                               |
| Accuracy                 | pH                                                                                  | $\pm 0.05$ pH                                                                                               |
| Accuracy                 | EC/TDS                                                                              | $\pm 2\%$ F.S.                                                                                              |
| Accuracy                 | Temperature                                                                         | $\pm 0.5^\circ\text{C}$ / $\pm 1^\circ\text{F}$                                                             |
| Temperature Compensation | pH: automatic; EC/TDS: automatic with $\beta$ adjustable from 0.0 to 2.4% / °C      |                                                                                                             |
| Calibration              | pH                                                                                  | automatic, 1 or 2 points with 2 sets of memorized buffers<br>(pH 4.01 / 7.01 / 10.01 or 4.01 / 6.86 / 9.18) |
| Calibration              | EC/TDS                                                                              | automatic, 1 point                                                                                          |
| TDS Conversion Factor    | adjustable from 0.45 to 1.00                                                        |                                                                                                             |
| pH Electrode             | HI 73127 (replaceable; included)                                                    |                                                                                                             |
| Environment              | 0 to 50°C (32 to 122°F); RH max 100%                                                |                                                                                                             |
| Battery Type / Life      | 4 x 1.5V / approx. 100 hours of continuous use; auto-off after 8 minutes of non-use |                                                                                                             |
| Dimensions               | 163 x 40 x 26 mm (6.4 x 1.6 x 1.0")                                                 |                                                                                                             |
| Weight                   | 100 g (3.5 oz.)                                                                     |                                                                                                             |



## HQ30d Portable pH, Conductivity, Dissolved Oxygen (DO), ORP, and ISE Multi-Parameter Meter



Product #: HQ30DS3000000 Quantity  
USD Price: \$750.00

★★★★★ 5/5

[Read 1 review](#) [Write a review](#) [Follow this product](#)

Portable meter measures critical water quality parameters - without the need for multiple instruments

Single input channel for flexible measurement of pH, Conductivity, Dissolved Oxygen (DO), BOD, ORP, Ammonia, Ammonium, Fluoride, Chloride, Sodium, and temperature - any INTELLiCAL™ smart probe

Intuitive user interface for simple operation and accurate results

Guided calibration and check standard reviews reduce calibration errors. Stabilization alerts and visual measurement lock ensure that you can trust the accuracy of the results

Trust your measurements - INTELLiCAL™ smart probes store all calibrations in the probe

Calibration history allows quick and easy change out of probes without re-calibrating. The HQd™ smart system records serial numbers, current calibration data, user ID, sample ID, time, and date automatically in the data log for complete GLP traceability

Designed for demanding conditions

Rugged, waterproof (IP67) meter provides worry-free, reliable operation in lab or field environments

Convenient kit includes everything you need to start testing

Meter kit includes: 4 AA batteries, quick-start guide, user manual, and documentation CD

### Specifications

|                                        |                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC and USB Operation                   | optional                                                                                                                                                                                                                                                                                                                                                          |
| Automatic Buffer Recognition           | Color-coded: 4.01, 7.00, 10.01 pH<br>IUPAC: 1.679, 4.005, 7.000, 10.012, 12.45<br>DIN: 1.00, 4.65, 9.323<br>User-defined custom buffer sets                                                                                                                                                                                                                       |
| Barometric Pressure Measurement        | For automatic compensation of DO when using an LDO or LBOD probe                                                                                                                                                                                                                                                                                                  |
| Battery Requirements                   | 4 AA                                                                                                                                                                                                                                                                                                                                                              |
| Benchtop                               | with stand                                                                                                                                                                                                                                                                                                                                                        |
| BOD5/CBOD resolution                   | Available when used with Hach WIMS BOD Manager software                                                                                                                                                                                                                                                                                                           |
| Cable resistance correction            | Digital - not needed                                                                                                                                                                                                                                                                                                                                              |
| Calibration curves display             | Calibration summary data logged and displayed                                                                                                                                                                                                                                                                                                                     |
| Calibration Intervals/Alerts/Reminder  | 2 hours to 7 days                                                                                                                                                                                                                                                                                                                                                 |
| Compliance                             | CE, WEEE                                                                                                                                                                                                                                                                                                                                                          |
| Conductivity Accuracy                  | ± 0.5 % from (1 µS/cm - 200 mS/cm)                                                                                                                                                                                                                                                                                                                                |
| Conductivity measurement               | 5 different stability modes                                                                                                                                                                                                                                                                                                                                       |
| Conductivity Measurement Range         | 0.01 µS/cm to 200 mS/cm                                                                                                                                                                                                                                                                                                                                           |
| Conductivity resolution                | 0.01 µS/cm with 2 digits                                                                                                                                                                                                                                                                                                                                          |
| Custom Calibration Standards           | User-defined standard sets                                                                                                                                                                                                                                                                                                                                        |
| Data Export                            | Download via USB connection to PC or flash stick<br>Automatically transfer entire data log or as readings are taken                                                                                                                                                                                                                                               |
| Data Memory                            | 500 results                                                                                                                                                                                                                                                                                                                                                       |
| Digital (Intelligent) electrode inputs | 2                                                                                                                                                                                                                                                                                                                                                                 |
| Dimensions (H x W x D)                 | 7.8 in x 3.7 in x 1.4 in (197 mm x 95 mm x 36 mm)                                                                                                                                                                                                                                                                                                                 |
| Display                                | Display readings from one or two probes<br>Simultaneous readings from two probes (HQ40d only)<br>pH, pH, mV, temperature<br>Conductivity, Conductivity, TDS, salinity, resistivity, temperature<br>LDO, dissolved oxygen, pressure, temperature<br>LBOD, dissolved oxygen, pressure, temperature<br>ORP/Redox, mV, temperature<br>Sodium, Sodium, mV, temperature |
| Display Lock Function                  | Continuous measurement or press to read mode available with averaging function for LDO measurement                                                                                                                                                                                                                                                                |
| Display Type                           | 240 x 160 pixel Display readings from one or two probes<br>pH, pH, mV, temperature<br>Conductivity, Conductivity, TDS, salinity, resistivity, temperature<br>LDO, dissolved oxygen, pressure, temperature<br>ORP/Redox, mV, temperature<br>Sodium, Sodium, mV, temperature                                                                                        |
| DO Measurement Range                   | 0.01 to 20 mg/L (0 to 200%)                                                                                                                                                                                                                                                                                                                                       |
| DO Resolution                          | 0.01 mg/L                                                                                                                                                                                                                                                                                                                                                         |
| Fixed Buffer Selection                 | (IUPAC standards<br>(DIN 19286) or Technical buffer (DIN 19287) or 4-7-10 series or user defined                                                                                                                                                                                                                                                                  |
| Inputs                                 | M12 digital (1)<br>for INTELLiCAL probes                                                                                                                                                                                                                                                                                                                          |
| Interface Languages                    | 13**                                                                                                                                                                                                                                                                                                                                                              |
| Internal Data Storage                  | 500                                                                                                                                                                                                                                                                                                                                                               |
| IP Rating                              | IP67                                                                                                                                                                                                                                                                                                                                                              |
| Languages                              | English, French, German, Italian, Spanish, Danish, Dutch, Polish, Portuguese, Turkish, Swedish, Czech, Russian                                                                                                                                                                                                                                                    |
| mV Accuracy                            | ± 0.1 mV                                                                                                                                                                                                                                                                                                                                                          |
| mV Measurement at Stable Reading       | 5 (auto) stabilization settings                                                                                                                                                                                                                                                                                                                                   |
| mV Resolution                          | 0.1 mV                                                                                                                                                                                                                                                                                                                                                            |
| Operating Error Messages               | Text messages displayed                                                                                                                                                                                                                                                                                                                                           |
| Operating Humidity                     | 90 % relative humidity (non-condensing)                                                                                                                                                                                                                                                                                                                           |
| Operating Interface                    | Keypad                                                                                                                                                                                                                                                                                                                                                            |
| Operating Temperature                  | 5 to 45 °C                                                                                                                                                                                                                                                                                                                                                        |
| ORP Electrode Calibration              | Predefined ORP standards (including Zobell's solution)                                                                                                                                                                                                                                                                                                            |
| Outputs                                | USB to PC / flash stick                                                                                                                                                                                                                                                                                                                                           |
| PC Data Transfer Software              | Included                                                                                                                                                                                                                                                                                                                                                          |
| pH Measurement at stable reading       | 5 stabilization settings                                                                                                                                                                                                                                                                                                                                          |
| Printer                                | Optional accessory                                                                                                                                                                                                                                                                                                                                                |
| Salinity Resolution                    | 0.01 ppt                                                                                                                                                                                                                                                                                                                                                          |
| Warranty                               | 3 years                                                                                                                                                                                                                                                                                                                                                           |
| Water Resistance                       | Meter Casing: 1 meter submersion for 30 minutes (IP67)                                                                                                                                                                                                                                                                                                            |
| Weight                                 | 0.74 lbs (0.335 kg)                                                                                                                                                                                                                                                                                                                                               |

# 2100P and 2100P IS Portable Turbidimeter

Turbidimetry

## Features and Benefits

### Laboratory Quality in a Portable Unit

The Hach 2100P and 2100P IS Portable Turbidimeters offer a level of performance previously possible only with laboratory instruments. Microprocessor-controlled operation and Hach's unique Ratio™ optics bring great accuracy, sensitivity, and reliability to field and in-plant testing.

### Two Models for Specific Requirements

- **2100P Turbidimeter**—Get fast, accurate turbidity testing in the field or the lab, over a wide range of samples. Compliant with USEPA Method 180.1 design criteria.
- **2100P IS Turbidimeter**—Designed to meet international standards that mandate measurement using an LED light source.

### Two-detector Optical System

The two-detector optical system compensates for color in the sample, light fluctuation, and stray light, enabling analysts to achieve laboratory-grade performance on a wide range of samples, even under difficult, onsite conditions.



The Hach 2100P and 2100P IS Portable Turbidimeters bring laboratory-level performance on-site, offering fast, accurate results and the ease-of-use analysts demand in the field.

With a measurement range of 0 to 1000 NTU and a resolution of 0.01 NTU, the 2100P turbidimeter is ideal for regulatory monitoring, process control or field studies.

## Specifications\*

|                              | 2100P                                                                           | 2100P IS                                          |
|------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------|
| <b>Measurement Method</b>    | Nephelometric Ratio                                                             |                                                   |
| <b>Regulatory</b>            | Meets EPA Method 180.1                                                          | Meets EN ISO 7027                                 |
| <b>Light Source</b>          | Tungsten lamp                                                                   | Light-emitting diode (LED) @ 860 nm               |
| <b>Range</b>                 |                                                                                 |                                                   |
| Automatic Range Mode         | 0 to 1000 NTU                                                                   | 0 to 1000 FNU                                     |
| Manual Range Selection       | 0 to 9.99, 0 to 99.9 and 0 to 1000 NTU                                          | 0 to 9.99, 0 to 99.9 and 0 to 1000 FNU            |
| <b>Accuracy</b>              | ±2% of reading plus stray light                                                 |                                                   |
| <b>Repeatability</b>         | ±1% of reading, or 0.01 NTU, whichever is greater                               | ±1% of reading, or 0.01 FNU, whichever is greater |
| <b>Resolution</b>            | 0.01 on lowest range                                                            |                                                   |
| <b>Signal Averaging</b>      | Selectable on/off                                                               |                                                   |
| <b>Power Requirement</b>     | 4 AA alkaline batteries or optional battery eliminator                          |                                                   |
| <b>Battery Life, Typical</b> | 300 tests with signal average mode off<br>180 tests with signal average mode on |                                                   |
| <b>Operating Temperature</b> | 0 to 50°C (32 to 122°F)                                                         |                                                   |
| <b>Sample Required</b>       | 15 mL (0.5 oz.)                                                                 |                                                   |
| <b>Sample Cells</b>          | 60 x 25 mm (2.36 x 1 in.) borosilicate glass with screw caps                    |                                                   |
| <b>Dimensions</b>            | 22.2 x 9.5 x 7.9 cm (8.75 x 3.75 x 3.12 in.)                                    |                                                   |
| <b>Weight</b>                | 0.5 kg (1.1 lb.); shipping weight 2.7 kg (6 lb.)                                |                                                   |
| <b>Warranty</b>              | 2 years                                                                         |                                                   |

\*Specifications subject to change without notice.

DW = drinking water WW = wastewater municipal PW = pure water / power  
IW = industrial water E = environmental C = collections FB = food and beverage



Be Right™

D

W

P

I

F

## 2100Q and 2100Q is Portable Turbidimeter



*The Hach 2100Q and 2100Q is Portable Turbidimeters offer unsurpassed ease of use and accuracy in turbidity measurement. Only Hach offers this unique combination of advanced features, such as assisted calibration and simplified data transfer, and measurement innovation, giving you accurate results every time.*

### Features and Benefits

#### Easy Calibration and Verification

Hach 2100Q and 2100Q is Portable Turbidimeters provide confidence your measurements are right every time. On-screen assisted calibration and verification save you time and ensure accuracy. With an easy-to-follow interface, complicated manuals are not needed to perform routine calibrations. Single-standard RapidCal™ calibration offers a simplified solution for low level measurements.

#### Simple Data Transfer

Data transfer with the optional USB + Power Module is simple, flexible, and doesn't require additional software. All data can be transferred to the module and easily downloaded to your computer with a USB connection, providing superior data integrity and availability. With two different module options, you can customize connectivity and power to meet your unique needs.

#### Accurate for Rapidly Settling Samples

The Hach 2100Q Portable Turbidimeter incorporates an innovative Rapidly Settling Turbidity™ mode to provide accurate, repeatable measurements for difficult to measure, rapidly settling samples. An exclusive algorithm that

calculates turbidity based on a series of automatic readings eliminates redundant measurements and estimating.

#### Convenient Data Logging

Up to 500 measurements are automatically stored in the instrument for easy access and backup. Stored information includes: date and time, operator ID, reading mode, sample ID, sample number, units, calibration time, calibration status, error messages and the result.

#### Optical System for Precision in the Field

The two-detector optical system compensates for color in the sample, light fluctuation, and stray light, enabling analysts to achieve laboratory-grade performance on a wide range of samples, even under difficult site conditions.

#### Two Models for Specific Requirements

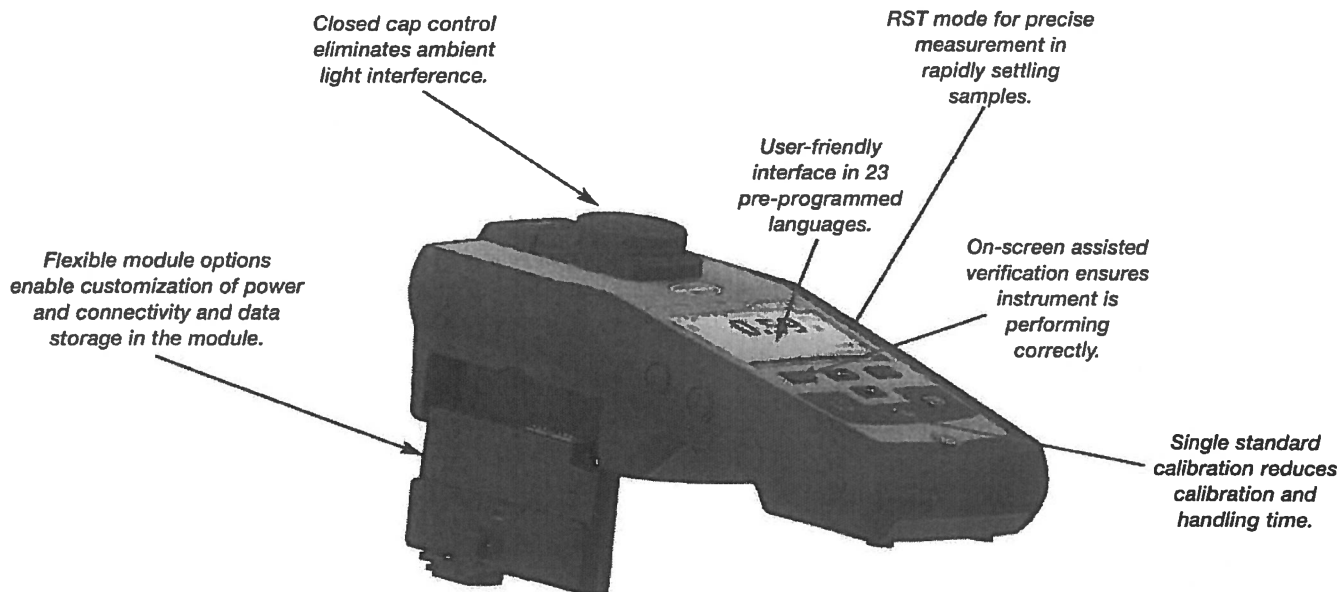
- **2100Q Turbidimeter**—Compliant with USEPA Method 180.1 design criteria.
- **2100Q is Turbidimeter**—Compliant with ISO 7027 design criteria.

DW = drinking water WW = wastewater municipal PW = pure water / power  
IW = Industrial water E = environmental C = collections FB = food and beverage



Be Right™

## Key Features



## Specifications\*

### Measurement Method

Ratio turbidimetric determination using a primary nephelometric light scatter signal (90°) to the transmitted light scatter signal.

### Regulatory

2100Q: Meets EPA Method 180.1  
2100Q is: Meets ISO 7027

### Light Source

2100Q: Tungsten filament lamp  
2100Q is: Light-emitting diode (LED) @ 860 nm

### Range

0 to 1000 NTU (FNU)

### Accuracy

±2% of reading plus stray light from 0 to 1000 NTU

### Repeatability

±1% of reading, or 0.01 NTU (FNU), whichever is greater

### Resolution

0.01 NTU on lowest range

### Stray Light

<0.02 NTU (FNU)

### Signal Averaging

Selectable on/off

### Detector

Silicon photovoltaic

### Reading Modes (user selectable)

Normal (Push to Read)  
Signal Averaging  
Rapidly Settling Turbidity

### Data Logger

500 records

### Power Requirement

110-230 Vac, 50/60 Hz (with Power or USB+Power Module)  
4 AA alkaline batteries  
Rechargeable NiMH (for use with USB+Power Module)

### Operating Conditions

Temperature: 0 to 50°C (32 to 122°F)  
Relative Humidity: 0 to 90% @ 30°C,  
0 to 80% @ 40°C, 0 to 70% @ 50°C, noncondensing

### Storage Conditions

-40 to 60°C (-40 to 140°F), instrument only

### Languages

English, French, German, Italian, Spanish, Portuguese (BR), Portuguese (PT), Bulgarian, Chinese, Czech, Danish, Dutch, Finnish, Greek, Hungarian, Japanese, Korean, Polish, Romanian, Russian, Slovenian, Swedish, Turkish

### Interface

Optional USB

### Instrument Enclosure Rating

IP67 (closed lid, battery compartment excluded)

### Protection Class

Power Supply: Class II

### Certification

CE certified

### Sample Required

15 mL (0.3 oz.)

### Sample Cells

60 x 25 mm (2.36 x 1 in.) borosilicate glass with screw cap

### Dimensions

22.9 x 10.7 x 7.7 cm (9.0 x 4.2 x 3.0 in.)

### Weight

527 g (1.16 lb) without batteries  
618 g (1.36 lb) with four AA alkaline batteries

### Warranty

1 year

\*Specifications subject to change without notice.

Sondes:    EXO1                      EXO2

Removable Bail

6-Pin Cable Connector

High-impact Xenoy Housing

Pressure Transducer Opening

Red LED Indicator - Status

Blue LED Indicator - Bluetooth

On/Off Magnetic Switch for Power and Bluetooth

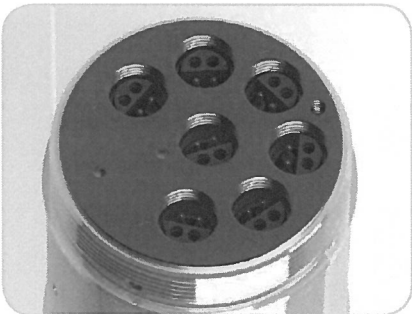
4-Pin Wet-Mateable Connectors

Port Plug

Anti-fouling Wiper



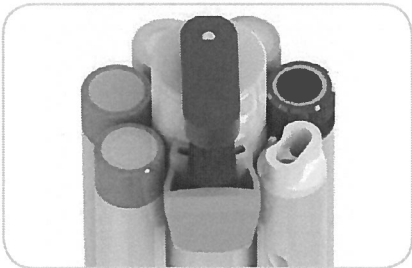
Cable connector, battery valve, and expansion port for an additional sensor



EXO2 sonde contains 6 universal sensor ports plus a central port for an anti-fouling wiper

Battery Compartment

Cutaway: Reinforced internal structure



Anti-fouling wiper keeps sensors clear of biofouling and lengthens deployment times by 25%

Welded Titanium Housing



EXO1 sonde contains 4 universal sensor ports

## Instrument Specifications\*

|                                             |                                                                                                                                                                                     |                         |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| EXO1 Sonde                                  |                                                                                                                                                                                     |                         |
| Ports                                       | 4 sensor ports<br>Peripheral port: 1 power communication port                                                                                                                       |                         |
| Size                                        | Diameter: 4.70 cm (1.85 in)<br>Length: 64.77 cm (25.50 in)                                                                                                                          |                         |
| Weight                                      | 1.42 kg (3.15 lbs) with 4 probes, guard and batteries installed                                                                                                                     |                         |
| EXO2 Sonde                                  |                                                                                                                                                                                     |                         |
| Ports                                       | 7 sensor ports (6 ports available when central wiper used)<br>Peripheral ports: 1 power communication port; 1 auxiliary expansion port                                              |                         |
| Size                                        | Diameter: 7.62 cm (3.00 in)<br>Length: 71.10 cm (28.00 in)                                                                                                                          |                         |
| Weight                                      | 3.60 kg (7.90 lbs) with 5 probes, guard and batteries installed                                                                                                                     |                         |
| Sondes                                      |                                                                                                                                                                                     |                         |
| Operating Temperature                       | -5 to 50°C                                                                                                                                                                          |                         |
| Storage Temperature                         | -20 to 80°C (except 0 to 60°C for pH and pH/ORP sensors)                                                                                                                            |                         |
| Depth Rating                                | 0 to 250 m (0 to 820 ft)                                                                                                                                                            |                         |
| Communications                              | Computer Interface: Bluetooth wireless technology, RS-485, USB<br>Output Options: USB with signal output adapter (SOA); RS-232 & SDI-12 with DCP-SOA                                |                         |
| Sample Rate                                 | Up to 4 Hz                                                                                                                                                                          |                         |
| Battery Life                                | 90 days**                                                                                                                                                                           |                         |
| Data Memory                                 | 512 MB total memory; >1,000,000 logged readings                                                                                                                                     |                         |
| Sensors                                     |                                                                                                                                                                                     | Calculated Parameters   |
| Ammonium                                    | ORP                                                                                                                                                                                 | Salinity                |
| Chloride                                    | pH                                                                                                                                                                                  | Specific Conductance    |
| Conductivity                                | Temperature                                                                                                                                                                         | Total Dissolved Solids  |
| Depth                                       | Total Algae (Chlorophyll + BGA-PC or PE)                                                                                                                                            | Total Suspended Solids  |
| Dissolved Oxygen                            | Turbidity                                                                                                                                                                           |                         |
| Fluorescent Dissolved Organic Matter (fDOM) | Vented Level                                                                                                                                                                        |                         |
| Nitrate                                     |                                                                                                                                                                                     |                         |
| EXO Handheld                                |                                                                                                                                                                                     |                         |
| Size                                        | Width: 12.00 cm (4.72 in)<br>Height: 25.00 cm (9.84 in)                                                                                                                             |                         |
| Weight                                      | 0.71 kg (1.56 lbs) without batteries                                                                                                                                                |                         |
| Operating System                            | Windows CE 5.0                                                                                                                                                                      |                         |
| Operating Temperature                       | -10 to 50°C                                                                                                                                                                         |                         |
| Storage Temperature                         | -20 to 80°C                                                                                                                                                                         |                         |
| IP Rating                                   | IP-67                                                                                                                                                                               |                         |
| Data Memory                                 | 2 GB total memory; >2,000,000 data sets                                                                                                                                             |                         |
| Accessories                                 |                                                                                                                                                                                     |                         |
| Cables (vented and non-vented)              | Flow cells                                                                                                                                                                          | Sonde/sensor guard      |
| Carrying case                               | KOR software                                                                                                                                                                        | Calibration cup         |
| DCP Signal Output Adapter                   | USB Signal Output Adapter                                                                                                                                                           | Anti-fouling components |
| Warranty                                    |                                                                                                                                                                                     |                         |
| 3 months                                    | Replaceable reagent modules for ammonium, chloride, and nitrate                                                                                                                     |                         |
| 1 Year                                      | Optical DO membranes and replaceable reagent moldules for pH and pH/ORP                                                                                                             |                         |
| 2 Years                                     | Cables; sonde bulkheads; handheld; conductivity, temperature, depth, and optical sensors; electronics base for pH, pH/ORP, ammonium, chloride, and nitrate sensors; and accessories |                         |

\* Specifications indicate typical performance and are subject to change.  
Please check EXOwater.com for up-to-date information.

\*\* Typically 90 days at 20°C at 15-minute logging interval; temperature/conductivity, pH/ORP, DO, and turbidity sensors installed on EXO1; or temperature/conductivity, pH/ORP, DO, total algae, and turbidity sensors installed with central wiper that rotates once per logging interval on EXO2. Battery life is heavily dependent on sensor configuration.

EXO Bluetooth modules comply with Part 15C of FCC Rules and have FCC, CE Mark and C-tick approval. Bluetooth-type approvals and regulations can be country specific. Check local laws and regulations to insure that the use of wireless products purchased from Xylem are in full compliance.

## Sensor Specifications\*

| Sensor                                                                                 | Range                                                              | Accuracy*                                                                                                         | Response               | Resolution                                           |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------|------------------------------------------------------|
| Ammonium <sup>11</sup><br>(ammonia with pH sensor)                                     | 0 to 200 mg/L <sup>1</sup>                                         | ±10% of reading or 2 mg/L-N, w.i.g.                                                                               | -                      | 0.01 mg/L                                            |
| Barometer                                                                              | 375 to 825 mmHg                                                    | ±1.5 mmHg from 0 to 50°C                                                                                          | -                      | 0.1 mmHg                                             |
| Blue-green Algae<br>Phycocyanin (PC)<br>(part of Total Algae sensor)                   | 0 to 100 RFU;<br>0 to 100 µg/L PC                                  | Linearity: R <sup>2</sup> > 0.999 for serial dilution of Rhodamine WT solution from 0 to 100 µg/mL PC equivalents | T63<2 sec              | 0.01 RFU; 0.01 µg/L PC                               |
| Blue-green Algae<br>Phycoerythrin (PE)<br>(part of Total Algae sensor)                 | 0 to 100 RFU;<br>0 to 280 µg/L PE                                  | Linearity: R <sup>2</sup> > 0.999 for serial dilution of Rhodamine WT solution from 0 to 280 µg/mL PE equivalents | T63<2 sec              | 0.01 RFU; 0.01 µg/L PE                               |
| Chloride <sup>11</sup>                                                                 | 0 to 1000 mg/L-Cl <sup>2</sup>                                     | ±15% of reading or 5 mg/L-Cl, w.i.g.                                                                              | -                      | 0.01 mg/L                                            |
| Chlorophyll<br>(part of Total Algae sensor)                                            | 0 to 400 µg/L Chl;<br>0 to 100 RFU                                 | Linearity: R <sup>2</sup> > 0.999 for serial dilution of Rhodamine WT solution from 0 to 400 µg/L Chl equivalents | T63<2 sec              | 0.01 µg/L Chl; 0.01 RFU                              |
| Conductivity <sup>3</sup>                                                              | 0 to 200 mS/cm                                                     | 0 to 100: ±0.5% of reading or 0.001 mS/cm, w.i.g.; 100 to 200: ±1% of reading                                     | T63<2 sec              | 0.0001 to 0.01 mS/cm (range dependent)               |
| Depth <sup>4</sup><br>(non-vented)                                                     | 0 to 10 m (0 to 33 ft)                                             | ±0.04% FS (±0.004 m or ±0.013 ft)                                                                                 | T63<2 sec              | 0.001 m (0.001 ft) (auto-ranging)                    |
|                                                                                        | 0 to 100 m (0 to 328 ft)                                           | ±0.04% FS (±0.04 m or ±0.13 ft)                                                                                   |                        |                                                      |
|                                                                                        | 0 to 250 m (0 to 820 ft)                                           | ±0.04% FS (±0.10 m or ±0.33 ft)                                                                                   |                        |                                                      |
| Vented Level                                                                           | 0 to 10 m (0 to 33 ft)                                             | ±0.03% FS (±0.003 m or ±0.010 ft)                                                                                 |                        |                                                      |
| Dissolved Oxygen<br>Optical                                                            | 0 to 500% air saturation                                           | 0 to 200%: ±1% of reading or 1% saturation, w.i.g.; 200 to 500%: ±5% of reading <sup>5</sup>                      | T63<5 sec <sup>6</sup> | 0.1% air saturation                                  |
|                                                                                        | 0 to 50 mg/L                                                       | 0 to 20 mg/L: ±0.1 mg/L or 1% of reading, w.i.g.; 20 to 50 mg/L: ±5% of reading <sup>5</sup>                      |                        | 0.01 mg/L                                            |
| fDOM                                                                                   | 0 to 300 ppb Quinine Sulfate equivalents (QSE)                     | Linearity: R <sup>2</sup> > 0.999 for serial dilution of 300 ppb QS solution<br>Detection Limit: 0.07 ppb QSE     | T63<2 sec              | 0.01 ppb QSE                                         |
| Nitrate <sup>11</sup>                                                                  | 0 to 200 mg/L-N <sup>1</sup>                                       | ±10% of reading or 2 mg/L-N, w.i.g.                                                                               | -                      | 0.01 mg/L                                            |
| ORP                                                                                    | -999 to 999 mV                                                     | ±20 mV in Redox standard solutions                                                                                | T63<5 sec <sup>7</sup> | 0.1 mV                                               |
| pH                                                                                     | 0 to 14 units                                                      | ±0.1 pH units within ±10°C of calibration temp; ±0.2 pH units for entire temp range <sup>8</sup>                  | T63<3 sec <sup>9</sup> | 0.01 units                                           |
| Salinity (Calculated from Conductivity and Temperature)                                | 0 to 70 ppt                                                        | ±1.0% of reading or 0.1 ppt, w.i.g.                                                                               | T63<2 sec              | 0.01 ppt                                             |
| Specific Conductance (Calculated from Cond. and Temp.)                                 | 0 to 200 mS/cm                                                     | ±0.5% of reading or .001 mS/cm, w.i.g.                                                                            | -                      | 0.001, 0.01, 0.1 mS/cm (auto-scaling)                |
| Temperature                                                                            | -5 to 50°C                                                         | -5 to 35°C: ±0.01°C <sup>10</sup><br>35 to 50°C: ±0.05°C <sup>10</sup>                                            | T63<1 sec              | 0.001 °C                                             |
| Total Dissolved Solids (TDS)<br>(Calculated from Conductivity and Temperature)         | 0 to 100,000 g/L<br>Cal constant range 0.30 to 1.00 (0.64 default) | Not Specified                                                                                                     | -                      | variable                                             |
| Total Suspended Solids (TSS)<br>(Calculated from Turbidity and user reference samples) | 0 to 1500 mg/L                                                     | Not Specified                                                                                                     | T63<2 sec              | variable                                             |
| Turbidity <sup>11</sup>                                                                | 0 to 4000 FNU                                                      | 0 to 999 FNU: 0.3 FNU or ±2% of reading, w.i.g.; 1000 to 4000 FNU: ±5% of reading <sup>12</sup>                   | T63<2 sec              | 0 to 999 FNU: 0.01 FNU;<br>1000 to 4000 FNU: 0.1 FNU |

All sensors have a depth rating to 250 m (820 ft), except shallow and medium depth sensors and ISEs. EXO sensors are not backward compatible with 6-Series sondes.

\* Specifications indicate typical performance and are subject to change. Please check EXOwater.com for up-to-date information.  
Accuracy specification is attained immediately following calibration under controlled and stable environmental conditions. Performance in the natural environment may vary from quoted specification.

<sup>1</sup> 0-30°C    <sup>2</sup> 0-40°C    w.i.g. = whichever is greater

<sup>3</sup> Outputs of specific conductance (conductivity corrected to 25°C) and total dissolved solids are also provided. The values are automatically calculated from conductivity according to algorithms found in *Standard Methods for the Examination of Water and Wastewater* (Ed. 1989).

<sup>4</sup> Accuracy specifications apply to conductivity levels of 0 to 100,000 µS/cm.

<sup>5</sup> Relative to calibration gases

<sup>6</sup> When transferred from air-saturated water to stirred deaerated water

<sup>7</sup> When transferred from water-saturated air to Zobell solution

<sup>8</sup> Within the environmental pH range of pH 4 to pH 10

<sup>9</sup> On transfer from water-saturated air to rapidly stirred air-saturated water at a specific conductance of 800 µS/cm at 20°C; T63<5 seconds on transfer from water-saturated air to slowly stirred air-saturated water.

<sup>10</sup> Temperature accuracy traceable to NIST standards

<sup>11</sup> Calibration: 1-, 2-, or 3-point, user-selectable

<sup>12</sup> Specification is defined in AMCO-AEPA Standards



## FH950 Portable Velocity Meter with 20' Cable



Product #: FH950.10020      Quantity  
 USD Price: \$4,585.00  
 Ships within 2 weeks

### Reduce manhours 50%

The step-by-step user interface simplifies programming, delivers real-time data, and downloads directly to PC allowing a single person to take the readings and eliminating post site visit manual data transfer from logbook to PC

### Automatically calculates total discharge based on USGS and ISO methods

Reduces time to manually calculate and likelihood of errors

### Real-time velocity graphed on color display

Visualize velocity trends quickly

### Lowest maintenance solution on the market

Electromagnetic velocity sensor with no moving parts never requires mechanical maintenance

### Lightweight, rugged portable meter

Only 1.5 pounds

### What's in the box

#### FH950.1 System Includes:

- Portable Velocity Meter
- Electromagnetic Sensor with 20' cable
- Fabric Carrying Case
- Adjustable Meter Rod Mount
- Universal Sensor Mount
- Battery Charger with Domestic/International Plug Adapters
- USB Cable
- Lanyard
- Sensor Screw Kit
- Absorbent Wipe

### Specifications

|                              |                                                                                                                                                                       |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Accuracy 2:                  | $\pm 2\%$ of reading $\pm 0.05$ ft/s ( $\pm 0.015$ m/s) through the range of 0 to 10 ft/s (0 to 3.04 m/s); $\pm 4\%$ of reading from 10 to 16 ft/s (3.04 to 4.87 m/s) |
| Battery Life:                | heavy typical day use; 68°F (20°C)                                                                                                                                    |
| Display: LCD:                | Color, LCD 3.5 QVGA transfective (readable in direct sunlight)                                                                                                        |
| Keypad:                      | Alpha-numerica                                                                                                                                                        |
| Operating Temperature Range: | -20 to 55 °C                                                                                                                                                          |
| Range:                       | to ft/s                                                                                                                                                               |
| Resolution:                  | Measurement Resolution - <10: 0.001; <100: 0.01; >100: 0.1                                                                                                            |
| Storage Conditions:          | -20 °C to 60 °C                                                                                                                                                       |

## Appendix D. Chlorophyll *a* Field Form

## NEORSD Chlorophyll a Sampling Field Sheet

Stream: \_\_\_\_\_  
 Location: \_\_\_\_\_  
 RM: \_\_\_\_\_  
 Lat/Long: \_\_\_\_\_

Collectors: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Time: \_\_\_\_\_

Number of Rocks: \_\_\_\_\_

Total Area Scraped: \_\_\_\_\_ cm<sup>2</sup>

Diameter of individual scrape

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_
- 7 \_\_\_\_\_
- 8 \_\_\_\_\_
- 9 \_\_\_\_\_
- 10 \_\_\_\_\_
- 11 \_\_\_\_\_
- 12 \_\_\_\_\_
- 13 \_\_\_\_\_
- 14 \_\_\_\_\_
- 15 \_\_\_\_\_
- 16 \_\_\_\_\_
- 17 \_\_\_\_\_
- 18 \_\_\_\_\_
- 19 \_\_\_\_\_
- 20 \_\_\_\_\_
- 21 \_\_\_\_\_
- 22 \_\_\_\_\_
- 23 \_\_\_\_\_
- 24 \_\_\_\_\_
- 25 \_\_\_\_\_

Area of individual scrape

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_
- 7 \_\_\_\_\_
- 8 \_\_\_\_\_
- 9 \_\_\_\_\_
- 10 \_\_\_\_\_
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- 16 \_\_\_\_\_
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- 18 \_\_\_\_\_
- 19 \_\_\_\_\_
- 20 \_\_\_\_\_
- 21 \_\_\_\_\_
- 22 \_\_\_\_\_
- 23 \_\_\_\_\_
- 24 \_\_\_\_\_
- 25 \_\_\_\_\_

Total: \_\_\_\_\_

| Diameter to Area Conversion |                         |
|-----------------------------|-------------------------|
| Diameter (cm)               | Area (cm <sup>2</sup> ) |
| 1.6                         | 2.011                   |
| 1.7                         | 2.27                    |
| 1.8                         | 2.545                   |
| 1.9                         | 2.835                   |
| 2.0                         | 3.142                   |
| 2.1                         | 3.464                   |
| 2.2                         | 3.801                   |
| 2.3                         | 4.155                   |

Total Sample Volume \_\_\_\_\_ ml

Filter 1 LABLynx ID \_\_\_\_\_  
 Vol \_\_\_\_\_ ml

Filter 2 LABLynx ID \_\_\_\_\_  
 Vol \_\_\_\_\_ ml

Filter 3 LABLynx ID \_\_\_\_\_  
 Vol \_\_\_\_\_ ml

| Water Column Chlorophyll Sample |                                  |
|---------------------------------|----------------------------------|
| Filter 1                        | LABLynx ID _____<br>Vol _____ ml |
| Filter 2                        | LABLynx ID _____<br>Vol _____ ml |
| Filter 3                        | LABLynx ID _____<br>Vol _____ ml |

**Flow:**      None      Low      Normal      Elevated      High

**Turbidity:**   Clear      Low      Moderate\*      High\*

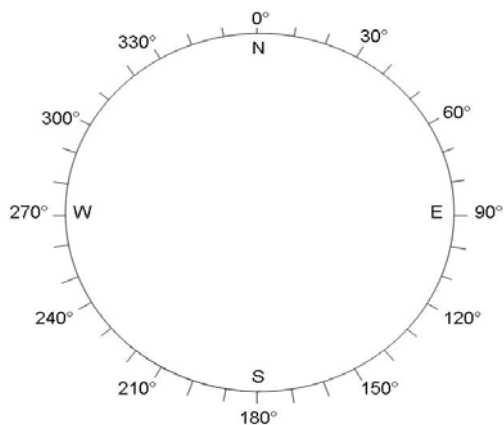
\*Explain \_\_\_\_\_

**Sky:**      Overcast      Cloudy      Partly Cloudy      Mostly Clear      Clear

**Canopy:**   Open      Mostly Open      Partly Closed      Closed

**Riparian**   None      Narrow L R      Moderate L R      Wide L R

# Downstream Channel Direction



## Clinometer

Left Bank \_\_\_\_\_°

Right Bank \_\_\_\_\_°

Left Bank \_\_\_\_\_°

Right Bank \_\_\_\_\_°

Left Bank \_\_\_\_\_°

Right Bank \_\_\_\_\_°

## Stream Widths

\_\_\_\_\_m \_\_\_\_\_m \_\_\_\_\_m

Record two most predominate substrates with an X, and check all present.

|               | Riffle | Run   | Reach |
|---------------|--------|-------|-------|
| Boulder/Slabs | _____  | _____ | _____ |
| Bedrock       | _____  | _____ | _____ |
| Boulder/Slabs | _____  | _____ | _____ |
| Cobble        | _____  | _____ | _____ |
| Gravel        | _____  | _____ | _____ |
| Sand          | _____  | _____ | _____ |
| Silt          | _____  | _____ | _____ |
| Hardpan       | _____  | _____ | _____ |
| Detritus      | _____  | _____ | _____ |
| Artificial    | _____  | _____ | _____ |

## Substrate Origin

\_\_\_\_\_ Limestone    \_\_\_\_\_ Tills    \_\_\_\_\_ Rip-rap  
 \_\_\_\_\_ Sandstone    \_\_\_\_\_ Shale    \_\_\_\_\_ Wetlands  
 \_\_\_\_\_ Lacustrine    \_\_\_\_\_ Hardpan    \_\_\_\_\_ Coal Fines

## Silt

\_\_\_\_\_ Heavy    \_\_\_\_\_ Moderate    \_\_\_\_\_ Normal    \_\_\_\_\_ None

## Embeddedness

\_\_\_\_\_ Extensive    \_\_\_\_\_ Moderate    \_\_\_\_\_ Normal    \_\_\_\_\_ None

Notes: \_\_\_\_\_

Length of Reach: \_\_\_\_\_m

Stream Drawing

## Appendix E. Laboratory Certifications



*State of New Hampshire*  
*Environmental Laboratory Accreditation Program*  
*Awards*

**PRIMARY NH ELAP ACCREDITATION**

to

**NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES (#2238)**

of

**CUYAHOGA HEIGHTS, OH**

For the matrix, method and analytes listed on the latest Analyte List in accordance  
with the provisions on the 2016 TNI Standards and Env-C 300.

**Certificate Number:** 223823

**Effective Date:** 12/1/2023

**Expiration Date:** 11/30/2024

**Laboratory ID:** 2238



*Bill Hall*  
NORTHEAS11/20/2023

Bill Hall  
NH ELAP Program Manager

Method accreditation does not imply acceptance for NHDES compliance testing. Laboratory is required to use EPA-approved methods required by regulation. Continuing accreditation status is dependent on successful ongoing participation in the program. Customers may verify the laboratory's current accreditation status by calling (603) 271-2998 or by visiting the NH ELAP website (<https://www.des.nh.gov/water/drinking-water/new-hampshire-environmental-laboratory-accreditation-program>).

# NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

## PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 223823-A



**NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES**  
**4747 EAST 49TH STREET**

**CUYAHOGA HEIGHTS OH 44125**  
**216-641-6000**  
**Lab ID: 2238**



| Analyte Code                                                                      | Analyte Name     | Effective Date | Expiration Date          | Matrix | Category          | Accr. Type |
|-----------------------------------------------------------------------------------|------------------|----------------|--------------------------|--------|-------------------|------------|
| <b>Method Code: 20211443    Method Ref: SM 9223 B (COLILERT® QUANTI-TRAY®)</b>    |                  |                | <b>Revision: 23RD ED</b> |        | <b>Date: 2016</b> |            |
| 2525                                                                              | ESCHERICHIA COLI | 03/23/2021     | 11/30/2024               | D      | MIC               | NE         |
| 2500                                                                              | TOTAL COLIFORMS  | 03/23/2021     | 11/30/2024               | D      | MIC               | NE         |
| <b>Method Code: 20213449    Method Ref: SM 9223 B (COLILERT®-18 QUANTI-TRAY®)</b> |                  |                | <b>Revision: 23RD ED</b> |        | <b>Date: 2016</b> |            |
| 2525                                                                              | ESCHERICHIA COLI | 03/23/2021     | 11/30/2024               | D      | MIC               | NE         |
| 2500                                                                              | TOTAL COLIFORMS  | 03/23/2021     | 11/30/2024               | D      | MIC               | NE         |
| <b>Method Code: 20214431    Method Ref: SM 9223 B (COLILERT®-18)</b>              |                  |                | <b>Revision: 23RD ED</b> |        | <b>Date: 2016</b> |            |
| 2525                                                                              | ESCHERICHIA COLI | 03/23/2021     | 11/30/2024               | D      | MIC               | NE         |
| 2500                                                                              | TOTAL COLIFORMS  | 03/23/2021     | 11/30/2024               | D      | MIC               | NE         |
| <b>Method Code: 20214442    Method Ref: SM 9223 B (COLILERT®)</b>                 |                  |                | <b>Revision: 23RD ED</b> |        | <b>Date: 2016</b> |            |
| 2525                                                                              | ESCHERICHIA COLI | 03/23/2021     | 11/30/2024               | D      | MIC               | NE         |
| 2500                                                                              | TOTAL COLIFORMS  | 03/23/2021     | 11/30/2024               | D      | MIC               | NE         |
| <b>Method Code: 10013806    Method Ref: EPA 200.7</b>                             |                  |                | <b>Revision: 4.4</b>     |        | <b>Date: 1994</b> |            |
| 1000                                                                              | ALUMINUM         | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1015                                                                              | BARIUM           | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1020                                                                              | BERYLLIUM        | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1030                                                                              | CADMIUM          | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1035                                                                              | CALCIUM          | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1040                                                                              | CHROMIUM         | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1055                                                                              | COPPER           | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1070                                                                              | IRON             | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1085                                                                              | MAGNESIUM        | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1090                                                                              | MANGANESE        | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1105                                                                              | NICKEL           | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1150                                                                              | SILVER           | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1155                                                                              | SODIUM           | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1190                                                                              | ZINC             | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| <b>Method Code: 10014605    Method Ref: EPA 200.8</b>                             |                  |                | <b>Revision: 5.4</b>     |        | <b>Date: 1994</b> |            |
| 1000                                                                              | ALUMINUM         | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1005                                                                              | ANTIMONY         | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1010                                                                              | ARSENIC          | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1015                                                                              | BARIUM           | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1030                                                                              | CADMIUM          | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1040                                                                              | CHROMIUM         | 03/23/2021     | 11/30/2024               | D      | MET               | NE         |
| 1055                                                                              | COPPER           | 01/25/2022     | 11/30/2024               | D      | MET               | NE         |

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# NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

## PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 223823-A



**NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES**  
**4747 EAST 49TH STREET**

**CUYAHOGA HEIGHTS OH 44125**  
**216-641-6000**  
**Lab ID: 2238**



|                                                                                |                                     |            |                          |   |                   |    |
|--------------------------------------------------------------------------------|-------------------------------------|------------|--------------------------|---|-------------------|----|
| 1075                                                                           | LEAD                                | 03/23/2021 | 11/30/2024               | D | MET               | NE |
| 1090                                                                           | MANGANESE                           | 03/23/2021 | 11/30/2024               | D | MET               | NE |
| 1105                                                                           | NICKEL                              | 03/23/2021 | 11/30/2024               | D | MET               | NE |
| 1140                                                                           | SELENIUM                            | 03/23/2021 | 11/30/2024               | D | MET               | NE |
| 1150                                                                           | SILVER                              | 03/23/2021 | 11/30/2024               | D | MET               | NE |
| 1190                                                                           | ZINC                                | 03/23/2021 | 11/30/2024               | D | MET               | NE |
| <b>Method Code: 10036609 Method Ref: EPA 245.1</b>                             |                                     |            | <b>Revision: 3</b>       |   | <b>Date: 1994</b> |    |
| 1095                                                                           | MERCURY                             | 03/23/2021 | 11/30/2024               | D | MET               | NE |
| <b>Method Code: 10011800 Method Ref: EPA 180.1</b>                             |                                     |            | <b>Revision: 2.0</b>     |   | <b>Date: 1993</b> |    |
| 2055                                                                           | TURBIDITY                           | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| <b>Method Code: 10013806 Method Ref: EPA 200.7</b>                             |                                     |            | <b>Revision: 4.4</b>     |   | <b>Date: 1994</b> |    |
| 1755                                                                           | TOTAL HARDNESS AS CaCO <sub>3</sub> | 03/29/2021 | 11/30/2024               | D | NMI               | NE |
| <b>Method Code: 10053200 Method Ref: EPA 300.0</b>                             |                                     |            | <b>Revision: 2.1</b>     |   | <b>Date: 1993</b> |    |
| 1575                                                                           | CHLORIDE                            | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| 1730                                                                           | FLUORIDE                            | 12/07/2021 | 11/30/2024               | D | NMI               | NE |
| 1810                                                                           | NITRATE AS N                        | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| 1840                                                                           | NITRITE AS N                        | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| 1870                                                                           | ORTHOPHOSPHATE AS P                 | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| 2000                                                                           | SULFATE                             | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| <b>Method Code: 10070005 Method Ref: EPA 365.1</b>                             |                                     |            | <b>Revision: 2</b>       |   | <b>Date: 1993</b> |    |
| 1870                                                                           | ORTHOPHOSPHATE AS P                 | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| <b>Method Code: 20048617 Method Ref: SM 2510 B-2011</b>                        |                                     |            | <b>Revision:</b>         |   | <b>Date: 2011</b> |    |
| 1610                                                                           | CONDUCTIVITY                        | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| <b>Method Code: 20050457 Method Ref: SM 2540 C</b>                             |                                     |            | <b>Revision: 23RD ED</b> |   | <b>Date: 2015</b> |    |
| 1955                                                                           | RESIDUE-FILTERABLE (TDS)            | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| <b>Method Code: 20102414 Method Ref: SM 4500-F C-2011</b>                      |                                     |            | <b>Revision:</b>         |   | <b>Date: 2011</b> |    |
| 1730                                                                           | FLUORIDE                            | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| <b>Method Code: 20105220 Method Ref: SM 4500-H+ B-2011</b>                     |                                     |            | <b>Revision:</b>         |   | <b>Date: 2011</b> |    |
| 1900                                                                           | PH                                  | 03/23/2021 | 11/30/2024               | D | NMI               | NE |
| <b>Method Code: 60044088 Method Ref: NECI NITRATE-REDUCTASE</b>                |                                     |            | <b>Revision:</b>         |   | <b>Date: 2016</b> |    |
| 1810                                                                           | NITRATE AS N                        | 11/20/2023 | 11/30/2024               | D | NMI               | CN |
| 1820                                                                           | NITRATE PLUS NITRITE AS N           | 11/20/2023 | 11/30/2024               | D | NMI               | CN |
| 1840                                                                           | NITRITE AS N                        | 11/20/2023 | 11/30/2024               | D | NMI               | CN |
| <b>Method Code: 20211443 Method Ref: SM 9223 B (COLILERT® QUANTI-TRAY®)</b>    |                                     |            | <b>Revision: 23RD ED</b> |   | <b>Date: 2016</b> |    |
| 2525                                                                           | ESCHERICHIA COLI                    | 03/23/2021 | 11/30/2024               | N | MIC               | NE |
| 2500                                                                           | TOTAL COLIFORMS                     | 03/23/2021 | 11/30/2024               | N | MIC               | NE |
| <b>Method Code: 20213449 Method Ref: SM 9223 B (COLILERT®-18 QUANTI-TRAY®)</b> |                                     |            | <b>Revision: 23RD ED</b> |   | <b>Date: 2016</b> |    |
| 2525                                                                           | ESCHERICHIA COLI                    | 03/23/2021 | 11/30/2024               | N | MIC               | NE |

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# NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

## PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 223823-A



**NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES**  
**4747 EAST 49TH STREET**

**CUYAHOGA HEIGHTS OH 44125**  
**216-641-6000**  
**Lab ID: 2238**



|                                                         |                 |            |                      |   |                   |    |
|---------------------------------------------------------|-----------------|------------|----------------------|---|-------------------|----|
| 2500                                                    | TOTAL COLIFORMS | 03/16/2021 | 11/30/2024           | N | MIC               | NE |
| <b>Method Code: 10013806      Method Ref: EPA 200.7</b> |                 |            | <b>Revision: 4.4</b> |   | <b>Date: 1994</b> |    |
| 1000                                                    | ALUMINUM        | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1005                                                    | ANTIMONY        | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1010                                                    | ARSENIC         | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1015                                                    | BARIUM          | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1020                                                    | BERYLLIUM       | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1030                                                    | CADMIUM         | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1035                                                    | CALCIUM         | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1040                                                    | CHROMIUM        | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1050                                                    | COBALT          | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1055                                                    | COPPER          | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1070                                                    | IRON            | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1075                                                    | LEAD            | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1085                                                    | MAGNESIUM       | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1090                                                    | MANGANESE       | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1100                                                    | MOLYBDENUM      | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1105                                                    | NICKEL          | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1125                                                    | POTASSIUM       | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1140                                                    | SELENIUM        | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1150                                                    | SILVER          | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1155                                                    | SODIUM          | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1160                                                    | STRONTIUM       | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1165                                                    | THALLIUM        | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1175                                                    | TIN             | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1180                                                    | TITANIUM        | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1185                                                    | VANADIUM        | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1190                                                    | ZINC            | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| <b>Method Code: 10014605      Method Ref: EPA 200.8</b> |                 |            | <b>Revision: 5.4</b> |   | <b>Date: 1994</b> |    |
| 1000                                                    | ALUMINUM        | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1005                                                    | ANTIMONY        | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1010                                                    | ARSENIC         | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1015                                                    | BARIUM          | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1020                                                    | BERYLLIUM       | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1030                                                    | CADMIUM         | 12/01/2019 | 11/30/2024           | N | MET               | NE |
| 1035                                                    | CALCIUM         | 12/01/2019 | 11/30/2024           | N | MET               | NE |

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# NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

## PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 223823-A



**NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES**  
**4747 EAST 49TH STREET**

**CUYAHOGA HEIGHTS OH 44125**  
**216-641-6000**  
**Lab ID: 2238**



|                                                            |                                     |            |                      |                   |     |    |
|------------------------------------------------------------|-------------------------------------|------------|----------------------|-------------------|-----|----|
| 1040                                                       | CHROMIUM                            | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1050                                                       | COBALT                              | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1055                                                       | COPPER                              | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1070                                                       | IRON                                | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1075                                                       | LEAD                                | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1085                                                       | MAGNESIUM                           | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1090                                                       | MANGANESE                           | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1100                                                       | MOLYBDENUM                          | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1105                                                       | NICKEL                              | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1125                                                       | POTASSIUM                           | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1140                                                       | SELENIUM                            | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1150                                                       | SILVER                              | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1155                                                       | SODIUM                              | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1160                                                       | STRONTIUM                           | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1175                                                       | TIN                                 | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1180                                                       | TITANIUM                            | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1185                                                       | VANADIUM                            | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| 1190                                                       | ZINC                                | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| <b>Method Code: 10036609 Method Ref: EPA 245.1</b>         |                                     |            | <b>Revision: 3</b>   | <b>Date: 1994</b> |     |    |
| 1095                                                       | MERCURY                             | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| <b>Method Code: 10237204 Method Ref: EPA 1631E</b>         |                                     |            | <b>Revision:</b>     | <b>Date: 2002</b> |     |    |
| 1095                                                       | MERCURY                             | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| <b>Method Code: 20066266 Method Ref: SM 3500-CR B-2011</b> |                                     |            | <b>Revision:</b>     | <b>Date: 2011</b> |     |    |
| 1045                                                       | CHROMIUM (VI)                       | 12/01/2019 | 11/30/2024           | N                 | MET | NE |
| <b>Method Code: 10011800 Method Ref: EPA 180.1</b>         |                                     |            | <b>Revision: 2.0</b> | <b>Date: 1993</b> |     |    |
| 2055                                                       | TURBIDITY                           | 12/01/2019 | 11/30/2024           | N                 | NMI | NE |
| <b>Method Code: 10013806 Method Ref: EPA 200.7</b>         |                                     |            | <b>Revision: 4.4</b> | <b>Date: 1994</b> |     |    |
| 1755                                                       | TOTAL HARDNESS AS CaCO <sub>3</sub> | 03/29/2021 | 11/30/2024           | N                 | NMI | NE |
| <b>Method Code: 10014605 Method Ref: EPA 200.8</b>         |                                     |            | <b>Revision: 5.4</b> | <b>Date: 1994</b> |     |    |
| 1755                                                       | TOTAL HARDNESS AS CaCO <sub>3</sub> | 03/29/2021 | 11/30/2024           | N                 | NMI | NE |
| <b>Method Code: 10053200 Method Ref: EPA 300.0</b>         |                                     |            | <b>Revision: 2.1</b> | <b>Date: 1993</b> |     |    |
| 1540                                                       | BROMIDE                             | 12/01/2019 | 11/30/2024           | N                 | NMI | NE |
| 1575                                                       | CHLORIDE                            | 12/01/2019 | 11/30/2024           | N                 | NMI | NE |
| 1810                                                       | NITRATE AS N                        | 12/01/2019 | 11/30/2024           | N                 | NMI | NE |
| 1840                                                       | NITRITE AS N                        | 12/01/2019 | 11/30/2024           | N                 | NMI | NE |
| 1870                                                       | ORTHOPHOSPHATE AS P                 | 12/01/2019 | 11/30/2024           | N                 | NMI | NE |
| 2000                                                       | SULFATE                             | 12/01/2019 | 11/30/2024           | N                 | NMI | NE |

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# NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

## PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 223823-A



**NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES**  
**4747 EAST 49TH STREET**

**CUYAHOGA HEIGHTS OH 44125**  
**216-641-6000**  
**Lab ID: 2238**



|                              |                                      |            |                          |                   |     |    |
|------------------------------|--------------------------------------|------------|--------------------------|-------------------|-----|----|
| <b>Method Code: 10055206</b> | <b>Method Ref: EPA 310.2</b>         |            | <b>Revision:</b>         | <b>Date: 1974</b> |     |    |
| 1505                         | ALKALINITY AS CaCO <sub>3</sub>      | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 10063602</b> | <b>Method Ref: EPA 350.1</b>         |            | <b>Revision: 2</b>       | <b>Date: 1993</b> |     |    |
| 1515                         | AMMONIA AS N                         | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 10065404</b> | <b>Method Ref: EPA 351.2</b>         |            | <b>Revision: 2</b>       | <b>Date: 1993</b> |     |    |
| 1795                         | TOTAL KJELDAHL NITROGEN (TKN)        | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 10070005</b> | <b>Method Ref: EPA 365.1</b>         |            | <b>Revision: 2</b>       | <b>Date: 1993</b> |     |    |
| 1713                         | DISSOLVED REACTIVE PHOSPHORUS        | 11/26/2022 | 11/30/2024               | N                 | NMI | NE |
| 1870                         | ORTHOPHOSPHATE AS P                  | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| 1910                         | TOTAL PHOSPHORUS                     | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 10077404</b> | <b>Method Ref: EPA 410.4</b>         |            | <b>Revision: 2</b>       | <b>Date: 1993</b> |     |    |
| 1565                         | CHEMICAL OXYGEN DEMAND (COD)         | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 10079400</b> | <b>Method Ref: EPA 420.1</b>         |            | <b>Revision:</b>         | <b>Date: 1978</b> |     |    |
| 1905                         | TOTAL PHENOLICS                      | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 10261617</b> | <b>Method Ref: EPA 1664B</b>         |            | <b>Revision:</b>         | <b>Date: 2010</b> |     |    |
| 1803                         | N-HEXANE EXTRACTABLE MATERIAL (O&G)  | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20048617</b> | <b>Method Ref: SM 2510 B-2011</b>    |            | <b>Revision:</b>         | <b>Date: 2011</b> |     |    |
| 1610                         | CONDUCTIVITY                         | 03/23/2021 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20049438</b> | <b>Method Ref: SM 2540 B-2015</b>    |            | <b>Revision:</b>         | <b>Date: 2015</b> |     |    |
| 1950                         | RESIDUE-TOTAL (TS)                   | 08/22/2021 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20050457</b> | <b>Method Ref: SM 2540 C</b>         |            | <b>Revision: 23RD ED</b> | <b>Date: 2015</b> |     |    |
| 1955                         | RESIDUE-FILTERABLE (TDS)             | 03/23/2021 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20051223</b> | <b>Method Ref: SM 2540 D-2015</b>    |            | <b>Revision:</b>         | <b>Date: 2015</b> |     |    |
| 1960                         | RESIDUE-NONFILTERABLE (TSS)          | 08/22/2021 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20080426</b> | <b>Method Ref: SM 4500-CL E-2011</b> |            | <b>Revision:</b>         | <b>Date: 2011</b> |     |    |
| 1940                         | TOTAL RESIDUAL CHLORINE              | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20085216</b> | <b>Method Ref: SM 4500-CL C-2011</b> |            | <b>Revision:</b>         | <b>Date: 2011</b> |     |    |
| 1575                         | CHLORIDE                             | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20097023</b> | <b>Method Ref: SM 4500-CN G</b>      |            | <b>Revision: 23RD ED</b> | <b>Date: 2016</b> |     |    |
| 1510                         | AMENABLE CYANIDE                     | 03/23/2021 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20099814</b> | <b>Method Ref: SM 4500-CN N</b>      |            | <b>Revision: 23RD ED</b> | <b>Date: 2016</b> |     |    |
| 1645                         | TOTAL CYANIDE                        | 11/26/2022 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20105220</b> | <b>Method Ref: SM 4500-H+ B-2011</b> |            | <b>Revision:</b>         | <b>Date: 2011</b> |     |    |
| 1900                         | PH                                   | 12/01/2019 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20135039</b> | <b>Method Ref: SM 5210 B-2016</b>    |            | <b>Revision:</b>         | <b>Date: 2016</b> |     |    |
| 1530                         | BIOCHEMICAL OXYGEN DEMAND (BOD)      | 03/23/2021 | 11/30/2024               | N                 | NMI | NE |
| 1555                         | CARBONACEOUS BOD (CBOD)              | 03/23/2021 | 11/30/2024               | N                 | NMI | NE |
| <b>Method Code: 20137637</b> | <b>Method Ref: SM 5310 B-2014</b>    |            | <b>Revision: 23RD ED</b> | <b>Date: 2014</b> |     |    |
| 2040                         | TOTAL ORGANIC CARBON (TOC)           | 03/23/2021 | 11/30/2024               | N                 | NMI | NE |

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# NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

## PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 223823-A



**NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES**  
**4747 EAST 49TH STREET**

**CUYAHOGA HEIGHTS OH 44125**  
**216-641-6000**  
**Lab ID: 2238**



|                              |                                                                      |            |                            |                   |     |    |
|------------------------------|----------------------------------------------------------------------|------------|----------------------------|-------------------|-----|----|
| <b>Method Code: 30034107</b> | <b>Method Ref: ASTM D7781-14</b>                                     |            | <b>Revision:</b>           | <b>Date: 2014</b> |     |    |
| 1810                         | NITRATE AS N                                                         | 11/20/2023 | 11/30/2024                 | N                 | NMI | CN |
| 1820                         | NITRATE PLUS NITRITE AS N                                            | 11/26/2022 | 11/30/2024                 | N                 | NMI | NE |
| 1840                         | NITRITE AS N                                                         | 11/20/2023 | 11/30/2024                 | N                 | NMI | CN |
| <b>Method Code: 60031450</b> | <b>Method Ref: OIA 1677-09</b>                                       |            | <b>Revision:</b>           | <b>Date: 2010</b> |     |    |
| 1523                         | AVAILABLE CYANIDE                                                    | 03/23/2021 | 11/30/2024                 | N                 | NMI | NE |
| <b>Method Code: 10133207</b> | <b>Method Ref: SW-846 3005A</b>                                      |            | <b>Revision: UPDATE I</b>  | <b>Date: 1992</b> |     |    |
| 1438                         | PRECONCENTRATION UNDER ACID                                          | 12/01/2019 | 11/30/2024                 | N                 | PRE | NE |
| <b>Method Code: 10133605</b> | <b>Method Ref: SW-846 3010A</b>                                      |            | <b>Revision: UPDATE I</b>  | <b>Date: 1992</b> |     |    |
| 1420                         | HOT PLATE ACID DIGESTION (HNO <sub>3</sub> + HCL)                    | 12/01/2019 | 11/30/2024                 | N                 | PRE | NE |
| <b>Method Code: 10134006</b> | <b>Method Ref: SW-846 3015A</b>                                      |            | <b>Revision: UPDATE IV</b> | <b>Date: 2007</b> |     |    |
| 1430                         | MICROWAVE-ASSISTED ACID DIGESTION OF TCLP EXTRACTS                   | 03/23/2021 | 11/30/2024                 | N                 | PRE | NH |
| <b>Method Code: 20095458</b> | <b>Method Ref: SM 4500-CN C</b>                                      |            | <b>Revision: 23RD ED</b>   | <b>Date: 2016</b> |     |    |
| 1412                         | CYANIDE, MANUAL DISTILLATION                                         | 11/26/2022 | 11/30/2024                 | N                 | PRE | NE |
| <b>Method Code: 10214207</b> | <b>Method Ref: EPA 1000.0 - FATHEAD MINNOW, 7-DAY CHRONIC, DAILY</b> |            | <b>Revision:</b>           | <b>Date: 2002</b> |     |    |
| 3470                         | IC <sub>25</sub> (ON) GROWTH                                         | 12/01/2019 | 11/30/2024                 | N                 | TOX | NE |
| 3475                         | NOEC (GROWTH)                                                        | 12/01/2019 | 11/30/2024                 | N                 | TOX | NE |
| 3465                         | NOEC (SURVIVAL)                                                      | 12/01/2019 | 11/30/2024                 | N                 | TOX | NE |
| <b>Method Code: 10253040</b> | <b>Method Ref: EPA 1002.0 - CERIODAPHNIA DUBIA, 3-BROOD CHRONIC,</b> |            | <b>Revision:</b>           | <b>Date: 2002</b> |     |    |
| 3480                         | IC <sub>25</sub> REPRODUCTION                                        | 12/01/2019 | 11/30/2024                 | N                 | TOX | NE |
| 3465                         | NOEC (SURVIVAL)                                                      | 12/01/2019 | 11/30/2024                 | N                 | TOX | NE |
| 3485                         | NOEC REPRODUCTION                                                    | 12/01/2019 | 11/30/2024                 | N                 | TOX | NE |
| <b>Method Code: 10013806</b> | <b>Method Ref: EPA 200.7</b>                                         |            | <b>Revision: 4.4</b>       | <b>Date: 1994</b> |     |    |
| 1000                         | ALUMINUM                                                             | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1005                         | ANTIMONY                                                             | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1010                         | ARSENIC                                                              | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1015                         | BARIUM                                                               | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1020                         | BERYLLIUM                                                            | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1030                         | CADMIUM                                                              | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1035                         | CALCIUM                                                              | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1040                         | CHROMIUM                                                             | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1050                         | COBALT                                                               | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1055                         | COPPER                                                               | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1070                         | IRON                                                                 | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1075                         | LEAD                                                                 | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |
| 1085                         | MAGNESIUM                                                            | 12/01/2019 | 11/30/2024                 | SC                | MET | NE |

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|                                                            |                               |            |                              |    |                   |    |
|------------------------------------------------------------|-------------------------------|------------|------------------------------|----|-------------------|----|
| 1090                                                       | MANGANESE                     | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1100                                                       | MOLYBDENUM                    | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1105                                                       | NICKEL                        | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1125                                                       | POTASSIUM                     | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1140                                                       | SELENIUM                      | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1150                                                       | SILVER                        | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1155                                                       | SODIUM                        | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1160                                                       | STRONTIUM                     | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1165                                                       | THALLIUM                      | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1175                                                       | TIN                           | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1180                                                       | TITANIUM                      | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1185                                                       | VANADIUM                      | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| 1190                                                       | ZINC                          | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| <b>Method Code: 10036609 Method Ref: EPA 245.1</b>         |                               |            | <b>Revision: 3</b>           |    | <b>Date: 1994</b> |    |
| 1095                                                       | MERCURY                       | 12/01/2019 | 11/30/2024                   | SC | MET               | NE |
| <b>Method Code: 10063602 Method Ref: EPA 350.1</b>         |                               |            | <b>Revision: 2</b>           |    | <b>Date: 1993</b> |    |
| 1515                                                       | AMMONIA AS N                  | 12/01/2019 | 11/30/2024                   | SC | NMI               | NE |
| <b>Method Code: 10065404 Method Ref: EPA 351.2</b>         |                               |            | <b>Revision: 2</b>           |    | <b>Date: 1993</b> |    |
| 1795                                                       | TOTAL KJELDAHL NITROGEN (TKN) | 12/01/2019 | 11/30/2024                   | SC | NMI               | NE |
| <b>Method Code: 10070005 Method Ref: EPA 365.1</b>         |                               |            | <b>Revision: 2</b>           |    | <b>Date: 1993</b> |    |
| 1910                                                       | TOTAL PHOSPHORUS              | 12/01/2019 | 11/30/2024                   | SC | NMI               | NE |
| <b>Method Code: 10198455 Method Ref: SW-846 9045D</b>      |                               |            | <b>Revision: UPDATE IIIB</b> |    | <b>Date: 2004</b> |    |
| 1900                                                       | PH                            | 03/23/2021 | 11/30/2024                   | SC | NMI               | NE |
| <b>Method Code: 20005270 Method Ref: SM 2540 G-2011</b>    |                               |            | <b>Revision:</b>             |    | <b>Date: 2011</b> |    |
| 1947                                                       | RESIDUE - FIXED               | 12/01/2019 | 11/30/2024                   | SC | NMI               | NE |
| 1950                                                       | RESIDUE-TOTAL (TS)            | 12/01/2019 | 11/30/2024                   | SC | NMI               | NE |
| 1970                                                       | RESIDUE-VOLATILE              | 12/01/2019 | 11/30/2024                   | SC | NMI               | NE |
| <b>Method Code: NH0344 Method Ref: NEORSOP SOP 2037-06</b> |                               |            | <b>Revision: 6</b>           |    | <b>Date:</b>      |    |
| 1645                                                       | TOTAL CYANIDE                 | 12/07/2021 | 11/30/2024                   | SC | NMI               | NE |
| <b>Method Code: 10136002 Method Ref: SW-846 3051A</b>      |                               |            | <b>Revision: UPDATE IV</b>   |    | <b>Date: 2007</b> |    |
| 1426                                                       | MICROWAVE DIGESTION OF SOLIDS | 03/23/2021 | 11/30/2024                   | SC | PRE               | NE |

*Bill White*  
**NORTHEAST 11/20/2023**

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**4747 EAST 49TH STREET**

**CUYAHOGA HEIGHTS OH 44125**  
**216-641-6000**  
**Lab ID: 2238**



Bill Hall  
NH ELAP Program Manager  
Issue Date: 11/20/2023

Matrix Legend: AE=Air; BT=Tissue; D=Drinking Water; N=Non-Potable Water; SC=Solid and Chemical Materials

Category Legend: MIC=Microbiology; MET=Metals; NMI=Non-Metal Inorganics; PRE=Preparation; VOC=Volatile Organic Compounds; SBN=SVOC-BNA; SHE=SVOC-Herbicides; SNO=SVOC-NOS; SPC=SVOC-PCB; SPE=SVOC-Pesticides; RAD=Radiochemistry; WET=Wet, PFC=Perfluorinated compound

Accreditation Legend: NE=NELAP; NH=NH State Certification; CE=State Certification; IN=Interim (NELAP); WI=Withdrawn; AP=Applied; RE=Revoked; SU=Suspended

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## Appendix F. Acknowledgment Letters

February 29, 2024

Mr. Seth Hothem  
Supervisor of Environmental Assessment  
Northeast Ohio Regional Sewer District  
4747 East 49<sup>th</sup> Street  
Cuyahoga Heights, OH 44125

Dear Mr. Hothem:

This letter is to acknowledge that I am responsible for assisting the Northeast Ohio Regional Sewer District's Water Quality and Industrial Surveillance Division in conducting chemical water quality assessments for the 2024 Cuyahoga River and Northern Tributaries Environmental Monitoring, East Side Tributaries Environmental Monitoring, Stream Restoration Projects Environmental Monitoring, the Lake Erie Beach Monitoring and Lake Erie Nutrient Study.

It is understood that an Ohio Environmental Protection Agency Level 3 Qualified Data Collector (QDC) Certification for Chemical Water Quality Assessment is required to perform these tasks and that I am responsible for maintaining my Level 3 QDC Certification during the term of these Study Plans.

In addition, I have not been convicted nor pleaded guilty to a Violation of Section 2911.21 of the Revised Code (criminal Trespass) or a substantially similar municipal ordinance within the previous five years.

Sincerely,



Kelsey Hickox  
QDC Number: 01091  
Stormwater Inspector III  
Northeast Ohio Regional Sewer District  
4747 East 49<sup>th</sup> Street  
Cuyahoga Heights, OH 44125

February 29, 2024

Mr. Seth Hothem  
Supervisor of Environmental Assessment  
Northeast Ohio Regional Sewer District  
4747 East 49<sup>th</sup> Street  
Cuyahoga Heights, OH 44125

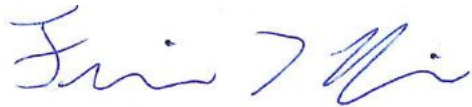
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Sincerely,



Francisco J. Rivera  
QDC Number: 00262  
Watershed Team Leader  
Northeast Ohio Regional Sewer District  
3900 Euclid Avenue  
Cleveland, OH 44115

Appendix G. Wild Animal Collector's Permit

To be submitted once received from ODNR

## Appendix H. References

## References

- Biohabitats (2020). *City of Brooklyn: Stickney Creek Stream Stabilization and Floodplain Restoration*. Biohabitats.
- Chlorophyll a Sampling and Field Filtering Standard Operating Procedure (SOP-EA001-00)
- EPA New England- Region 1 (2005). *Standard operating procedure for calibration and field measurement procedures for the YSI Model 6-Series Sondes and Data Logger (Including: temperature, pH, specific conductance, turbidity, dissolved oxygen, chlorophyll, rhodamine WT, ORP, and barometric pressure)* (7<sup>th</sup> Revision). North Chelmsford, MA: The Office of Environmental Measurement and Evaluation, Ecosystem Assessment- Ecology Monitoring Team.
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- Ohio Environmental Protection Agency (1987b). *Biological criteria for the protection of aquatic life: Volume III. Standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities* (Updated September 1989; March 2001; November 2006; August 2008; June 2015). Columbus, OH: Division of Water Quality Monitoring and Assessment.
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