

STATE OF OHIO

CREDIBLE DATA PROGRAM

Chapter 3745-4 of the ADMINISTRATIVE CODE

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3745-4-01 **Purpose and applicability.**

- (A) The purpose of this chapter, credible data rules, is to establish criteria for three levels of credible data for a surface water quality monitoring and assessment program established by the director and to establish the necessary training and experience for persons to submit credible data, thereby increasing the information base upon which to enhance, improve and maintain water resource quality in Ohio. Except as provided in paragraph (D) of this rule, persons collecting data and submitting it to Ohio EPA for consideration as credible data must have status as a qualified data collector (QDC) as provided in rule 3745-4-03 of the Administrative Code.

- (B) Participation in this program is voluntary except for the requirement under section 6111.54 of the Revised Code that each state agency in possession of surface water quality data shall submit the data to the environmental protection agency in a format designated by the director. State agencies shall submit surface water quality data to Ohio EPA by March thirty-first of each year, beginning in 2007. If surface water quality data submitted by state agencies were collected in accordance with this chapter, the data will be approved as credible.

- (C) This chapter establishes requirements for study plan design, sample collection, analytical methods, data assessment, and quality assurance and quality control procedures that are associated with credible data at level 1, level 2 and level 3.
 - (1) Level 1 data are collected and submitted to Ohio EPA for purposes of public awareness and educational activities. The specifications associated with level 1 data are commensurate with the training and methods associated with established science education programs and volunteer stream and lake monitoring programs.

 - (2) Level 2 data are collected and submitted to Ohio EPA for the purposes of evaluating the effectiveness of pollution controls for point sources and nonpoint sources and initial screening of water quality problems to determine if additional study is needed. Level 2 data may also serve the purpose of public awareness and educational activities. The specifications associated with level 2 data are commensurate with a higher degree of training and more rigorous test methods than level 1.

 - (3) Level 3 is the highest level of credible data that are used for a variety of regulatory purposes specified in section 6111.52 of the Revised Code, and may also serve those purposes associated with level 1 and level 2 data. The specifications associated with level 3 data are commensurate with the training, skills and test methods used by Ohio EPA and by other professional environmental organizations. These high standards are necessary to ensure that level 3 data are of the caliber necessary to make and defend regulatory and management decisions involving surface water resources in Ohio.

(D) Data not requiring collection by a qualified data collector.

(1) The data originating from studies conducted and samples collected by Ohio EPA, Ohio EPA's contractors, federal environmental agencies including the United States environmental protection agency, and other state environmental agencies shall be considered:

(a) Level 1 credible data if appropriate test methods and laboratory quality assurance program specifications identified in paragraph (B)(2) of rule 3745-4-04 of the Administrative Code were followed;

(b) Level 2 credible data if appropriate test methods and laboratory quality assurance program specifications identified in paragraphs (B)(2) and (B)(3) of rule 3745-4-05 of the Administrative Code were followed; or

(c) Level 3 credible data if appropriate test methods and laboratory quality assurance program specifications identified in paragraphs (B)(2) and (B)(3) of rule 3745-4-06 of the Administrative Code were followed.

(2) Furthermore, unless the director identifies reasons why the data are not credible, data shall be considered credible for the submitted purposes if the data meets one or more of the following requirements:

(a) Data were submitted pursuant to the requirements of a permit issued by a state agency including, but not limited to, compliance sampling results submitted pursuant to national pollutant discharge elimination system (NPDES) permits and compliance sampling results from licensed public water systems with surface water intakes conducted pursuant to Chapter 3745-81 of the Administrative Code, primary drinking water rules;

(b) Data were submitted pursuant to findings and orders issued by the director;
or

(c) Data were submitted pursuant to a court order.

(E) Nothing in this chapter shall be construed as granting approval for the collection of any wildlife without obtaining a wild animal collecting permit from the chief of the division of wildlife, Ohio department of natural resources pursuant to section 1533.08 of the Revised Code and performing the duties specified in section 1533.09 of the Revised Code. The collection of federally listed endangered and threatened species is not authorized by this chapter.

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3745-4-02 **Definitions.**

- (A) "Compelling reasons" as to why historical data are credible means that no more recent data exist, or more recent data alone are insufficient to establish water quality, or the director identifies other circumstances supporting the use of the historical data. Historical data shall be evaluated to insure that more recent information does not indicate that the data are not representative of current conditions.
- (B) "Credible data" means scientifically valid chemical, physical, or biological water quality monitoring data concerning surface waters, including qualitative scoring of physical habitat characteristics and the sampling of fish, macroinvertebrates, and water quality, that have been collected by or submitted to the director and that comply with the requirements established in this chapter. Credible data may include historical data if the director identifies compelling reasons as to why the data are credible.
- (C) "Data quality objectives (DQOs)" means qualitative and quantitative statements derived from the DQO process that clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions. The planning process for ensuring environmental data are the type, quality, and quantity needed for decision making is called the DQO process.
- (D) "Detection limit" means the lowest concentration of a target analyte that a given method or piece of equipment can reliably ascertain and report as greater than zero.
- (E) "Director" means the director of the Ohio environmental protection agency.
- (F) "Educational monitoring program" means a surface water quality data collection program designed for education or public awareness purposes and associated with an accredited or school-sponsored science education program. The program must be consistent with national or state science content standards, provide an introduction to basic water quality principles and train participants in the use of field instrumentation, sample collection and preservation, and data recording techniques.
- (G) "Federal environmental agency," as used in this chapter, means an agency of the United States government, or a department, division, or program in an agency of the United States government, whose primary function includes protection, management, study or assessment of the environment, natural resources or ecological systems, including but not limited to:
 - (1) The United States environmental protection agency;

- (2) The United States fish and wildlife service, the national park service, the office of surface mining, and the United States geological survey in the United States department of the interior;
 - (3) The United States army corps of engineers;
 - (4) The national oceanic and atmospheric administration in the United States department of commerce;
 - (5) The environmental management program in the United States department of energy;
 - (6) The forest service, the natural resources conservation service, and the agricultural research service in the United States department of agriculture; and
 - (7) The Ohio river valley water sanitation commission (ORSANCO).
- (H) "Generic study plan" means a plan for data collection, analysis, and interpretation prepared by the director designed to be used by a QDC in lieu of a project study plan.
- (I) "Headwater habitat evaluation index (HHEI)" means an assessment methodology of the principal physical and riparian stream habitat features in primary headwater habitat streams.
- (J) "Historical data" means data that are more than five years old.
- (K) "Mine affected stream" means a water body with one or more of the following characteristics:
- (1) A stream or stream segment identified as being impaired or impacted due to causes and sources related to coal mining;
 - (2) A stream or stream segment identified in a plan approved under the acid mine drainage abatement and treatment program administered by the Ohio department of natural resources;
 - (3) A stream or stream segment, not necessarily directly affected by coal mining, but contained within a watershed assessment unit with documented environmental problems related to coal mining; and
 - (4) Streams or stream segments designated limited resource water (acid mine drainage) or modified warmwater habitat (mine affected) in Chapter 3745-1 of the Administrative Code.
- (L) "Ohio EPA" means the Ohio environmental protection agency.

- (M) "Primary headwater habitat stream" means a surface water having a defined bed and bank, with either continuous or periodical flowing water, watershed area less than or equal to 1.0 square mile (two hundred fifty-nine hectare), and maximum depth of water pools equal to or less than forty centimeters.
- (N) "Project study plan" means a document describing the purpose of the data collection, the parameters or conditions that will be monitored, the methods of data collection and analysis, the identification of monitoring sites, a schedule for data collection and reporting, and how the data will be interpreted and presented.
- (O) "Quality assurance plan" (synonymous with "quality assurance manual" for the purposes of this chapter) means a document that details a laboratory's procedures to assure the accuracy and reproducibility of analytical results. A quality assurance plan includes information about laboratory personnel and their qualifications as well as laboratory equipment, methods, data management, and other specific procedures related to and including sample analysis.
- (P) "Qualified data collector (QDC)" means an individual who meets the requirements established in paragraph (A) of rule 3745-4-03 of the Administrative Code.
- (Q) "Qualitative habitat evaluation index (QHEI)" means an assessment methodology of the principal physical and riparian stream habitat features that affect fish communities and other aquatic life.
- (R) A "sampling and analysis plan (SAP)" documents the procedural and analytical requirements for a one-time or time-limited project designed to assess water quality that involves the collection of samples of water, biological assessments or other water quality indicators.
- (S) "State environmental agency," as used in this chapter, means an agency within the executive branch of the government of the state of Ohio, or a department, division, or program in an agency within the executive branch of the government of the state of Ohio, whose primary function includes protection, management, study or assessment of the environment, natural resources or ecological systems, including but not limited to:
- (1) The Ohio environmental protection agency;
 - (2) The Ohio department of natural resources;
 - (3) The bureau of environmental health in the division of prevention in the Ohio department of health;
 - (4) The livestock environmental permitting program in the Ohio department of agriculture;

- (5) The bureau of underground storage tank regulations in the state fire marshal division of the Ohio department of commerce; and
- (6) The office of environmental services in the Ohio department of transportation.
- (T) "Volunteer monitoring program" means any organized effort to collect surface water quality data using standardized sampling and testing protocols. The program must provide an introduction to basic water quality principles and train participants in the use of field instrumentation, sample collection and preservation, and data recording techniques.

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3745-4-03 **Qualified data collectors.**

(A) Criteria to become a qualified data collector (QDC).

(1) All data submitted to the director for consideration as credible data shall originate from studies and samples collected by, or under the supervision of, a QDC or as provided under paragraph (D) of rule 3745-4-01 of the Administrative Code. An individual seeking to become a QDC shall submit an application to the director. The applicant may request status as a QDC for one or more levels and, within level 2 and level 3, the various specialties listed in paragraphs (A)(3) and (A)(4) of this rule. The application shall include such documentary information and evidence as the director deems reasonably necessary to enable the director to determine that the individual meets the qualifications set forth in this rule. The director shall provide application forms and the applicant shall supply information that, at a minimum, meets the criteria in paragraphs (A)(2) to (A)(4) of this rule.

(2) Level 1 application requirements.

(a) An individual successfully completing a level 1 training after the effective date of this rule from a QDC trainer approved by the director shall be approved automatically as a level 1 QDC if the trainee provides name and contact information at the training. Individuals automatically approved as level 1 QDCs will be included on the list of approved QDCs on the credible data website <http://www.epa.ohio.gov/dsw/credibledata/index.aspx>.

(b) An individual seeking to become a QDC for level 1 credible data who is in either of the following categories may submit an application to the director:

(i) Successfully completed level 1 training from a QDC trainer approved by the director, but did not submit an application to become a QDC for level 1 credible data prior to the effective date of this rule; or

(ii) Successfully completed level 1 training from a QDC trainer not approved by the director. The applicant must have successfully completed training offered through an acceptable educational monitoring program or an acceptable volunteer monitoring program. The acceptability of a program will be determined based on factors including, but not limited to:

(a) Whether the program has an affiliation with a national, state or local organization that actively encourages and supports surface water monitoring;

- (b) Whether the program has a commitment to maintaining a data collection effort spanning more than one year; and
 - (c) The quality of training received by participants regarding basic water quality principles, the use of field instrumentation, sample collection and preservation and data recording techniques.
- (3) Level 2 application requirements. An individual seeking to become a QDC for level 2 credible data shall submit an application requesting QDC status in one or more of the following specialties and must meet the criteria listed in this paragraph.
 - (a) Stream habitat assessment. The level 2 QDC applicant must demonstrate that the applicant has:
 - (i) A general knowledge of stream and riverine physical forms and habitat features; and
 - (ii) Within the last five years, attended training and achieved a passing mark in "Qualitative Habitat Evaluation Index" (QHEI) testing offered by Ohio EPA or a person authorized pursuant to this chapter to provide such training.
 - (b) Primary headwater stream habitat assessment. The level 2 QDC applicant must demonstrate that the applicant has:
 - (i) A general knowledge of stream and riverine physical forms and habitat features; and
 - (ii) Within the last five years, attended training in QHEI, biocriteria and "Headwater Habitat Evaluation Index" (HHEI) and achieved a passing mark in HHEI testing offered by Ohio EPA or a person authorized pursuant to this chapter to provide such training.
 - (c) Benthic macroinvertebrate biology. The level 2 QDC applicant must demonstrate that the applicant has:

[Comment: The QHEI and biocriteria training is strongly encouraged for QDCs in the level 2 macroinvertebrate specialty. The QHEI and biocriteria training provides a broad-based understanding of how Ohio EPA uses biology to assess stream health.]

 - (i) A general knowledge of stream and riverine or lake physical forms and habitat features;

- (ii) Knowledge of and the ability to accurately use macroinvertebrate taxonomic references and dichotomous keys to identify midwestern aquatic macroinvertebrates to the level of family;
 - (iii) Within one hundred eighty days prior to submission of a level 2 QDC application, achieved a passing mark in a macroinvertebrate taxonomic identification examination administered by Ohio EPA or a person authorized under this chapter to administer such an examination;
 - (iv) College-level course credit in aquatic invertebrate zoology or practical experience in the identification of aquatic macroinvertebrates;
 - (v) Completed and achieved passing marks in undergraduate core course work in limnology, aquatic biology, environmental sciences or a related discipline, or has two years practical experience in environmental assessment work; and
 - (vi) Two years of practical experience involving work in developing biological water quality sampling and analysis plans, quality assurance plans, and data quality objectives processes.
- (d) Chemical water quality assessment. The level 2 QDC applicant must demonstrate that the applicant has:
- (i) A general knowledge of stream and riverine or lake physical forms and habitat features;
 - (ii) Completed and achieved passing marks in undergraduate core course work in a biological, chemical, natural or physical science, or has two years of pertinent laboratory experience performing water quality testing and analysis, or has two years of pertinent experience in chemical or microbiological water quality data analysis, interpretation and report writing;
 - (iii) Two years of practical experience involving work in developing chemical or microbiological water quality sampling and analysis plans, quality assurance plans, and data quality objectives processes; and
 - (iv) Two years of practical experience involving water quality sampling techniques and water quality sampling equipment.
- (4) Level 3 application requirements. An individual seeking to become a QDC for level 3 credible data shall submit an application requesting QDC status in one or more of the following specialties and must meet the criteria listed in this paragraph.

- (a) Stream habitat assessment. The level 3 QDC applicant must demonstrate that the applicant has:
- (i) A general knowledge of stream and riverine physical forms and habitat features; and
 - (ii) Within the last two years, attended training and achieved a passing mark in the "Qualitative Habitat Evaluation Index" (QHEI) testing offered by Ohio EPA or a person authorized pursuant to this chapter to provide such training.
- (b) Primary headwater stream habitat assessment. The level 3 QDC applicant must demonstrate that the applicant has:
- (i) A general knowledge of stream and riverine physical forms and habitat features; and
 - (ii) Within the last two years, attended training in QHEI and in "Headwater Habitat Evaluation Index" (HHEI) and achieved a passing mark in HHEI testing offered by Ohio EPA or a person authorized pursuant to this chapter to provide such training.
- (c) Fish community biology. The level 3 QDC applicant must demonstrate that the applicant has:

[Comment: Approval as a level 3 QDC in fish community biology requires training and testing in stream habitat assessment and QHEI. Therefore, approval as a level 3 QDC in fish community biology implies approval for level 3 stream habitat assessment and QHEI (i.e., separate approval is not necessary).]

- (i) A general knowledge of stream and riverine physical forms and habitat features;
- (ii) Knowledge of Ohio EPA electrofishing sampling protocols and data assessment procedures;
- (iii) Knowledge of and the ability to accurately use fish taxonomic references and dichotomous keys to identify midwestern fish to the level of species;
- (iv) Maintained qualifications as an individual certified to conduct fish assessments and habitat assessments as a certified professional in the voluntary action program pursuant to rule 3745-300-05 of the Administrative Code or, within the last two years, attended training and achieved a passing mark in an equivalent training program offered by

Ohio EPA or a person authorized under this chapter to administer such training;

- (v) College-level course credit in ichthyology or two years experience in the identification of midwestern fish species;
 - (vi) Completed and achieved passing marks in undergraduate core course work in limnology, aquatic biology, environmental sciences or a related discipline, or has two years practical experience in environmental assessment work;
 - (vii) Two years of practical experience involving work in developing biological water quality sampling and analysis plans, quality assurance plans, and data quality objectives processes; and
 - (viii) Two years practical experience in using electrofishing sampling techniques.
- (d) Benthic macroinvertebrate biology. The level 3 QDC applicant must demonstrate that the applicant has:
- (i) A general knowledge of stream and riverine physical forms and habitat features;
 - (ii) Knowledge of Ohio EPA macroinvertebrate field sampling, laboratory analysis, and data assessment procedures;
 - (iii) Knowledge of and the ability to accurately use macroinvertebrate taxonomic references and dichotomous keys to identify midwestern aquatic macroinvertebrates to the level of taxonomy used by Ohio EPA;
 - (iv) Maintained qualifications as an individual certified to conduct macroinvertebrate assessments as a certified professional in the voluntary action program pursuant to rule 3745-300-05 of the Administrative Code or, within the last two years, attended training and achieved a passing mark in an equivalent training program offered by Ohio EPA or a person authorized under this chapter to administer such training;
 - (v) College-level course credit in aquatic invertebrate zoology or two years practical experience in the identification of aquatic macroinvertebrates;
 - (vi) Completed and achieved passing marks in undergraduate core course work in limnology, aquatic biology, environmental sciences or a related

discipline, or has two years practical experience in environmental assessment work; and

- (vii) Two years of practical experience involving work in developing biological water quality sampling and analysis plans, quality assurance plans, and data quality objectives processes.
- (e) Chemical water quality assessment. The level 3 QDC applicant must demonstrate that the applicant has:
- (i) A general knowledge of stream and riverine or lake physical forms and habitat features;
 - (ii) Completed and achieved passing marks in undergraduate core course work in a biological, microbiological, chemical, natural or physical science, or has four years of pertinent laboratory experience performing water quality testing and analysis, or has four years of pertinent experience in chemical water quality data analysis, interpretation and report writing;
 - (iii) Two years of practical experience involving work in developing microbiological or chemical surface water quality sampling and analysis plans, quality assurance plans, and data quality objectives processes; and
 - (iv) Two years of practical experience involving surface water quality sampling techniques and water quality sampling equipment.
- (f) In lieu of the training set forth in paragraph (A)(4) of this rule, an applicant may serve a six-month apprenticeship under the mentorship of a level 3 QDC in the same specialty. For level 3 fish and macroinvertebrate certification, field collection and taxonomic identification must be included as part of the apprenticeship. The QDC shall monitor, assess and document the apprentice and provide an interim and final written evaluation of the apprentice to the director. The director reserves the right to perform unannounced audits during the apprenticeship period. Accepting the apprenticeship as fulfillment of level 3 QDC qualifications shall be at the discretion of the director. If accepted, the applicant must take and pass the level 3 test for the specialty following the completion of the apprenticeship.
- (g) Notwithstanding paragraph (A)(4)(f) of this rule, the director retains the discretion to certify an applicant as level 3 QDC based upon a demonstration by the applicant of a combination of equivalent education and experience to that set forth in paragraphs (A)(4)(a) to (A)(4)(e) of this rule, along with the applicant successfully passing a test to be administered

by Ohio EPA concerning the specific specialties for which the applicant is requesting QDC status.

(B) Process for initial approval as a QDC.

- (1) Except for applicants eligible for automatic approval as level 1 QDCs in accordance with paragraph (A)(2)(a) of this rule, an applicant seeking to become a QDC must submit to the director a complete and current application on forms provided by the director. The application shall include documentation demonstrating that the applicant meets the minimum qualifications listed in paragraph (A) of this rule. The director may require the applicant to furnish additional documentation pertaining to the application.
- (2) Except for applicants eligible for automatic approval as level 1 QDCs in accordance with paragraph (A)(2)(a) of this rule, an applicant must submit copies of official transcripts from the appropriate educational institution and official training certifications or alternate required documentation to verify that the applicant meets the educational and training requirements set forth in paragraph (A) of this rule.
- (3) The level 2 and level 3 QDC applicants shall certify that all information submitted in support of the application is true, accurate, and complete and that the applicant has not been convicted of 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. Failure to include the certification shall render the application incomplete.
- (4) Ohio EPA will conduct a completeness review of the application within thirty days of receipt and will notify the applicant in the event the application is incomplete. Ohio EPA will not consider an incomplete application and will notify the applicant of the reasons the application is incomplete and of any additional information required for further consideration.
- (5) Within thirty days of Ohio EPA's determination that an application is complete, the director will either approve or deny the application by sending a letter to the applicant. If the director denies the application, the director will identify the deficiencies upon which the denial of the application is based.

(C) Process for approval of renewal as a QDC.

- (1) Status as level 1 QDC does not expire and a renewal application is not required.
- (2) Status as a level 2 QDC automatically expires five years after the date of approval of the application unless the approval has been renewed.

- (3) Status as a level 3 QDC automatically expires two years after the date of approval of the application unless the approval has been renewed or a timely renewal application has been submitted in accordance with this rule. Notwithstanding the above, status as a level 3 QDC will be automatically renewed for a period of three years without submission of an application, where the QDC has submitted data while in the status of a level 3 QDC and the director has determined the data to be level 3 data. The automatic renewal process can proceed on a rolling basis and each three-year renewal period will be deemed effective beginning on the date of the QDC's submittal of level 3 data.
- (4) An applicant seeking renewal of the applicant's status as a level 2 or level 3 QDC shall submit to the director a renewal application prior to the date of expiration of the applicant's status as a level 2 or level 3 QDC.
 - (a) Renewal application and requirements.
 - (i) Renewal applications shall be on forms for that purpose available from Ohio EPA.
 - (ii) The renewal application shall provide a means to re-submit the original application, if appropriate, or to update and amend the original application as necessary.
 - (iii) Ohio EPA will approve or deny the renewal application in accordance with the procedures set forth in paragraphs (B)(4) and (B)(5) of this rule.
 - (iv) Renewal of level 2 QDC status is contingent upon the applicant's demonstration of active participation (in that specialty) in the credible data water quality monitoring program within the last five years.
 - (v) Renewal of level 3 QDC status is contingent upon the applicant's demonstration of active participation (at that level and in that specialty) in the credible data water quality monitoring program within the prior two years.
 - (vi) Active participation means that the QDC has participated in activities under this program at the level and specialty of the applicant's QDC certification during the period the applicant's certification was valid including, for level 3 fish and macroinvertebrate certification, field collection and taxonomic identification.
 - (b) Renewal grace period.
 - (i) A QDC with expired level 2 status may submit a renewal application for a period of one year after the expiration date.

(ii) A QDC with expired level 3 status may submit a renewal application for a period of three months after the expiration date.

(iii) A QDC with expired status may submit data if the project was initiated prior to the expiration date, providing the QDC submits an approvable renewal application within the time periods indicated by paragraph (C)(4) of this rule.

(iv) A QDC with a lapsed status extending beyond these time periods must submit a full application as specified in paragraph (B) of this rule.

(D) Process for revocation of status as a QDC.

(1) The director may revoke an individual's status as a QDC upon finding that the QDC has:

(a) Fraudulently obtained or attempted to obtain QDC status or renewal thereof; or

(b) Knowingly or negligently submitted misleading, inaccurate, or false data to Ohio EPA; or

(c) Consistently failed to attain the necessary standards for study design, field collection methods, laboratory techniques, or quality assurance and quality control procedures for the collection of credible data under this chapter.

(2) Upon making a finding under paragraph (D)(1) of this rule, the director shall first issue a proposed action revoking QDC status in accordance with Chapter 3745-47 of the Administrative Code.

(3) The director shall notify the QDC of a proposed action under paragraph (D)(2) of this rule. The notice shall be by certified mail and shall set forth the action proposed by the director, the proposed effective date thereof, the reason therefor, the length of time the proposed action shall be applied, and the procedure for appealing the action.

(4) Revocation of QDC status shall state a period during which the individual shall not apply for such status. After the period of ineligibility has expired, the former QDC may apply for status as a QDC under this chapter.

(E) Authorizing QDCs to train others to become QDCs.

(1) The director may authorize individuals who have been approved as QDCs pursuant to paragraphs (A) and (B) of this rule and who meet the qualifications in paragraph (E) of this rule to train others to become QDCs.

- (2) An individual seeking to become a QDC trainer for level 1 credible data shall include with the application to become a level 1 QDC trainer documentation demonstrating that:
 - (a) The individual has successfully completed training offered through an educational monitoring program or a volunteer monitoring program designed specifically for teaching the technical and leadership skills to group leader candidates; and
 - (b) The individual has credentials establishing that the individual is a qualified instructor in an organization that operates or participates in an educational monitoring program or a volunteer monitoring program.
 - (3) An individual seeking to become a QDC trainer for level 2 or level 3 credible data shall include with the application to become a level 2 or level 3 QDC trainer documentation demonstrating that:
 - (a) The individual has credentials establishing that the individual is a qualified instructor in a secondary or post-secondary educational institution or an adult education program, or has two years of experience in providing classroom and field training in water quality monitoring;
 - (b) The individual has credentials indicating that the individual has completed college-level course credit in subjects closely related to the training subject matter (e.g., fisheries, aquatic macroinvertebrates, or water chemistry); and
 - (c) The individual has a specific course outline for the training and, if examination is required, examination protocols and sample examination questions.
 - (4) Upon the conclusion of each training, the trainer who conducted the training will provide each person who successfully completed the training with a certificate of completion that includes the date of training and the trainer's name and signature. The trainer shall submit to Ohio EPA the names and contact information for those persons who successfully completed the training.
- (F) Notwithstanding the requirements of paragraph (E) of this rule, an individual, or an individual who works for an organization, contracted by Ohio EPA to do QDC training shall be considered to be an approved QDC trainer for the life of that contract. Trainers' qualifications will be evaluated by Ohio EPA staff as part of the contract process.

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3745-4-04 **Level 1 data requirements and reporting.**

- (A) Except as provided by paragraph (D) of rule 3745-4-01 of the Administrative Code, all data submitted to the director for consideration as level 1 credible data shall be collected and submitted by level 1, level 2 or level 3 qualified data collectors (QDCs) approved by the director pursuant to rule 3745-4-03 of the Administrative Code. The director shall accept the data as level 1 credible data provided the requirements of this rule are met. The director shall have sole authority in determining whether data meet these requirements. Data reporting shall be in a format consistent with the requirements listed in this rule. Data submitted by a QDC determined to meet these requirements shall be included in a computerized database maintained by Ohio EPA and made available for sharing with other agencies and interested persons.

- (B) Data submitted by a QDC must meet the requirements in this paragraph to be accepted as level 1 credible data.
 - (1) Adherence to a study plan. Persons submitting data to Ohio EPA as a QDC under section 6111.53 of the Revised Code must prepare and adhere to a project study plan or, alternatively, use a generic study plan as described in this paragraph.
 - (a) The QDC shall prepare and submit to the director for approval a project study plan using educational monitoring program guidance materials, volunteer monitoring program guidance materials, or other valid resources. Upon completion of the plan review, the director shall send written notification of deficiencies in the plan, if any are found, to the QDC and provide the QDC a reasonable opportunity to address such deficiencies. If the deficiencies are not addressed, the director may disapprove the study plan. A plan submitted by a QDC not disapproved within sixty days of the initial submittal or, where a notification of deficiency has been issued, within sixty days of any revised submittal, shall be considered to have been approved. The director will disapprove a site-specific plan that does not include the certification statement in paragraph (B)(3)(c) of this rule.

 - (b) Generic study plan. The director may from time to time make available generic study plans suitable for certain project objectives and utilizing appropriate methods. After such time that a generic study plan is available, the QDC may elect to collect data using the generic study plan. The QDC is encouraged to send written notification to the director of the QDC's intent to follow the generic study plan. The director may ask the QDC to supply additional pertinent project specific information on a form provided by Ohio EPA. However, the QDC may submit credible data to the director in accordance with a generic study plan without prior notification or approval from the director.

- (2) Use of appropriate test methods. In preparing the project study plan, the QDC shall be responsible for selecting the appropriate field and laboratory methods, including quality assurance/quality control steps, that fit the objectives and purpose of the data collection project. All methods should be commensurate with the purposes of level 1 and the need for sufficient rigor and sensitivity to detect relatively large differences in water quality over time or from sampling site to sampling site. The QDC may select from parameters and test methods published by the director pursuant to paragraph (C) of this rule or similar parameters and test methods recommended by an educational or volunteer monitoring program or reported in the scientific literature.
- (3) Data reporting. QDCs choosing to submit their data to Ohio EPA must submit all collected data. Submission of data may be done at any time, but must be done no later than one year after completion of the study identified in the project study plan. For ongoing sampling programs, data submission should begin no later than one year after the initial phase of study identified in the project study plan. The following shall be submitted:
 - (a) Level 1 sample data using the online credible data database;
 - (b) A certification that, to the best of the QDC's knowledge and belief, the data were collected in accordance with the procedures required by the approved project study plan, generic study plan, or generic plan component; and
 - (c) A signed statement from each QDC working on the project certifying that the QDC has not been convicted of 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.
- (4) Data approval process. The director shall review data submissions to verify that they were submitted by a QDC, that appropriate test methods and quality control/quality assurance practices were used, and that the data reporting requirements are complete. The review will ensure that all components of the plan for the collection of data were followed. If substantial discrepancies are found, the director may decide not to approve the data. The director will provide written notification to the person submitting the data as to whether the data have been approved as level 1 credible data.

(C) Publication of appropriate test methods.

The director from time to time shall publish examples of appropriate level 1 test methods for commonly sampled parameters. Appendix A of this rule is the published list of such examples as of the effective date of this rule.

Effective: 7/29/2011

R.C. 119.032 review date: 4/19/2011 and 7/29/2016

Promulgated Under: 119.03

Statutory Authority: 6111.51

Rule Amplifies: 6111.50, 6111.51, 6111.52, 6111.53, 6111.54, 6111.55,
6111.56

Prior Effective Dates: 3/24/2006

Appendix A to rule 3745-4-04 of the Administrative Code.
Some examples of acceptable analytical methods for level 1 and level 2 credible data.

		Credible Data	Volunteer Manual	Hach Company	USEPA Methods	Standard Methods	Other
Parameter	Technique	Level	(complete reference citations provided at end of table)				
			Chapter	Method	Method	Method	--
Chemical and physical parameters and methods							
Acidity	Digital titrator	1, 2		8200 8233			
	Acidity as CaCO ₃ , Electrometric endpoint or phenolphthalein endpoint	2			305.1	2310 B	
Alkalinity	Digital titrator method (Phenolphthalein and Methylorange endpoints)	1, 2	5.10	8203			
	Alkalinity as CaCO ₃ , Electrometric endpoint of Colorimetric manual titration to pH 4.5	2			310.1	2320 B	
	Alkalinity as CaCO ₃ , Electrometric endpoint of Colorimetric automatic titration to pH 4.5	2			310.2		
Ammonia (as N)	Nesslerization	2			350.2	18 th edition 4500-NH3C	
	Titration	2			350.2	20 th edition 4500-NH3C	
	Electrode	2			350.3	20 th edition 4500-NH3D or E	
	Colorimetric, automated phenate	2			350.1	20 th edition 4500-NH3G	

Appendix A to rule 3745-4-04 of the Administrative Code.
Some examples of acceptable analytical methods for level 1 and level 2 credible data.

Parameter	Technique	Level	(complete reference citations provided at end of table)				
			Chapter	Method	Method	Method	--
			Credible Data	Volunteer Manual	Hach Company	USEPA Methods	Standard Methods
Conductivity	Handheld meter	1					See endnote ¹
	Field meter with probe	1, 2	5.9				See endnote ¹
	Wheatstone bridge- type meter	2			120.1	2510 B	
Dissolved Oxygen	Electrometric method	1, 2			360.1	4500-O G	
	Azide modification (Winkler) method	1, 2			360.2	4500-O C	
	Azide modification of Winkler method buret titration	1, 2		8229			
	High range dissolved oxygen method	1, 2		8166			
	Field meter with galvanic, polarographic or luminescent probe	1, 2	5.2				See endnote ¹
	Handheld meter	1, 2					See endnote ¹
Nitrate or Nitrate-nitrite minus nitrite	Manual Cadmium reduction method with portable colorimeter or color wheel	1, 2	5.7				
	Electrode Method	2				4500-NO ₃ C	
	Colorimetric (Brucine sulfate)	2			352.1		
	Colorimetric, manual Cadmium reduction with laboratory or portable colorimeter	2			353.3	4500-NO ₃ E	

Appendix A to rule 3745-4-04 of the Administrative Code.
Some examples of acceptable analytical methods for level 1 and level 2 credible data.

Parameter	Technique	Level	(complete reference citations provided at end of table)				
			Chapter	Method	Method	Method	--
			Credible Data	Volunteer Manual	Hach Company	USEPA Methods	Standard Methods
Phosphorus total or dissolved (0.45 micron filtered sampled)	Colorimetric, manual ascorbic acid single reagent	1, 2	5.6		365.2	4500-P E	
	Colorimetric, manual ascorbic acid two reagent	2	5.6		365.3		
	Colorimetric, automated ascorbic acid	2	5.6		365.1	4500-P F	
pH	Field meter with probe	1, 2	5.4				See endnote ¹
	Digital pocket meters	1, 2	5.4				See endnote ¹
	Color comparison systems	1, 2	5.4				See endnote ¹
Temperature	Liquid-in-glass thermometer	1, 2				2550 B	
	Thermistor thermometer	1, 2				2550 B	
	Field meter with probe	1, 2	5.3				See endnote ¹
	Digital thermometer	1, 2					See endnote ¹
	Handheld meter	1, 2					See endnote ¹
Turbidity	Portable/pocket turbidity meter	1, 2	5.5				See endnote ¹
	Nephelometric	2			180.1	2130 B	
Total suspended residue or total suspended solids (TSS)	Transparency tube	1, 2	5.5				See endnote ²
	Gravimetric method	2	5.8		160.2	2540 D	

Appendix A to rule 3745-4-04 of the Administrative Code.
Some examples of acceptable analytical methods for level 1 and level 2 credible data.

		Credible Data	Volunteer Manual	Hach Company	USEPA Methods	Standard Methods	Other
Parameter	Technique	Level	(complete reference citations provided at end of table)				
			Chapter	Method	Method	Method	--
Other parameters and methods							
Bacteria	E. coli membrane filtration plating on mTEC agar	2	5.11			9213 D	
	Fecal coliform membrane filtration plating on mFC agar	2	5.11			9222 D	
Benthic insects (statewide for level 1, outside of mine affected streams in WAP for level 2)	Stream Quality Monitoring (SQM)	1					See endnote ³
	Validation study necessary	2					See endnote ⁴
Benthic insects (limited to mine affected streams in WAP)	Macroinvertebrate Aggregated Index for Streams (MAIS)	2					See endnote ⁵
Stream flow	Travel-time method	1	5.1				
	Vertical-axis velocity meter	2					See endnote ⁶
	Electromagnetic flow meter	2					See endnote ⁶
Water transparency	Secchi disk	1, 2	5.5				
	Transparency tube	1	5.5				See endnote ²

Appendix A to rule 3745-4-04 of the Administrative Code.
 Some examples of acceptable analytical methods for level 1 and level 2 credible data.

		Credible Data	Volunteer Manual	Hach Company	USEPA Methods	Standard Methods	Other
Parameter	Technique	Level	(complete reference citations provided at end of table)				
			Chapter	Method	Method	Method	--
Reference citations	<p>Volunteer Manual - USEPA. 1997. Volunteer Stream Monitoring: A Methods Manual. EPA 841-B-97-003. United States Environmental Protection Agency, Office of Water. Washington D.C. 210 p. (This document is available through libraries and on the web at www.epa.gov/owow/monitoring/volunteer/.)</p> <p>Hach Company. 2005. Water analysis methods published by Hach Company, Loveland, CO. (These methods are available on the web at www.hach.com.)</p> <p>USEPA. 1983. Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency. EPA 600/4-79-020. United States Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory. Cincinnati, Ohio. 552 p. (This document is available through libraries and on the web at http://water.epa.gov/aboutow/owm/sectwqs.cfm.)</p> <p>“Standard Methods” (These methods are available through libraries; the latest edition of the methods is also available on the web at www.standardmethods.org.)</p> <p>Eaton, A.D., L.S. Clesceri, E.W. Rice, A.E. Greenberg, M.A.H. Franson, (editors). 2005. Standard Methods for the Examination of Water and Wastewater: Centennial Edition. 21st Edition. ISBN: 0875530478. American Public Health Association. Washington, D.C. 1368 p.</p> <p>Clesceri, L.S., A.E. Greenberg, and A.D.Eaton, (editors). 1998. Standard Methods for the Examination of Water and Wastewater. 20th Edition. ISBN: 0875532357. American Public Health Association. Washington, D.C. 1325 p.</p> <p>APHA. 1995. Standard Methods for the Examination of Water and Wastewater. American Public Health Association. 19th Edition. American Public Health Association. Washington, D.C.</p> <p>APHA. 1992. Standard Methods for the Examination of Water and Wastewater. American Public Health Association. 18th Edition. American Public Health Association. Washington, D.C.</p>						

Appendix A to rule 3745-4-04 of the Administrative Code.
Some examples of acceptable analytical methods for level 1 and level 2 credible data.

Table endnotes:

1. Follow instructions provided by manufacturer of instrumentation.
2. Methods are described in: Anderson, P. and R. D. Davic. 2004. Use of transparency tubes for rapid assessment of total suspended solids and turbidity in streams. *Lake and Reservoir Management*. 20(2): 110-120. This document describes studies that found a highly predictive correlation between these assessment tools and NTU turbidity in streams. (This document is available on the web at www.epa.ohio.gov/dsw/credibledata/index.aspx.)
3. Methods are described in: Kopec J. and S. Lewis. 1983. Stream quality monitoring. Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Scenic Rivers Programs. Columbus, Ohio. 20 p.; and Ohio DNR. A guide to volunteer stream monitoring. Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Scenic Rivers Section. Columbus, Ohio. 40 pp. (Both documents can be obtained by contacting Ohio Department of Natural Resources, Division of Natural Areas & Preserves, 2045 Morse Road, Bldg. F-1, Columbus OH 43229 (614) 265-6453.)
4. Ohio EPA is interested in cooperating with investigators to develop and test suitable methods. Contact Jeff DeShon, Ohio EPA, Division of Surface Water (jeff.deshon@epa.state.oh.us) for more information. "Western Allegheny Plateau Ecoregion (WAP)" means the relatively homogenous ecoregion in eastern and southeastern Ohio and delineated in the publication "Omernik, J.M. 1987. Ecoregions of the conterminous United States. *Ann. Assoc. Amer. Geogr.* 77(1):118-125." (This document is available through libraries and the map is available on the web at www.epa.gov/wed/pages/ecoregions/level_iii.htm.)
5. For mine affected streams contained fully or partially within the Western Allegheny Plateau ecoregion of Ohio, macroinvertebrate sampling shall be conducted using a combination of the kick-net riffle sampling and dip-net sweeps as described in Barbour et al. (1999). In areas of, or samples with, high organism density, subsampling of the composited final sample shall be performed in accordance with Section 7.3.2 of Barbour et al. (1999). Raw collated benthic macroinvertebrate data shall be collapsed and categorized through the MAIS (Smith and Voshell 1997), yielding an index value correspondent with levels of environmental quality. Johnson, K. S. 2007. Field and Laboratory Methods for using the MAIS (Macroinvertebrate Aggregated Index for Streams) in Rapid Bioassessment of Ohio Streams. Ohio University Department of Biological Sciences. Athens, OH. 18 pp.

Barbour M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid bioassessment protocols for use in streams and wadable rivers: periphyton, benthic macroinvertebrates and fish. Second edition. EPA 841/B-99-002. U.S. Environmental Protection Agency, Office of Water. Washinton D.C. (This document is available through libraries and on the web at <http://water.epa.gov/scitech/monitoring/rsl/bioassessment/index.cfm>.)

Johnson, K.J. 2007. Field and Laboratory Methods for using the MAIS (Macroinvertebrate Aggregated Index for Streams) in Rapid Bioassessment of Ohio Streams. Ohio University Department of Biological Sciences. Athens, OH. 18 pp.

Smith, E.P. and J.R. Voshell. 1997. Studies of benthic macroinvertebrates and fish in streams within EPA Region 3 for the development of

Appendix A to rule 3745-4-04 of the Administrative Code.

Some examples of acceptable analytical methods for level 1 and level 2 credible data.

biological indicators of ecological condition. Part 1, benthic macroinvertebrates. Report to U.S. EPA.. Cooperative Agreement CF821462010. U.S. Environmental Protection Agency. Washington D.C. (This document is available on the web at www.epa.ohio.gov/dsw/credibledata/references.aspx.)

6. Rantz, Saul Edward et al. 1982. Measurement and computation of streamflow -- v. 1, Measurement of stage and discharge: U.S. Geological Survey Water-Supply Paper 2175. United States Department of Interior, U.S. Geological Survey. Washington D.C. 284 p. (This document is available through libraries and on the web at <http://pubs.usgs.gov/wsp/wsp2175/>.)

Level 2 data requirements and reporting.

- (A) Except as provided by paragraph (D) of rule 3745-4-01 of the Administrative Code, all data submitted to the director for consideration as level 2 credible data shall be collected and submitted by level 2 or level 3 qualified data collectors (QDCs) approved by the director pursuant to rule 3745-4-03 of the Administrative Code. Other persons trained and supervised by the QDC may assist with the collection of data. The director shall accept the data as level 2 credible data provided the requirements of this rule are met. The director shall have sole authority in determining whether data meet these requirements. Data reporting shall be in a format consistent with the requirements listed in this rule. Data submitted by a QDC determined to meet these requirements shall be included in a computerized database maintained by Ohio EPA and made available for sharing with other agencies and interested persons.
- (B) Data submitted by a QDC must meet the requirements in this paragraph to be accepted as level 2 credible data.
- (1) Adherence to a study plan. Persons submitting data to Ohio EPA as a QDC under section 6111.53 of the Revised Code must prepare and adhere to a project study plan or, alternatively, use a generic study plan as described in this paragraph.
- (a) The QDC shall prepare and submit to the director for approval a project study plan using the guidelines presented in appendix A of this rule. The director may approve an alternative to the guidelines in appendix A of this rule upon a reasonable and scientifically supported demonstration by a QDC. Upon completion of the plan review, the director shall send written notification of deficiencies in the plan, if any are found, to the QDC and provide the QDC a reasonable opportunity to address such deficiencies. If the deficiencies are not addressed, the director may disapprove the study plan. A plan submitted by a QDC (level 2 or level 3) not disapproved within sixty days of the initial submittal or, where a notification of deficiency has been issued, within sixty days of any revised submittal, shall be considered to have been approved. The director will disapprove a site-specific plan that does not include the certification statement in paragraph (B)(4)(e) of this rule.
- (b) Generic study plan. The director may from time to time make available generic study plans suitable for certain project objectives and utilizing appropriate methods. After such time that a generic study plan is available, the QDC may elect to collect data using the generic study plan appropriate to the data quality objectives for the specific study. The level 2 QDC shall submit to the director a notification of the level 2 QDC's intent to utilize a generic plan or generic plan component under this paragraph. The QDC is

encouraged to submit the notification to the director at least ninety days prior to the first anticipated sampling activity. The QDC may submit credible data to the director in accordance with a generic study plan without prior approval from the director.

[Comment: QDCs are encouraged to submit notification of intent to use generic study plans at least ninety days prior to sample collection to allow time for consultation with Ohio EPA. The objective of the consultation is to ensure that Ohio EPA and the QDC agree that the generic study plan is suitable for the project and the stated data quality objectives, thereby allowing the data generated to be deemed credible at the level intended by the QDC.]

- (2) Use of appropriate test methods. In preparing the project study plan, the QDC shall be responsible for selecting the appropriate field and laboratory methods, including quality assurance and quality control steps, that fit the objectives and purpose of the project. All methods should be commensurate with the purposes of level 2 and the need for sufficient rigor and sensitivity to detect relatively small differences in water quality over time or from sampling site to sampling site. The QDC may select from parameters and test methods published by the director pursuant to paragraph (C) of this rule or similar methods published in the scientific literature. Explicit approval of the specific methods employed shall occur when Ohio EPA reviews project study plans or whenever Ohio EPA makes available a generic study plan.
- (3) All laboratories that perform analysis under a level 2 study plan must implement a quality assurance program and must document all elements of the program in a quality assurance manual (QAM) or quality assurance plan (QAP). Guidelines for the elements that should be addressed in the QAM or QAP are presented in appendix B of this rule.
- (4) Data reporting. QDCs choosing to submit their data to Ohio EPA must submit all collected data. Submission of data may be done at any time, but must be done no later than one year after completion of the study identified in the project study plan. For ongoing sampling programs, data submission should begin no later than one year after the initial phase of study identified in the project study plan. The following shall be submitted:
 - (a) Level 2 sample data using the online credible data database;
 - (b) Documentation demonstrating adherence to an approved project study plan, generic study plan, or generic plan component;
 - (c) The results from all quality assurance and quality control samples collected during implementation of the approved project study plan, generic study plan, or generic plan component using the online credible data database;

- (d) A certification that, to the best of the QDC's knowledge and belief, the data were collected in accordance with the procedures required by the approved project study plan, generic study plan, or generic plan component; and
 - (e) A signed statement from each QDC working on the project certifying that the QDC has not been convicted of 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.
- (5) Reporting laboratory quality assurance and quality control plans. In addition to the information required by paragraph (B)(4) of this rule, the QDC, upon request of the director, shall provide quality assurance and quality control documentation for all laboratories that were used to analyze any data collected pursuant to the approved project study plan, generic study plan, or generic plan component. The QDC is responsible for providing this documentation in the form of a laboratory QAP that meets the content guidelines presented in appendix B of this rule.
- (6) Data approval process. The director shall review data submissions to verify that they were submitted by a QDC, that appropriate test methods and quality control quality assurance practices were used, and that the data reporting requirements are complete. The review will ensure that all components of the plan for the collection of data were followed. If substantial discrepancies are found, the director may decide not to approve the data. The director will provide written notification to the person submitting the data as to whether the data have been approved and at what level the data qualify as credible data.

(C) Publication of acceptable methods.

The director from time to time shall publish examples of acceptable level 2 analytical methods for commonly sampled parameters. Appendix C is the published list of such examples as of the effective date of this rule.

Effective: 7/29/2011

R.C. 119.032 review date: 4/19/2011 and 7/29/2016

Promulgated Under: 119.03

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Prior Effective Dates: 3/24/2006

3745-4-05 Appendix A Guidelines for the preparation of level 2 project study plans.

Persons preparing level 2 project study plans for the credible data surface water quality monitoring program should consult the following set of guidelines to ensure the adequacy of the project study plan. The director may conclude that the project study plan is deficient if the information requested on this list is missing and there is no other comparable justification for the technical and scientific adequacy of the project study plan.

- (1) The name and contact information (affiliation, qualified data collector number, address, electronic mail address, and phone number) for the qualified data collector designated as the project leader;
- (2) The names of any other persons expected to assist with sample collection, sample analysis, and data entry, including the individuals' status as qualified data collectors;
- (3) If persons who are not level 2 or level 3 qualified data collectors are expected to assist with sample collection, sample analysis, or data entry, the plan must include detailed procedures (e.g., training, testing, follow-ups) for the supervision of those persons who are not level 2 or level 3 qualified data collectors;
- (4) A clear statement of the objectives of the planned sampling activities, including data quality objectives, a precise delineation of the study areas, and the general types of data to be collected (e.g., chemical water quality, stream habitat, stream flow, biological);
- (5) A detailed description and maps of the overall sampling areas, including proposed sampling locations, HUC 8 number and name and the spacial relationship to specific point and nonpoint source issues (when applicable) that will be evaluated, and discussion of other factors that may influence water quality conditions within the study area;
- (6) A list of the sampling equipment to be used, including model numbers and manufacturers of field meters and probes and flow current meters;
- (7) A specific list of all parameters to be sampled and analyzed at each sampling location;
- (8) Identification of field collection and data assessment techniques for stream habitat and macroinvertebrate sampling and, for all chemical parameters sampled, identification of the sample collection methods, the field or laboratory analytical methods used, and the detection limits;
- (9) For all stream flow measurements, identification of the methods used;

- (10) A schedule of planned sampling activities, including the anticipated beginning and ending dates for sampling or alternatively, for ongoing sampling programs, the beginning and ending dates for the initial phase of sampling;
- (11) If a laboratory will be used for chemical or biological analyses, identify the laboratory and provide a contact name, address, electronic mail address, and phone number for the contact and all laboratory accreditations;
- (12) If applicable, a copy of an approved scientific collector's permit issued by the Ohio department of natural resources, division of wildlife;
- (13) A statement attesting that the qualified data collector acting as the lead project manager will maintain and make available to the director, for each sampling location, the name of the water body sampled, sampling location latitude and longitude, sampling location river mile where possible or practicable, general location information, the U.S. geological survey HUC 8 number and name, and the purpose for data collection at each sampling location;
- (14) A statement attesting that the qualified data collectors will maintain and make available to the director a digital photo catalog of all sampling locations, including photos of the specific sampling location, riparian zone adjacent to the sampling location, and general land use in the immediate vicinity of the sampling location;
- (15) A statement attesting that the qualified data collector acting as the lead project manager will provide to the director upon request ten voucher specimens of each identified taxonomic family of macroinvertebrates that are collected at sampling locations. All voucher materials shall be kept for at least ten years;
- (16) In the event that the lead qualified data collector is not approved for all project data types, include a signed statement to attest that the qualified data collector for each additional data type or specialty is aware of their responsibilities for that data (including vouchers, photos, and site information as described in this appendix). This statement should specify the name of that particular study plan; and
- (17) A certification from each qualified data collector working on the project attesting that the qualified data collector has not been convicted of 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.

3745-4-05 Appendix B Guidelines for laboratory quality assurance plans.

All laboratories that perform analysis under a level 2 study plan shall implement a quality assurance program and shall document all elements of the program in a quality assurance manual (QAM) or quality assurance plan (QAP). The elements covered in the QAM or QAP should, at a minimum, include the items listed in this appendix.

- (1) Title page with authorization signatures and dates.
- (2) Table of contents.
- (3) Statement of quality assurance policy.
- (4) Laboratory organization and responsibility, including:
 - (a) Organizational tables;
 - (b) Position descriptions for all personnel; and
 - (c) Training, education, and experience of laboratory personnel.
- (5) Data quality objectives for accuracy, precision, and reporting limits for each test, target analyte, and sample matrix.
- (6) Analytical methods variances.
- (7) Laboratory equipment and instrument lists.
- (8) Sample receipt and chain-of-custody procedures. This section should include procedures for:
 - (a) Receiving samples;
 - (b) Sample login;
 - (c) Sample security;
 - (d) Sample storage;
 - (e) Sample tracking; and
 - (f) Sample disposal.
- (9) Laboratory standard operating procedures (SOPs) with dates of last revision. This section should include procedures for:

- (a) Glassware preparation;
 - (b) Sample preparation;
 - (c) Sample cleanup;
 - (d) Sample analysis; and
 - (e) A description of quality control procedures that are required and followed for each method.
- (10) Calibration procedures. This section should describe:
- (a) The type of calibration used for each method;
 - (b) The criteria for acceptance or verification; and
 - (c) The frequency of calibration.
- (11) Preventive maintenance and documentation. This section should describe:
- (a) The location of instrument manuals; and
 - (b) The schedules for performance of routine equipment maintenance;
- (12) Internal quality control checks, frequency, and criteria for acceptability. This section may reference laboratory SOPs, and should include the frequency and acceptability of method detection limit (MDL) calculations.
- (13) Data reduction, review, and reporting. This section could include discussion of the process used to do data assessment, evaluation of data completeness, comparability, and trends.
- (14) Standard corrective action procedures for quality control failures.
- (15) External and internal audits, accreditations, and certifications. This section should list all laboratory accreditations and or certifications, and participation in inter and intra laboratory studies.
- (16) Document retention and control. In this section, the lab should discuss its document retention schedule, storage, and retrieval procedures, including procedures for review and approval of revised lab documents (i.e., QAP and SOPs).
- (17) Procedures for procurement and process control. This section should describe the laboratory's policy and procedures for the selection and purchasing of equipment and supplies it uses that affect the quality of the environmental tests and calibrations.

Appendix C to rule 3745-4-05 of the Administrative Code.
Some examples of acceptable analytical methods for level 1 and level 2 credible data.

		Credible Data	Volunteer Manual	Hach Company	USEPA Methods	Standard Methods	Other
Parameter	Technique	Level	(complete reference citations provided at end of table)				
			Chapter	Method	Method	Method	--
Chemical and physical parameters and methods							
Acidity	Digital titrator	1, 2		8200 8233			
	Acidity as CaCO ₃ , Electrometric endpoint or phenolphthalein endpoint	2			305.1	2310 B	
Alkalinity	Digital titrator method (Phenolphthalein and Methylorange endpoints)	1, 2	5.10	8203			
	Alkalinity as CaCO ₃ , Electrometric endpoint of Colorimetric manual titration to pH 4.5	2			310.1	2320 B	
	Alkalinity as CaCO ₃ , Electrometric endpoint of Colorimetric automatic titration to pH 4.5	2			310.2		
Ammonia (as N)	Nesslerization	2			350.2	18 th edition 4500-NH3C	
	Titration	2			350.2	20 th edition 4500-NH3C	
	Electrode	2			350.3	20 th edition 4500-NH3D or E	
	Colorimetric, automated phenate	2			350.1	20 th edition 4500-NH3G	
Conductivity	Handheld meter	1					See endnote ¹

Appendix C to rule 3745-4-05 of the Administrative Code.
Some examples of acceptable analytical methods for level 1 and level 2 credible data.

		Credible Data	Volunteer Manual	Hach Company	USEPA Methods	Standard Methods	Other
Parameter	Technique	Level	(complete reference citations provided at end of table)				
			Chapter	Method	Method	Method	--
	Field meter with probe	1, 2	5.9				See endnote ¹
	Wheatstone bridge- type meter	2			120.1	2510 B	
Dissolved Oxygen	Electrometric method	1, 2			360.1	4500-O G	
	Azide modification (Winkler) method	1, 2			360.2	4500-O C	
	Azide modification of Winkler method buret titration	1, 2		8229			
	High range dissolved oxygen method	1, 2		8166			
	Field meter with galvanic, polarographic or luminescent probe	1, 2	5.2				See endnote ¹
	Handheld meter	1, 2					See endnote ¹
Nitrate or Nitrate-nitrite minus nitrite	Manual Cadmium reduction method with portable colorimeter or color wheel	1, 2	5.7				
	Electrode Method	2				4500-NO ₃ C	
	Colorimetric (Brucine sulfate)	2			352.1		
	Colorimetric, manual Cadmium reduction with laboratory or portable colorimeter	2			353.3	4500-NO ₃ E	
Phosphorus total or dissolved (0.45 micron filtered sampled)	Colorimetric, manual ascorbic acid single reagent	1, 2	5.6		365.2	4500-P E	
	Colorimetric, manual ascorbic acid two reagent	2	5.6		365.3		

Appendix C to rule 3745-4-05 of the Administrative Code.
 Some examples of acceptable analytical methods for level 1 and level 2 credible data.

		Credible Data	Volunteer Manual	Hach Company	USEPA Methods	Standard Methods	Other
Parameter	Technique	Level	(complete reference citations provided at end of table)				
			Chapter	Method	Method	Method	--
	Colorimetric, automated ascorbic acid	2	5.6		365.1	4500-P F	
pH	Field meter with probe	1, 2	5.4				See endnote ¹
	Digital pocket meters	1, 2	5.4				See endnote ¹
	Color comparison systems	1, 2	5.4				See endnote ¹
Temperature	Liquid-in-glass thermometer	1, 2				2550 B	
	Thermistor thermometer	1, 2				2550 B	
	Field meter with probe	1, 2	5.3				See endnote ¹
	Digital thermometer	1, 2					See endnote ¹
	Handheld meter	1, 2					See endnote ¹
Turbidity	Portable/pocket turbidity meter	1, 2	5.5				See endnote ¹
	Nephelometric	2			180.1	2130 B	
Total suspended residue or total suspended solids (TSS)	Transparency tube	1, 2	5.5				See endnote ²
	Gravimetric method	2	5.8		160.2	2540 D	

Appendix C to rule 3745-4-05 of the Administrative Code.
 Some examples of acceptable analytical methods for level 1 and level 2 credible data.

		Credible Data	Volunteer Manual	Hach Company	USEPA Methods	Standard Methods	Other
Parameter	Technique	Level	(complete reference citations provided at end of table)				
			Chapter	Method	Method	Method	--
Other parameters and methods							
Bacteria	E. coli membrane filtration plating on mTEC agar	2	5.11			9213 D	
	Fecal coliform membrane filtration plating on mFC agar	2	5.11			9222 D	
Benthic insects (statewide for level 1, outside of mine affected streams in WAP for level 2)	Stream Quality Monitoring (SQM)	1					See endnote ³
	Validation study necessary	2					See endnote ⁴
Benthic insects (limited to mine affected streams in WAP)	Macroinvertebrate Aggregated Index for Streams (MAIS)	2					See endnote ⁵
Stream flow	Travel-time method	1	5.1				
	Vertical-axis velocity meter	2					See endnote ⁶
	Electromagnetic flow meter	2					See endnote ⁶
Water transparency	Secchi disk	1, 2	5.5				
	Transparency tube	1	5.5				See endnote ²

Appendix C to rule 3745-4-05 of the Administrative Code.
 Some examples of acceptable analytical methods for level 1 and level 2 credible data.

		Credible Data	Volunteer Manual	Hach Company	USEPA Methods	Standard Methods	Other
Parameter	Technique	Level	(complete reference citations provided at end of table)				
			Chapter	Method	Method	Method	--
Reference citations	<p>Volunteer Manual - USEPA. 1997. Volunteer Stream Monitoring: A Methods Manual. EPA 841-B-97-003. United States Environmental Protection Agency, Office of Water. Washington D.C. 210 p. (This document is available through libraries and on the web at www.epa.gov/owow/monitoring/volunteer/.)</p> <p>Hach Company. 2005. Water analysis methods published by Hach Company, Loveland, CO. (These methods are available on the web at www.hach.com.)</p> <p>USEPA. 1983. Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency. EPA 600/4-79-020. United States Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory. Cincinnati, Ohio. 552 p. (This document is available through libraries and on the web at www.epa.gov/waterscience/methods/method/.)</p> <p>“Standard Methods” (These methods are available through libraries; the latest edition of the methods is also available on the web at www.standardmethods.org.)</p> <p>Eaton, A.D., L.S. Clesceri, E.W. Rice, A.E. Greenberg, M.A.H. Franson, (editors). 2005. Standard Methods for the Examination of Water and Wastewater: Centennial Edition. 21st Edition. ISBN: 0875530478. American Public Health Association. Washington, D.C. 1368 p.</p> <p>Clesceri, L.S., A.E. Greenberg, and A.D.Eaton, (editors). 1998. Standard Methods for the Examination of Water and Wastewater. 20th Edition. ISBN: 0875532357. American Public Health Association. Washington, D.C. 1325 p.</p> <p>APHA. 1995. Standard Methods for the Examination of Water and Wastewater. American Public Health Association. 19th Edition. American Public Health Association. Washington, D.C.</p> <p>APHA. 1992. Standard Methods for the Examination of Water and Wastewater. American Public Health Association. 18th Edition. American Public Health Association. Washington, D.C.</p>						

Table endnotes:

1. Follow instructions provided by manufacturer of instrumentation.
2. Methods are described in: Anderson, P. and R. D. Davic. 2004. Use of transparency tubes for rapid assessment of total suspended solids and turbidity in streams. *Lake and Reservoir Management*. 20(2): 110-120. This document describes studies that found a highly predictive correlation between these assessment tools and NTU turbidity in streams. (This document is available on the web at www.epa.ohio.gov/dsw/credibledata/index.aspx.)
3. Methods are described in: Kopec J. and S. Lewis. 1983. Stream quality monitoring. Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Scenic Rivers Programs. Columbus, Ohio. 20 p.; and Ohio DNR. A guide to volunteer stream monitoring. Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Scenic Rivers Section. Columbus, Ohio. 40 p. (Both documents can be obtained by contacting Ohio Department of Natural Resources, Division of Natural Areas & Preserves, 2045 Morse Road, Bldg. F-1, Columbus OH 43229 (614) 265-6453.)
4. Ohio EPA is interested in cooperating with investigators to develop and test suitable methods. Contact Jeff DeShon, Ohio EPA, Division of Surface Water (jeff.deshon@epa.state.oh.us) for more information. "Western Allegheny Plateau Ecoregion (WAP)" means the relatively homogenous ecoregion in eastern and southeastern Ohio and delineated in the publication "Omernik, J.M. 1987. Ecoregions of the conterminous United States. *Ann. Assoc. Amer. Geogr.* 77(1):118-125." (This document is available through libraries and the map is available on the web at www.epa.gov/wed/pages/ecoregions/level_iii.htm.)
5. For mine affected streams contained fully or partially within the Western Allegheny Plateau ecoregion of Ohio, macroinvertebrate sampling shall be conducted using a combination of the kick-net riffle sampling and dip-net sweeps as described in Barbour et al. (1999). In areas of, or samples with, high organism density, subsampling of the composited final sample shall be performed in accordance with Section 7.3.2 of Barbour et al. (1999). Raw collated benthic macroinvertebrate data shall be collapsed and categorized through the MAIS (Smith and Voshell 1997), yielding an index value correspondent with levels of environmental quality. Johnson, K. S. 2007. Field and Laboratory Methods for using the MAIS (Macroinvertebrate Aggregated Index for Streams) in Rapid Bioassessment of Ohio Streams. Ohio University Department of Biological Sciences. Athens, OH. 18 pp.

Barbour M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid bioassessment protocols for use in streams and wadable rivers: periphyton, benthic macroinvertebrates and fish. Second edition. EPA 841/B-99-002. U.S. Environmental Protection Agency, Office of Water. Washington D.C. (This document is available through libraries and on the web at www.epa.gov/owow/monitoring/rbp/.)

Johnson, K.J. 2007. Field and Laboratory Methods for using the MAIS (Macroinvertebrate Aggregated Index for Streams) in Rapid Bioassessment of Ohio Streams. Ohio University Department of Biological Sciences. Athens, OH. 18 pp.

Smith, E.P. and J.R. Voshell. 1997. Studies of benthic macroinvertebrates and fish in streams within EPA Region 3 for the development of biological indicators of ecological condition. Part 1, benthic macroinvertebrates. Report to U.S. EPA.. Cooperative Agreement CF821462010. U.S. Environmental Protection Agency. Washington D.C. (This document is available on the web at

Appendix C to rule 3745-4-05 of the Administrative Code.
Some examples of acceptable analytical methods for level 1 and level 2 credible data.

www.epa.ohio.gov/dsw/credibledata/references.aspx.)

6. Rantz, Saul Edward et al. 1982. Measurement and computation of streamflow -- v. 1, Measurement of stage and discharge: U.S. Geological Survey Water-Supply Paper 2175. United States Department of Interior, U.S. Geological Survey. Washington D.C. 284 p. (This document is available through libraries and on the web at <http://pubs.usgs.gov/wsp/wsp2175/>.)

3745-4-06 **Level 3 data requirements and reporting.**

- (A) Except as provided by paragraph (D) of rule 3745-4-01 of the Administrative Code, all data submitted to the director for consideration as level 3 credible data shall be collected and submitted by level 3 qualified data collectors (QDCs) approved by the director pursuant to rule 3745-4-03 of the Administrative Code. Other persons trained and supervised by the QDC may assist with the collection of data. The director shall accept the data as level 3 credible data provided the requirements of this rule are met. The director shall have sole authority in determining whether data meet these requirements. Data reporting shall be in a format consistent with the requirements listed in this rule. Data submitted by a QDC determined to meet these requirements shall be included in a computerized database maintained by Ohio EPA and made available for sharing with other agencies and interested persons.
- (B) Data submitted by a QDC must meet the following minimum requirements to be accepted as level 3 credible data.
- (1) Adherence to a study plan. Persons submitting data to Ohio EPA as a QDC under section 6111.53 of the Revised Code must prepare and adhere to a project study plan or, alternatively, use a generic study plan as described in this paragraph.
- (a) The QDC shall prepare and submit to the director for approval a project study plan using the guidelines presented in appendix A of this rule. The director may approve an alternative to the guidelines in appendix A of this rule upon a reasonable and scientifically supported demonstration by a QDC. Upon completion of the plan review, the director shall send written notification of deficiencies in the plan, if any are found, to the QDC and provide the QDC a reasonable opportunity to address such deficiencies. If the deficiencies are not addressed, the director may disapprove the study plan. A plan submitted by a level 3 QDC not disapproved within sixty days of the initial submittal or, where a notification of deficiency has been issued, within sixty days of any revised submittal, shall be considered to have been approved. The director will disapprove a site-specific plan that does not include the certification statement in paragraph (B)(4)(e) of this rule.
- (b) Generic study plan. The director may from time to time make available generic study plans suitable for certain project objectives and utilizing appropriate methods. After such time that a generic study plan is available, the QDC may elect to collect data using the generic study plan appropriate to the data quality objectives for the specific study. The level 3 QDC shall submit to the director a notification of the level 3 QDC's intent to utilize a generic plan or generic plan component under this paragraph. The QDC is encouraged to submit the notification to the director at least ninety days

prior to the first anticipated sampling activity. The QDC may submit credible data to the director in accordance with a generic plan without prior approval from the director.

[Comment: QDCs are encouraged to submit notification of intent to use generic study plans at least ninety days prior to sample collection to allow time for consultation with Ohio EPA. The objective of the consultation is to ensure that Ohio EPA and the QDC agree that the generic study plan is suitable for the project and the stated data quality objectives, thereby allowing the data generated to be deemed credible at the level intended by the QDC.]

- (2) Use of appropriate test methods. In preparing the project study plan, the QDC shall be responsible for selecting the appropriate field and laboratory methods, including quality assurance and quality control steps, that fit the objectives and purpose of the project. All methods should be commensurate with the purposes of level 3 and the need for sufficient rigor and sensitivity to detect relatively small differences in water quality over time or from sampling site to sampling site. The expectation and ability to utilize level 3 credible data in certain regulatory functions of Ohio EPA give rise to the requirement that all test methods for level 3 credible data be from one of the publications listed in paragraph (C) of this rule. Test methods published in updates to the publications listed in paragraph (C) of this rule may be used if approved by the director as part of a project study plan approval. Explicit approval of the specific methods employed in the study shall occur when Ohio EPA reviews project study plans or whenever Ohio EPA makes available a generic study plan.
- (3) All laboratories that perform analysis under a level 3 study plan must be accredited, participate in annual proficiency testing, and implement a quality assurance program as described in this paragraph.
 - (a) The QDC is responsible for ensuring that the laboratories used in generating level 3 credible data have current accreditations from one or more of the following organizations: national environmental laboratory accreditation program; American industrial hygiene association; international organization for standardization; or other governmental or private accrediting authorities that apply accreditation standards consistent with and equivalent to the organizations listed in this paragraph. An Ohio EPA laboratory audit, with all issues acceptably resolved, may be substituted for this accreditation (based on availability and to be scheduled through the credible data program).
 - (b) Laboratories analyzing level 3 data are required to participate in annual proficiency testing (PT) studies administered by providers that are accredited by the national institute of standards and technology (NIST) national voluntary laboratory accreditation program (NVLAP). The analyte

list should encompass all parameters for which the laboratory analyzes level 3 data. Laboratories may limit the scope of PT studies to those analytes that are readily available from the NIST NVLAP accredited providers.

- (c) Laboratories analyzing level 3 data are required to implement a quality assurance program and document all elements of the program in a quality assurance manual (QAM) or quality assurance plan (QAP). Guidelines for these elements are presented in appendix B of this rule.
- (4) Data reporting. QDCs choosing to submit their data to Ohio EPA must submit all collected data. Submission of data may be done at any time, but must be done no later than one year after completion of the study identified in the project study plan. For ongoing sampling programs, data submission should begin no later than one year after the initial phase of study identified in the project study plan. The following shall be submitted:
- (a) Habitat and chemistry sample data using the online credible data database;
 - (b) A paper copy of all level 3 fish and macroinvertebrate sample data on forms made available by the director, or on forms developed for the project if part of the approved project study plan;
 - (c) Documentation demonstrating adherence to an approved project study plan, generic study plan, or generic plan component;
 - (d) Copies of the results from all quality assurance and quality control samples collected during implementation of the approved project study plan, generic study plan, or generic plan component in the same manner as the data submitted in accordance with paragraphs (B)(4)(a) or (B)(4)(b) of this rule;
 - (e) A certification that, to the best of the QDC's knowledge and belief, the data were collected in accordance with the procedures required by the approved project study plan, generic study plan, or generic plan component; and
 - (f) A signed statement from each QDC working on the project certifying that the QDC has not been convicted of 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.
- (5) Reporting laboratory quality assurance and quality control plans. In addition to the information required by paragraph (B)(4) of this rule, the QDC, upon request of the director, shall provide quality assurance and quality control documentation for all laboratories which were used to analyze any data collected pursuant to the approved project study plan, generic study plan, or generic plan component. The QDC is responsible for providing this documentation in the

form of a laboratory quality assurance plan which meets the content guidelines presented in appendix B of this rule.

- (6) Data approval process. The director shall review data submissions to verify that the data submissions were submitted by a QDC, that appropriate test methods and quality control and quality assurance practices were used, and that the data reporting requirements are complete. The review will ensure that all components of the plan for the collection of data were followed. If substantial discrepancies are found, the director may decide not to approve the data, unless the QDC demonstrates to the satisfaction of the director that the discrepancy is valid and defensible for the purpose for which the data was collected. The director will provide written notification to the person submitting the data as to whether the data have been approved, and at what level the data qualify as credible data. The director shall approve or disapprove the data no later than one year from the submittal of such data to Ohio EPA.
- (C) Publications that provide acceptable level 3 test methods for the collection, analysis and interpretation of surface water quality monitoring data submitted under the credible data water quality monitoring program established pursuant to section 6111.53 of the Revised Code are presented in this paragraph. Most of these references are available on the web at <http://www.epa.ohio.gov/dsw/credibledata/references.aspx> or through public libraries. The director may approve other level 3 methods as part of a project study plan approval. Any level 3 methods must have a degree of accuracy commensurate with the purpose for which the data will be used.

The person submitting data as a level 3 QDC shall be responsible for the selection and proper execution of the test methods as described in paragraph (B)(2) of this rule. Test methods published in updates to the publications listed in paragraphs (C)(1) to (C)(6) of this rule may be used if approved by the director. Where the published methods allow for alternative test procedures for chemical or physical parameters and the appropriate review authority has approved the alternative test method, the director may approve use of the alternative test procedure through the study plan approval. Where Ohio EPA has developed, applied and published new biological or habitat assessment methods, the director may approve the use of such methods through the study plan approval.

(1) References for water quality sampling procedures.

- (a) Ohio EPA. 2009. Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices. Ohio Environmental Protection Agency, Division of Surface Water / Division of Environmental Services. Columbus, Ohio. 41 p. This document is available on the web at http://www.epa.ohio.gov/dsw/document_index/docindx.aspx.

- (b) Ohio EPA. 2010. Inland Lakes Sampling Procedure Manual. Ohio Environmental Protection Agency, Division of Surface Water. Columbus, Ohio 65 p. This document is available on the web at http://www.epa.ohio.gov/dsw/document_index/docindx.aspx.
 - (c) USEPA. 1982. Handbook for Sampling and Sample Preservation of Water and Wastewater. EPA 600/4-82-029. United States Environmental Protection Agency. Environmental Monitoring and Support Laboratory. Cincinnati, Ohio. 418 p. This document is available on the web by searching "600482029" at <http://nepis.epa.gov/EPA/html/Pubs/pubtitleORD.htm>.
 - (d) Ohio EPA. 1998. Sampling Methods for Documentation of a Public Health Nuisance under OAC Rule 3745-1-04 (F) & (G). August 20, 1998. Ohio Environmental Protection Agency, Division of Surface Water. Columbus, Ohio. 7 p. This document is available on the web at <http://www.epa.ohio.gov/portals/35/guidance/wqs3.pdf>.
 - (e) For the measurement of visibility using secchi disk depth when accompanied by measurements of total phosphorus and chlorophyll a, Lind, O. T. 1985. Handbook of common methods in limnology. Second edition. Kendal / Hunt Publishing Co., Dubuque, IA. 199 p.
 - (f) USEPA. 1997. Method 445.0. In vitro Determination of Chlorophyll a and Pheophytin a in Marine and Freshwater Algae by Fluorescence. Revision 1.2. September 1997. United States Environmental Protection Agency. National Exposure Research Laboratory Office of Research and Development. 22 p. This document is available on the web at http://www.epa.gov/nerlcwww/m445_0.pdf.
- (2) References for chemical and microbiological laboratory methods.
- (a) Eaton, A.D., L.S. Clesceri, E.W. Rice, A.E. Greenberg, M.A.H. Franson, (editors). 2005. Standard Methods for the Examination of Water and Wastewater: Centennial Edition. 21st Edition. ISBN: 0875530478. American Public Health Association. Washington, D.C. 1368 p. This document is available at many public libraries and on the web at <http://www.standardmethods.org/>.
 - (b) Clesceri, L.S., A.E. Greenberg, and A.D. Eaton, (editors). 1998. Standard Methods for the Examination of Water and Wastewater. 20th Edition. ISBN: 0875532357. American Public Health Association. Washington, D.C. 1325 p. This document is available at many public libraries and on the web at <http://www.standardmethods.org/>.

- (c) APHA. 1995. Standard Methods for the Examination of Water and Wastewater. American Public Health Association. 19th Edition. American Public Health Association. Washington, D.C. This document is available at many public libraries and on the web at <http://www.standardmethods.org/>.
- (d) APHA. 1992. Standard Methods for the Examination of Water and Wastewater. American Public Health Association. 18th Edition. American Public Health Association. Washington, D.C. This document is available at many public libraries and on the web at <http://www.standardmethods.org/>.
- (e) Ohio EPA. 1998. Permit Guidance #5 - Reporting and Testing Guidance for Biomonitoring Required by the Ohio Environmental Protection Agency. Ohio Environmental Protection Agency, Division of Surface Water. Columbus, Ohio. 31 p. (plus six attachments). This document is available on the web at <http://www.epa.ohio.gov/portals/35/guidance/permit5.pdf>.
- (f) USEPA. 40 C.F.R. 136. July 1, 2004 edition. This document is available on the web at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr136_main_02.tpl.
- (g) USEPA. 1983. Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency. EPA 600/4-79-020. United States Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory. Cincinnati, Ohio. 552 p. This document is available on the web at <http://yosemite.epa.gov/water/owrccatalog.nsf/EPATitle?OpenView&CartID=null> (search by title).
- (h) USEPA. 1978. Microbiological Methods for Monitoring the Environment, Water and Wastes . EPA-600/8-78/017. United States Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio. 356 p. This document is available on the web at <http://www.epa.gov/epahome/index/sources.htm>.
- (i) Fishman, M. J. (editor). 1993. Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory; determination of inorganic and organic constituents in water and fluvial sediments. Open File report 93-125. United States Department of the Interior, U. S. Geological Survey. Denver, CO. This document is available on the web at <http://infotrek.er.usgs.gov/pubs/>.
- (j) Stevens, H.H. et. al. 1975. Water temperature-influential factors, field measurements and data presentation. In: Techniques of Water-Resource

Investigations, Book 1, Chapter D1. United States Department of the Interior, U.S. Geological Survey. Washington, D.C. This document is available on the web at <http://water.usgs.gov/pubs/twri/>.

- (k) ASTM. 2005. Annual Book of ASTM Standards, Water and Environmental Technology. Volume 11.01: Sampling and Flow Measurement; Inorganic Constituents. Volume 11.02. Organic Constituents. American Society for Testing and Materials International. West Conshohocken, PA. This document is available on the web at <http://www.astm.org>.
- (l) AOAC. 2006. Official Methods of Analysis of AOAC INTERNATIONAL. 18th Edition. 2006. AOAC INTERNATIONAL. Gaithersburg, Maryland. This document is available on the web at <http://www.aoac.org>.
- (m) Arar, J.E. and B.G. Collins (USEPA). 1997. Method 445.0. In Vitro Determination of Chlorophyll a and Pheophytin a in Marine and Freshwater Algae by Fluorescence. Revision 1.2. September 1997. This document is available on the web at http://www.epa.gov/microbes/m445_0.pdf.

(3) References for stream flow measurement methods.

- (a) Rantz, S.E. et al. 1982. Measurement and computation of streamflow -- v. 1, Measurement of stage, and v. 2, Computation of discharge. U.S. Geological Survey Water-Supply Paper 2175. United States Department of Interior, U.S. Geological Survey. Washington D.C. 631 p. This document is available on the web at <http://infotrek.er.usgs.gov/pubs/>.
- (b) Lipscomb, S.W. 1995. Quality assurance plan for discharge measurements using broadband acoustic Doppler current profilers. U.S. Geological Survey Open File Report 95-701. 12 p. This document is available on the web at <http://infotrek.er.usgs.gov/pubs/>.
- (c) U.S. Geological Survey. 2005. Techniques of Water Resources Investigations Reports. Book 3: Applications of hydraulics, Section A: Surface-water techniques. (21 chapters). United States Department of Interior, U.S. Geological Survey. Washington D.C. This document is available on the web at <http://water.usgs.gov/pubs/twri/>.
- (d) Bureau of Reclamation. 1997 and 2001. Water Measurement Manual, Third Edition. United States Department of Interior, Bureau of Reclamation, Water Resources Research Laboratory. Denver, Colorado. This document is available on the web at http://www.usbr.gov/pmts/hydraulics_lab/pubs/wmm/index.htm.
- (e) International Organization for Standardization (ISO). 2010. Published standards found at 17.120.20. Flow in open channels. These documents are

available on the web at
http://www.iso.org/iso/iso_catalogue/catalogue_ics/catalogue_ics_browse.htm?ICS1=17&ICS2=120&ICS3=20.

- (f) ASTM. 2005. Annual Book of ASTM Standards, Water and Environmental Technology, Volume 11.01: Sampling and Flow Measurement. American Society for Testing and Materials International. West Conshohocken, PA. This document is available on the web at <http://www.astm.org>.

(4) References for stream habitat measurement methods.

- (a) Rankin, E.T. 1989. The qualitative habitat evaluation index (QHEI): rationale, methods, and application. Div. Water Qual. Plan. & Assess., Ecol. Assess. Sect., Columbus, Ohio. This document is available on the web at <http://www.epa.ohio.gov/dsw/bioassess/BioCriteriaProtAqLife.aspx>.
- (b) Midwest Biodiversity Institute (for Ohio EPA, Division of Surface Water). 2006. Methods for assessing habitat in flowing waters using the qualitative habitat evaluation index (QHEI). 26 pp. This document is available on the web at <http://www.epa.ohio.gov/dsw/bioassess/BioCriteriaProtAqLife.aspx>.
- (c) Rankin, E. T. 1995. The use of habitat assessments in water resource management programs. pp. 181-208. In: W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers. Boca Raton, FL. This document is available on the web at <http://www.crcpress.com/>.
- (d) Ohio EPA. 1989. Biological criteria for the protection of aquatic life: volume III: standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities. pp. V-4-18 to V-4-31. This document is available on the web at <http://www.epa.ohio.gov/dsw/bioassess/BioCriteriaProtAqLife.aspx>.
- (e) Ohio EPA. 2009. Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams. 86 p. This document is available on the web at <http://www.epa.ohio.gov/dsw/wqs/headwaters/index.aspx>.
- (f) Ohio EPA. 2010. Methods of Assessing Habitat in Lake Erie Shoreline Waters Using the Qualitative Habitat Evaluation Index (QHEI) Approach (Version 2.1). 35 p. Available on the web at <http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.aspx>.
- (g) Thoma, R. F. 2006. Development and Assessment of a Qualitative Habitat Evaluation Index For Application In Coastal Wetlands of the Great Lakes. pp. 171-194. In: T. P. Simon and P. M. Stewart (eds.). Coastal Wetlands of the Laurentian Great Lakes. Health Habitat and Indicators. AuthorHouse.

Bloomington, IN. This document is available on the web at <http://www.crcpress.com/>.

(5) References for fish tissue collection and contaminant testing.

- (a) Ohio EPA. 2009. State of Ohio Cooperative Fish Tissue Monitoring Program Fish Collection Guidance Manual. Ohio Environmental Protection Agency, Division of Surface Water. Columbus Ohio. 20 p. This document is available on the web at <http://www.epa.ohio.gov/dsw/fishadvisory/overview.aspx>.
- (b) USEPA. 2000. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. Volume 1, Fish Sampling and Analysis. Third edition. EPA 823/B-00-007. Office of Science and Technology, Office of Water, United States Environmental Protection Agency. Washington, D.C. This document is available on the web at <http://www.epa.gov/ost/fishadvice/volume1/index.html>.

(6) References for fish and macroinvertebrate community measurement methods.

- (a) Ohio Environmental Protection Agency. 1987a. Biological criteria for the protection of aquatic life: Volume I. The role of biological data in water quality assessment. Div. Water Qual. Monit. & Assess., Surface Water Section. Columbus, Ohio. This document is available on the web at <http://www.epa.ohio.gov/dsw/bioassess/BioCriteriaProtAqLife.aspx>.
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3745-4-06 Appendix A Guidelines for the preparation of level 3 project study plans.

Persons preparing level 3 project study plans for the credible data surface water quality monitoring program should consult the following set of guidelines to ensure the adequacy of the project study plan. This appendix is meant to serve as guidance in the preparation of study plans developed under rule 3745-4-06 of the Administrative Code and does not have the force of law. The director may conclude that the project study plan is deficient if the information requested in this appendix is missing and there is no other comparable justification for the technical and scientific adequacy of the project study plan.

- (1) A clear statement of the objectives of the planned activities, including data quality objectives and the types of data to be collected: chemical, stream habitat, fish, or macroinvertebrate;
- (2) A detailed explanation and description, including georeferencing, of the specific point and nonpoint source issues (when applicable) that will be evaluated and other sources that may influence ecological conditions within the study area;
- (3) A detailed explanation of parameter coverage within each data type (chemical, stream habitat, fish, and macroinvertebrate) for which sampling will be conducted at each sampling location;
- (4) Identification of field collection and data assessment techniques for stream habitat, fish, and macroinvertebrate sampling and, for all chemical parameters sampled, identification of the sample collection methods, the field or laboratory analytical methods used, and the detection limits;
- (5) For all stream flow measurements, identification of the methods used;
- (6) A detailed explanation and map or maps of planned sampling locations, including the name of the water body and each sampling location. For each sampling location the following information shall be included: sampling location latitude and longitude; sampling location river mile; general locational information; the U.S. geological survey HUC 8 number and name; and the purpose for data collection at each sampling location;
- (7) A detailed schedule of planned sampling activities or criteria for sampling conditions;
- (8) A written quality assurance and quality control (QA/QC) plan which adheres to the general quality assurance and quality control principles described in Ohio EPA's "Manual of Surveillance Methods and Quality Assurance Practices;"

- (9) A detailed explanation of all anticipated work products which will be submitted to the director for use by the director in consideration of the data as level 3 credible data. Examples of anticipated work products that shall be submitted to the director include, but are not limited to, the following: measured chemical, stream habitat, and biological data; beneficial use attainment statistics; biological index metrics and scores; water quality criteria exceedences; and stream habitat index metrics and scores;
- (10) A list of all qualified data collectors and other persons who will be involved with sample collection, sample analysis, and data entry along with specific procedures (e.g., training, testing, follow-ups) outlining how persons not qualified as level 3 data collectors will be trained and supervised to ensure the accuracy of their activities. The list shall include the name, qualified data collector number, address, electronic mail address, and phone number of all qualified data collectors and shall identify the qualified data collectors designated as the lead project managers;
- (11) If a contract laboratory will be used for chemical or biological analyses, identify the laboratory and provide a contact name, address, electronic mail address, and phone number for the contact;
- (12) If applicable, a copy of an approved scientific collector's permit issued by the Ohio department of natural resources, division of wildlife;
- (13) A statement certifying that a digital photo catalog of all sampling locations will be maintained for ten years including photos of the specific sampling location, riparian zone adjacent to the sampling location, and general land use in the immediate vicinity of the sampling location;
- (14) A statement certifying that the qualified data collector acting as the lead project manager will provide to the director upon request two voucher specimens of each taxa or species of fish and macroinvertebrates that are collected at sampling locations. If a specimen is too large to preserve, a large game species, or a legally protected species, diagnostic photographs or the preservation of specific diagnostic material from the specimen, where allowed, may be submitted in lieu of a complete specimen. All voucher materials shall be kept for at least ten years;
- (15) A statement attesting that the qualified data collector acting as the lead project manager will maintain and make available to the director, for each sampling location, the name of the water body sampled, the sampling location latitude and longitude, the sampling location river mile where possible or practicable, general location information, the USGS HUC 8 number and name, and the purpose for data collection at each sampling location;

- (16) In the event that the lead qualified data collector is not approved for all project data types, a signed statement to attest that the qualified data collector for each additional data type or specialty is aware of the qualified data collector's responsibilities for that data (including vouchers, photos, and site information as described in this appendix). This statement should specify the name of that particular project;
- (17) A statement from each qualified data collector working on the project certifying that he or she has not been convicted of 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.

Except as provided in this appendix, level 3 project study plans that use biological assessment methods shall provide for the collection of both fish and macroinvertebrate data at all sampling locations. If the level 3 project study plan does not include provisions for the collection of both fish and macroinvertebrates at all sampling locations, the project study plan shall include a detailed explanation of the circumstances, issues, and complexities associated with the proposed sampling location which preclude the use of both organism groups. If circumstances during project execution result in the failure to collect both fish and macroinvertebrates, then an explanation should accompany the data submission. Such circumstances may include, but are not limited to, problems with access to the sampling location, vandalism, on-site equipment failure, and extremely high or low stream flows.

3745-4-06 Appendix B Guidelines for laboratory quality assurance plans.

All laboratories that perform analysis under a level 3 study plan shall implement a quality assurance program and shall document all elements of the program in a quality assurance manual (QAM) or quality assurance plan (QAP). The elements covered in the QAM or QAP should, at a minimum, include the items listed in this appendix.

- (1) Title page with authorization signatures and dates.
- (2) Table of contents.
- (3) Statement of quality assurance policy.
- (4) Laboratory organization and responsibility, including:
 - (a) Organizational tables;
 - (b) Position descriptions for all personnel;
 - (c) Training, education, and experience of laboratory personnel;
 - (d) Training procedures; and
 - (e) Description of records retained by the laboratory on employee training and performance.
- (5) Data quality objectives for accuracy, precision, and reporting limits for each test, target analyte, and sample matrix.
- (6) Analytical methods variances, including justifications for method steps deviating from published methods.
- (7) Laboratory equipment and instrument lists.
- (8) Sample receipt and chain-of-custody procedures. This section should include procedures for:
 - (a) Receiving samples;
 - (b) Sample login;
 - (c) Sample security;
 - (d) Sample storage;
 - (e) Sample tracking; and

- (f) Sample disposal.
- (9) Laboratory standard operating procedures (SOPs) with dates of last revision. This section should include procedures for:
- (a) Glassware preparation;
 - (b) Sample preparation;
 - (c) Sample cleanup;
 - (d) Sample analysis; and
 - (e) A description of quality control procedures that are required and followed for each method.
- (10) Calibration procedures. This section should describe:
- (a) The type of calibration used for each method;
 - (b) The criteria for acceptance or verification; and
 - (c) The frequency of calibration.
- (11) Preventive maintenance and documentation. This section should describe:
- (a) The location of instrument manuals;
 - (b) Schedules for performance of routine equipment maintenance;
 - (c) Availability of instrument spare parts in the laboratory; and
 - (d) Maintenance contracts in place.
- (12) Internal quality control checks, frequency, and criteria for acceptability. This section may reference laboratory SOPs, and should include the frequency and acceptability of method detection limit (MDL) calculations.
- (13) Data reduction, review, and reporting. This section could include discussion of the process used to do data assessment, evaluation of data completeness, comparability, and trends.
- (14) Standard corrective action procedures for quality control failures.

- (15) External and internal audits, accreditations, and certifications. This section should list all laboratory accreditations and certifications, and participation in inter and intra laboratory studies.
- (16) Reports to management. This section should describe the various types of reports and meetings and their frequencies with management.
- (17) Document retention and control. In this section, the lab should discuss its document retention schedule, storage, and retrieval procedures, including procedures for review and approval of revised lab documents (i.e., QAP and SOPs).
- (18) Procedures for procurement and process control. This section should describe the laboratory's policy and procedures for the selection and purchasing of equipment and supplies it uses that affect the quality of the environmental tests and calibrations.