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**OHIO ENVIRONMENTAL PROTECTION AGENCY**  
**Division of Drinking and Ground Waters Ohio Administrative Code (OAC) Rules**

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**3745-7-01 Professional operator certification definitions.**

Except as otherwise noted, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter.

(A)

- (1) "Active instruction" means the time when a professional operator is receiving instruction. This does not include break time, introductions or question and answer sessions in excess of fifteen minutes. A professional operator shall not claim hours on a renewal application other than those received in active instruction.
- (2) "Agency" means the Ohio EPA.
- (3) "Automated" means the ability to monitor and control water and wastewater treatment processes and the status of treatment components by computer or electronic means.
- (4) "Available" means able to be contacted as needed twenty-four hours a day, seven days a week to make operational decisions in a timely manner.
- (5) "Average daily flow" for the purpose of this chapter means the average of the sixty highest daily flows during any one calendar year period.

(B) [Reserved.]

(C)

- (1) "Certified professional operator" or "professional operator" means an individual with valid certification issued pursuant to this chapter.
- (2) "Certified professional operator of record" or "professional operator of record" means the on-site certified professional operator or one of the on-site certified professional operators responsible for the technical operation of one or more of the following:
  - (a) A public water system.
  - (b) A water treatment plant, if a public water system has more than one water treatment plant.
  - (c) A distribution system.
  - (d) A sewerage system.
  - (e) A treatment works.
  - (f) A wastewater treatment facility, if a treatment works has more than one wastewater treatment facility.
- (3) "Complete application" means an application submitted with all required information on the form completed and all appropriate fees, transcripts and documentation attached. Applications missing any of the listed items shall not be considered complete.
- (4) "Contact hours" means time spent by a certified professional operator in approved formal or informal training.
- (5) "Continuous monitoring" means the monitoring and recording of parameters accomplished by either

meters or manual samples at least every fifteen minutes.

- (6) "Contract operations company" means a person which has been approved by the director to employ or subcontract with certified professional operators and contracts with public water systems or wastewater treatment facilities to provide the professional operator services required by this chapter.
- (7) "Contracted professional operator" means an individual who either works for a contract operations company or who individually contracts with public water systems or wastewater treatment facilities to provide the professional operator services required by this chapter.
- (8) "Core person ID" means the unique identifying number assigned to a person by the agency. For certified professional operators, this number is the middle digits of their certification number.
- (9) "Council" means the professional operator certification advisory council as established in rule 3745-7-10 of the Administrative Code.
- (D) "Director" means the director of the Ohio EPA or the director's duly authorized representative.
- (E) "Expired certificate" means a certificate which has not been renewed by December thirty-first of the renewal year. An expired certificate may be renewed within six months of the expiration date in accordance with rule 3745-7-15 of the Administrative Code.
- (F) "Field" means the field of practice for which a professional operator is certified. Water supply, water distribution, wastewater treatment, and wastewater collection are each fields of certification.
- (G) "Green leaf training provider" means a training provider that is approved by the director to issue trainer-specific contact hour course approval numbers.
- (H) [Reserved.]
- (I) "Invalid certificate" means a certificate which expired and was not renewed within six months of the expiration date.
- (J) [Reserved.]
- (K) [Reserved.]
- (L) [Reserved.]
- (M) "Management experience" means experience obtained while supervising, directing, or controlling the affairs associated with a public water system or treatment works. Such experience shall include, but not be limited to, being directly responsible for plant operations, supervising operating staff, and being responsible for personnel issues. Experience gained in the position of shift supervisor at a class III or IV facility shall qualify as management experience.
- (N) "NPDES" means national pollutant discharge elimination system.
- (O)
  - (1) "One year" means two thousand eighty hours when referring to operating experience. This is equal to forty hours per week for fifty-two weeks. When referring to educational experience one year shall constitute at least four hundred fifty hours of applicable course work.
  - (a) "Nine months" means fifteen hundred sixty hours when referring to operating experience.

(b) "Six months" means one thousand forty hours when referring to operating experience.

(2) "Operating experience" means time performing the day-to-day activities necessary to ensure the proper performance and operation of the equipment or processes of a public water system, treatment works, or sewerage system. Experience for the water supply or water distribution examination may only be obtained at a public water system as defined in this rule.

(a) From the effective date of this rule until one year after the effective date of this rule, types of experience related to a public water system, a treatment works, a water distribution system, or a sewerage system that qualify as operating experience include the following:

- (i) Experience while in the military with providing potable water or wastewater treatment.
- (ii) On-site investigations and inspections of operations that require coordination of work with active treatment processes, collection, or distribution systems.
- (iii) Laboratory analyses if the analyses are conducted in the laboratory of the owner of a public water system, treatment works or sewerage system.
- (iv) Construction inspection and engineering design that require coordination of the inspection or design with the operation of the active treatment processes, collection, or distribution systems.
- (v) Industrial wastewater treatment.

(b) Beginning one year after the effective date of this rule, types of experience related to a public water system, a treatment works, a water distribution system, or a sewerage system that qualify as operating experience include the following:

- (i) Experience while in the military with providing potable water or wastewater treatment.
- (ii) On-site investigations and inspections of operations that require coordination of work with active treatment processes, collection, or distribution systems.
- (iii) Hands-on operation and maintenance of a public water system, a treatment works, a water distribution system or a sewerage system.
- (iv) Experience in ensuring compliance with primary and secondary maximum contaminant levels, action levels and permit limits through the evaluation of facility process control parameters.
- (v) Industrial wastewater treatment.

(c) From the effective date of this rule until one year after the effective date of this rule, types of experience related to a public water system, a treatment works, a water distribution system, or a sewerage system that qualify as operating experience but may count for no more than twenty-five per cent of the operating experience requirement of each field include the following:

- (i) Sludge handling or hauling, if part of a treatment works.
- (ii) On-site supervisory control and data acquisition ("SCADA") systems monitoring.

(d) Beginning one year after the effective date of this rule, for applicants whose actual job responsibilities solely consist of one or more of the following types of experience, in conjunction with the applicant's job description, the experience shall qualify as operating experience but may count for no more than twenty-five per cent of the operating experience requirement of each field:

- (i) Sludge handling or hauling, if part of a treatment works.
  - (ii) On-site supervisory control and data acquisition ("SCADA") systems monitoring.
  - (iii) Laboratory analyses if the analyses are conducted in the laboratory of the owner of a public water system, treatment works or sewerage system.
  - (iv) Pretreatment, if part of a treatment works or sewerage system, where pretreatment is the only job duty.
  - (v) Collection system experience when applying for a wastewater treatment examination or certificate.
  - (vi) Distribution experience when applying for a water supply examination or certificate.
  - (vii) Construction inspection and engineering design that require coordination of the inspection or design with the operation of the active treatment process, sewerage or distribution systems.
  - (viii) Source water protection and watershed management.
- (e) From the effective date of this rule until one year after the effective date of this rule, the following types of experience related to a public water system, a treatment works, a water distribution system, or a sewerage system shall not qualify as operating experience:
- (i) Clerical duties.
  - (ii) Commercial laboratory work.
  - (iii) Sludge handling and hauling if not part of a treatment works.
  - (iv) Academic research.
  - (v) Meter reading only.
  - (vi) Experience as a laborer, if only responsible for mowing grass, painting tanks, etc.
  - (vii) Investigations and inspections of operations that do not require coordination of work with active treatment processes, collection, or distribution systems.
  - (viii) Construction inspections and engineering design that do not require coordination of work with active treatment processes, collection, or distribution systems.
  - (ix) Off-site monitoring of SCADA.
  - (x) Septage hauling.
- (f) Beginning one year after the effective date of this rule, the following types of experience related to a public water system, a treatment works, a water distribution system, or a sewerage system shall not qualify as operating experience:
- (i) Clerical duties.
  - (ii) Commercial laboratory work.
  - (iii) Sludge handling and hauling if not part of a treatment works.

- (iv) Academic research.
- (v) Meter reading only.
- (vi) Experience as a laborer, if only responsible for mowing grass, painting tanks, etc.
- (vii) Investigations and inspections of operations that do not require coordination of work with active treatment processes, collection, or distribution systems.
- (viii) Construction inspections and engineering design that do not require coordination of work with active treatment processes, collection, or distribution systems.
- (ix) Off-site monitoring of SCADA.
- (x) Septage hauling.
- (xi) Septic tank maintenance or operation.

(P)

- (1) "Person" means any individual; corporation; company; association; partnership; the state; or any political subdivision, agency, institution, or instrumentality thereof; any interstate body created by compact; or the federal government or any department, agency, or instrumentality thereof.
- (2) "Population," for the purpose of this chapter only, means the following:
  - (a) For community public water systems, population shall be determined in accordance with paragraph (P)(11)(a) of rule 3745-81-01 of the Administrative Code and the addition of the average of the highest sixty days for any non-community population determined using the methods identified in paragraph (P)(11)(b) of rule 3745-81-01 of the Administrative Code. In the event a certificate of occupancy or seating capacity is used in accordance with paragraph (P)(11)(b) of rule 3745-81-01 of the Administrative Code, an average does not need to be calculated.
  - (b) For noncommunity public water systems, population shall be the average of the highest sixty days for any non-community population determined using the methods identified in paragraph (P)(11)(b) of rule 3745-81-01 of the Administrative Code. In the event a certificate of occupancy or seating capacity is used in accordance with paragraph (P)(11)(b) of rule 3745-81-01 of the Administrative Code, an average does not need to be calculated.
- (3) "Precipitative softening" means a series of processes to remove hardness using lime or any other chemicals to cause chemical precipitation prior to filtration.
- (4) "Private sewer" means a sewer or sewerage system that is not public.
- (5) "Public sewer" means a sewer or sewerage system that is owned by a municipality, county, or state entity or any public body created under state law that has authority over sewerage.
- (6) "Public water system" is defined in rule 3745-81-01 of the Administrative Code.

(Q) [Reserved.]

(R) [Reserved.]

(S)

(1) "Sewage sludge facility" is as defined in rule 3745-40-01 of the Administrative Code.

(2) "Sewerage system" is as defined in section 6111.01 of the Revised Code.

(T)

(1) "Technical operation" means the act of making process control or system integrity decisions which directly impact the quality or quantity of water or effluent.

(2) "Treatment works" is as defined in section 6111.01 of the Revised Code.

(U) [Reserved.]

(V)

(1) "Valid certificate" means a certificate that is not expired, suspended, revoked or invalid.

(2) "Visit" means a period of time when a person is on-site at a public water system, treatment works, or sewerage system that is sufficient to perform routine sampling (e.g. flow, chlorine residual, and pH measurements), maintenance, or observation of a public water system, sewerage systems, or treatment works in order to ensure compliance and proper operation.

(W)

(1) "Wastewater" means water containing sewage, industrial waste, or other wastes.

(2) "Wastewater collection system" shall mean "sewerage system" as defined in section 6111.01 of the Revised Code.

(3) "Wastewater treatment facility" is as defined in rule 3745-33-01 of the Administrative Code. A treatment works may be comprised of more than one wastewater treatment facility.

(4) "Water treatment plant" means any type of equipment, device, treatment unit, or structure that in some way alters the physical, chemical, or microbiological quality of the water, excluding booster chlorination facilities within the distribution system of a public water system that has a classified water treatment plant. A public water system may be comprised of more than one water treatment plant.

(5) "Week" for the purposes of the rules in this chapter means a seven-day period beginning on Sunday and ending on the following Saturday.

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03/04/16



**3745-7-02 Certified professional operators of record.****(A) Responsibilities.**

- (1) Each person owning or operating a public water system, except as provided for in paragraph (B) of this rule, shall designate one or more professional operators of record to oversee the technical operation of the public water system or each water treatment plant and distribution system within the public water system. Each professional operator of record shall have a valid certification of a class equal to or greater than the classification of the public water system, distribution system or water treatment plant except as provided for in paragraphs (E) to (G) of this rule.
    - (a) The owner and professional operator of record of a public water system shall notify the director of the identity of a professional operator of record upon initiation or termination of service or upon request by the director.
    - (b) Notification shall be made on a form acceptable to the director within three days of initiation or termination of service or a request by the director.
  - (2) Each person owning or operating a treatment works or public sewerage system shall designate one or more professional operator of record to oversee the technical operation of the treatment works, sewerage system, or each wastewater treatment facility. Except as provided for in paragraphs (E) to (G) of this rule, each professional operator of record shall have a valid certification of a class equal to or greater than the classification of the treatment works, sewerage system, or wastewater treatment facility.
    - (a) The owner and professional operator of record of a treatment works or sewerage system shall notify the director of the identity of a professional operator of record upon initiation or termination of service or upon request by the director.
    - (b) Notification shall be made on a form acceptable to the director within three days of initiation or termination of service or a request by the director.
  - (3) Each person owning or operating a private sewerage system that has been classified by the director in accordance paragraph (B)(1)(d) of rule 3745-7-04 of the Administrative Code, shall designate one or more professional operator of record to oversee the technical operation of the private sewerage system. Except as provided for in paragraphs (E) to (G) of this rule, each professional operator of record shall have a valid certification of a class equal to or greater than the classification of the private sewerage system.
    - (a) The owner and professional operator of record of a private sewerage system shall notify the director of the identity of a professional operator of record upon initiation or termination of service or upon request by the director.
    - (b) Notification shall be made on a form acceptable to the director within three days of initiation or termination of service or a request by the director.
- (B) Transient noncommunity ground water public water systems without treatment for arsenic, nitrate or 4-log removal of viruses, serving populations of two hundred fifty or fewer, are not required to place the technical operation of such a public water system under a professional operator of record unless the director determines that a professional operator of record is necessary.
- (C) The certified professional operator of record required by paragraph (A) or (B) of this rule shall be an employee of the person owning or operating the public water system, treatment works, or sewerage system,

except as provided in paragraph (D) of this rule.

- (D) Owners of public water systems, sewerage systems, or treatment works may enter into a contract with an approved contracted professional operator or contract operations company for the services of one or more appropriately certified professional operators to serve as the professional operator of record provided the following:
- (1) The contract requires that the certified professional operator of record be available to respond to emergencies and provide the services necessary to maintain the reliable operation of the system.
  - (2) The contract clearly defines the responsibilities of the owner and the professional operator of record.
  - (3) The contract complies with the staffing requirements of paragraphs (C) to (E) of rule 3745-7-03 of the Administrative Code and paragraphs (C) to (D) of rule 3745-7-04 of the Administrative Code.
  - (4) The contracted professional operator of record shall perform duties as identified in rule 3745-7-09 of the Administrative Code.
- (E) The director may approve a professional operator with a valid class III certificate to be the professional operator of record for a class IV public water system or class IV treatment works for a period no longer than two years, if the class III professional operator has applied for and received approval to take a class IV examination in accordance with rule 3745-7-06 of the Administrative Code and maintains a valid class III certificate for the duration of time for which the director grants approval in accordance with this paragraph. A public water system or wastewater treatment works may only use this exemption for a total of thirty months within a five-year period.
- (F) Upon request, the director may approve an individual who passes the class I water supply examination, but does not have the necessary experience, to be the professional operator of record for a class I public water system with a population of less than two hundred fifty, provided the following conditions are met:
- (1) The professional operator holds a valid class A certificate.
  - (2) The professional operator is a full time (forty hours per week) employee of the facility where the public water system is located and has provided assistance in the operation of the treatment system to the class I professional operator of record for at least one year.
  - (3) The professional operator completes at least three hours of training specific to the type of treatment being used by the public water system and submits verification with the request.
  - (4) The public water system does not have an active enforcement action or violations related to maximum contaminant levels, treatment techniques, and monitoring or reporting within the last five years.
  - (5) The professional operator is prohibited from operating any other public water system.
  - (6) The professional operator remains a full time employee of the facility during the time of the exemption.
  - (7) The professional operator complies with the class I minimum staffing requirements.
  - (8) The professional operator obtains twelve contact hours every two years. At least six of those contact hours must be related to operation and maintenance, and at least three of those six hours must be related to the specific treatment in operation at the public water system.

The director shall withdraw the exemption if the public water system or professional operator does not

comply with requirements in paragraphs (F)(1) to (F)(8) of this rule.

(G) Upon request, the director may approve an individual who passes the class I water supply examination, but does not have the necessary experience, to be the professional operator of record for a health care facility that purchases water from a public water system and adds treatment for the control of *Legionella* provided the following conditions have been met:

- (1) The professional operator holds a valid class A certificate.
- (2) The professional operator is a full time (forty hours per week) employee of the facility where the public water system is located and has provided assistance in the operation of the treatment system to the class I professional operator of record for at least one year.
- (3) The professional operator completes at least three hours of training specific to the type of treatment being used by the public water system and submits verification with the request.
- (4) The public water system does not have an active enforcement action or violations related to maximum contaminant levels, treatment techniques, and monitoring or reporting within the last five years.
- (5) The professional operator is prohibited from operating any other public water system.
- (6) The professional operator remains a full time employee of the facility during the time of the exemption.
- (7) The professional operator complies with the class I minimum staffing requirements.
- (8) The professional operator obtains twelve contact hours every two years. At least six of those contact hours must be related to operation and maintenance, and at least three of those six hours must be related to the specific treatment in operation at the public water system.

The director shall withdraw the exemption if the public water system or the professional operator does not comply with requirements in paragraphs (G)(1) to (G)(8) of this rule.

(H) Nothing in this rule shall preclude the director from initiating action in accordance with paragraph (E) of rule 3745-7-03 of the Administrative Code or paragraph (D) of rule 3745-7-04 of the Administrative Code.

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**3745-7-03 Public water system classification and staffing requirements.**

Each public water system or water treatment plant and distribution system within a public water system shall be classified in accordance with this rule, with the exception of transient noncommunity public water systems using groundwater, without treatment for nitrate, arsenic or 4-log removal of viruses and having the potential to serve populations of two hundred fifty or fewer. In lieu of making a potential to serve population determination of two hundred fifty or fewer, a transient noncommunity public water system may demonstrate an average daily flow of less than one thousand two hundred fifty gallons per day.

All systems classified under this rule shall provide the minimum staffing required in accordance with this rule.

**(A) Applicability.**

- (1) Public water systems or water treatment plants and distribution systems within a public water system shall be classified in accordance with this rule and shall be staffed in accordance with paragraph (C) of this rule by either a professional operator of record pursuant to paragraph (A)(1) of rule 3745-7-02 of the Administrative Code or a backup professional operator pursuant to paragraphs (C)(3)(c), (C)(3)(d) and (C)(3)(e) of this rule.
- (2) The owner of a public water system may request that the director reclassify the facility in accordance with the provisions of this rule at any time.

**(B) Classification.**

- (1) A public water system or water treatment plant and distribution system within a public water system shall be classified in accordance with paragraphs (B)(2) to (B)(3) of this rule based on the approved design flow, degree of risk to public health or the environment, and the complexity of the treatment plant operation.
  - (a) The classification of a particular public water system or water treatment plant and distribution system within a public water system may change when there are system changes that affect the quality of the source, the complexity of treatment or the distribution system, the population the system has the potential to serve, or potential public health hazards.
  - (b) The director shall issue a certificate to each public water system indicating the classification of each water treatment plant and distribution system within the system. The owner shall display each certificate for public examination at the water treatment plant or principal office of the public water system.

**(2) Distribution system.**

- (a) The director shall classify as a class I water distribution system:
  - (i) The distribution system of each public water system if the system has the potential to serve a population of less than twenty-five thousand per day and is not part of a class A public water system as defined in table 1 of this rule.
  - (ii) Each public water system that consists solely of a distribution system if the system has the potential to serve a population of less than twenty-five thousand per day and is not part of a class A public water system as defined in table 1 of this rule.

- (b) For distribution systems that are not classified as a class I water distribution system under paragraph (B)(2)(a) of this rule and are not part of a class A public water system as defined in table 1 of this rule, the director shall classify the distribution system of each public water system and each public water system that consists solely of a distribution system as a class II water distribution system.
- (c) Each public water system that purchases water from another public water system and provides additional treatment shall have the treatment system classified in accordance with table 1 of this rule.
- (3) Unless classified as a class A system in accordance with number 10 of table 1 of this rule, public water systems shall be classified according to the criteria in numbers 1-9 of table 1 of this rule.

Table 1. Classification of class A, I, II, III, and IV public water systems

	System characteristics	Design flow*	Classification
1.	Surface water treatment, excluding slow sand filtration	More than 5.0 MGD	Class IV
		5.0 MGD or less	Class III
2.	Slow sand filtration surface water treatment	All	Class II
3.	Ground water treatment to remove any chemical contaminant with a maximum contaminant level (arsenic, nitrate, etc.) -or- precipitative softening ground water treatment	More than 5.0 MGD	Class III
		0.5 to 5.0 MGD	Class II
		Less than 0.5 MGD	Class I
4.	Ground water treatment for any contaminant with a secondary maximum contaminant level# or that only involves adding a disinfectant, but in either case excluding precipitative softening ground water treatment	More than 5.0 MGD	Class III
		2.5 to 5.0 MGD	Class II
		Less than 2.5 MGD	Class I
5.	Nontransient noncommunity groundwater treatment systems that have the potential to serve a population > 250 or a daily average flow >1250 gallons per day and serve a population < 1,000 not meeting the criteria of paragraph (1) and paragraph (4) of this table	Not applicable	Class I
6.	A transient noncommunity groundwater system that has the potential to serve a population < 250 or an average daily flow of 1250 gallons per day or less which treats for nitrate, arsenic or 4-log	Not applicable	Class I

Table 1. Classification of class A, I, II, III, and IV public water systems

	virus inactivation and removal		
7.	A purchased water system that provides additional treatment and has the potential to serve a population of twenty-five thousand per day or greater	Not applicable	Class II
8.	A purchased water system that provides additional treatment, does not meet the criteria in paragraph (10) of this table and has the potential to serve a population of less than twenty-five thousand per day	Not applicable	Class I
9.	Public water systems meeting the criteria of paragraphs (10)(a) to (10)(c) but not paragraph (10)(d) of this table	Not applicable	Class I
10.	Public water systems meeting all of the following criteria:	Not applicable	Class A
	(a) Is a community or nontransient noncommunity public water system that has the potential to serve a population of no more than 250 or produces an average daily flow of less than 1250 gallons per day, or a transient noncommunity public water system that has the potential to serve a population greater than 250 or produces an average daily flow of greater than 1250 gallons per day.		
	(b) Uses only purchased water or a ground water source		
	(c) Does not provide precipitative softening or treat for a chemical contaminant with a maximum contaminant level or action II as defined in rule 3745-81-01 of the Administrative Code		
	(d) Has no serious public health or environmental hazard associated with the operation of the public water system		

\* MGD = Million gallons per day

# "Secondary maximum contaminant level" is as defined in rule 3745-82-01 of the Administrative Code.

(C) Staffing.

- (1) A professional operator of record shall, at a minimum, be physically present at the public water system and fulfill the time requirements, as detailed in table 2, and perform technical operation as assigned by

the owner of a public water system or their designee. Time spent working on equipment within the service area of a public water system, as part of a professional operator of record's normal job responsibilities, shall count toward the minimum staffing time requirements.

Table 2. Minimum staffing requirements for a professional operator of record

System classification	Staffing requirement
Class A without treatment or only treating with a cartridge filter	At least 30 minutes per week.
Class A with treatment	2 days per week for a minimum of 1 hour per week.
Class I	3 days per week for a minimum of 1.5 hours per week.
Class II	5 days per week for a minimum of 20 hours per week.
Class III and IV	5 days per week for a minimum of 40 hours per week.

(2) Distribution system staffing.

- (a) The owner of a class I distribution system shall ensure that a professional operator of record or a professional operator that is certified in the field of water distribution or water supply, class A operators excluded, performs visits to any portion of the distribution system at least three days per week. The owner of the distribution system shall maintain documentation regarding their authorization of individuals other than the professional operator of record to perform these visits. The individual performing the visit shall document the visit in the log book and report any problems to the professional operator of record.
- (b) The owner of a class II distribution system shall ensure that a professional operator of record or a professional operator that is certified in the field of water distribution or water supply, class A operators excluded, performs visits to any portion of the distribution system at least five days per week. The owner of the distribution system shall maintain documentation regarding the authorization of individuals other than the professional operator of record to perform these visits. The individual performing the visit shall document the visit in the log book and report any problems to the professional operator of record.

(3) Exceptions.

- (a) During periods when the public water system is not producing or treating water it shall not be necessary to meet the staffing requirements in paragraph (C)(1) of this rule.
- (b) Upon application by the owner of the system using a form acceptable to the director, and the director's approval of the system operating plan described in paragraph (C)(3)(b)(i) of this rule, the director shall reduce the minimum staffing requirement for the professional operator of record of a class II, III, or IV public water system to no less than five days a week for a minimum of ten hours per week. The director shall not grant a reduction to a public water system where a professional operator of record cannot respond to operational problems within one hour, a public water system that has a history of noncompliance with maximum contaminant levels, treatment techniques, sampling, reporting, or any other violations related to the public water system, or a public water system under formal enforcement.
  - (i) Public water systems shall submit an operating plan for the system as part of the application for a staffing reduction. The operating plan shall include a description of the level of automation and



continuous monitoring at the facility, a standard operating procedure for any such automation or continuous monitoring equipment, and a detailed operations schedule showing the number of professional operators, the certification level, and the number of hours spent per week at the public water system. The description of the continuous monitoring shall include a description of the calibration frequency, verification of calibration and records maintenance. Reductions in minimum staffing for the professional operator of record may be granted in accordance with the criteria in Table 3 and Table 4 of this rule, either singly or in combination, based on the information provided in the system's operating plan. In no case shall a reduction of greater than thirty hours per week be granted for a class III or IV facility, or ten hours per week for a class II facility.

Table 3. Reductions in minimum professional operator of record staffing based on facility staffing levels

	Professional operator of record staffing may be reduced by 5 hours per week if:	Professional operator of record staffing may be reduced by 10 hours per week if:	Professional operator of record staffing may be reduced by 15 hours per week if:	Professional operator of record staffing may be reduced by 20 hours per week if:
Plant staffing at class III or IV water treatment plants	There is another professional operator certified at a level no more than 2 classes below that of the public water system onsite at the water treatment plant 2 hours per day 5 days per week	There is another professional operator certified at a level no more than 2 classes below that of the public water system onsite at the water treatment plant 4 hours per day 5 days per week	There is another professional operator certified at a level no more than 2 classes below that of the public water system onsite at the water treatment plant 6 hours per day 5 days per week	There is another professional operator certified at a level no more than 2 classes below that of the public water system onsite at the water treatment plant 8 hours per day 5 days per week
Plant staffing at class II water treatment plants	There is a class I professional operator onsite at the water treatment plant 3 hours per day 5 days per week	There is a class I professional operator onsite at the water treatment plant 4 hours per day 5 days per week	Not applicable	Not applicable
Plant staffing at class II water treatment plants	There is a Class 1 professional operator in training onsite at the water treatment plant for 6 hours a day 5 days per week	There is a Class 1 professional operator in training onsite at the water treatment plant for 8 hours a day 5 days per week	Not applicable	Not applicable

Table 4. Reductions in minimum professional operator of record staffing based on level of automation or continuous monitoring

	Professional operator of record staffing may be reduced by 5 hours per week if:	Professional operator of record staffing may be reduced by 10 hours per week if:	Professional operator of record staffing may be reduced by 15 hours per week if:	Professional operator of record staffing may be reduced by 20 hours per week if:
Automation or continuous monitoring at class II, III or IV plants	The water treatment plant has supervisory control and data acquisition ("SCADA") and continuous monitoring for MCL and treatment technique monitoring (turbidity, fluoride, pH, flow, temperature and chlorine residual, if applicable)	The water treatment plant is automated with continuous monitoring for the parameters required in the 5 hour reduction	The water treatment plant is automated with continuous monitoring for the parameters required in the 5 hour reduction and the water treatment plant must also have personnel onsite at the water treatment plant or an electronic notification system that notifies the professional operator of record when there are problems with the water treatment plant	The water treatment plant is automated with continuous monitoring for the parameters required in the 5 hour reduction and an electronic notification system or certified professional operators on each shift that will notify the professional operator of record when there are problems with the water treatment plant. The water treatment plant must also have the ability to be operated remotely or have a certified professional operator respond within 30 minutes

- (ii) Any change in the circumstances under which the reduction was approved (e.g., retirement of a professional operator listed in the approved staffing plan, loss of the professional operator of record, reduction in the workforce, removal or failure of automation or continuous monitoring, etc.) will require that the system immediately return to compliance with the minimum staffing requirements in paragraph (C)(1) of this rule. This provision shall not preclude a public water

system from submitting a modified operating plan.

- (iii) For a system operating plan to receive director's approval under table 4 of this rule, continuous monitors shall be calibrated in accordance with manufacturer standards or applicable regulations, whichever is more stringent. Calibration verification shall be conducted at least once per week or in accordance with applicable regulations, whichever is more stringent. Records of the calibrations and verifications shall be maintained for three years.
- (c) The professional operator of record of a class II, III, or IV public water system or class II water distribution system may be replaced by a backup professional operator with a certificate one classification lower than the public water system's classification for a period of up to thirty consecutive days. The use of this provision does not require notification to the agency. The operational records shall clearly indicate every time the backup professional operator is being used to meet the minimum staffing requirement. This provision may not be used to routinely circumvent minimum staffing requirements. In the case of systems which utilize an established flex work schedule of four ten-hour days, the use of a professional operator with a certificate one classification less than the facility to staff the facility on the fifth day of the week shall not be considered an attempt to circumvent the minimum staffing requirements.
- (d) Upon proper justification, such as military leave or long term illness, the director may authorize the replacement of the professional operator of record for a class II, III, or IV public water system or class II water distribution system by a backup professional operator with a certificate one classification lower than the facility for a period of greater than thirty consecutive days. Such requests shall be made in writing to the district office in which the system is located.
- (e) If the designated professional operator of record is unable to meet the minimum staffing requirements at a class A or class I public water system, then a professional operator with a certificate equal to or higher than the public water system may serve as the professional operator of record until such time as the designated professional operator of record is available. The operational records shall clearly indicate every time the backup professional operator is being used to meet the minimum staffing requirement. The use of this provision does not require notification to the agency unless the use of the backup professional operator exceeds thirty consecutive days. In the event the use of a backup professional operator under this provision exceeds thirty consecutive days, the owner or professional operator shall provide notice in accordance with paragraph (A)(1) of rule 3745-7-02 of the Administrative Code.
- (f) Any professional operator fulfilling the role of a backup professional operator shall be held responsible for any violations that occur during the period when they are acting as the backup professional operator.
- (g) In the event a public water system has more than one water treatment plant within one hundred feet of another water treatment plant, the public water system may submit a request on a form acceptable to the director, for a fifty per cent reduction of the hourly minimum staffing requirements for each water treatment plant. The request shall include documentation of the distance between the two facilities and documentation that the facilities are not under enforcement and have been in compliance with maximum contaminant levels, treatment techniques, sampling, reporting and professional operator certification requirements for the three years prior to the request. Upon receiving a complete application, the director may approve the minimum staffing reduction. Any change in the circumstances under which the reduction was approved (e.g., enforcement action entered, violation of the professional operator certification requirements, monitoring violations, etc.)

will require that the system immediately return to compliance with the minimum staffing requirements in paragraph (C)(1) of this rule. This provision shall not preclude the public water system from submitting a modified operating plan. A reduction granted under this provision in combination with any other reductions available in this rule shall not reduce the minimum staffing requirements at a class II, III or IV facility to less than five days per week for a minimum of ten hours per week.

(D) Additional staffing requirements.

- (1) The professional operator of record of the public water system or backup professional operator authorized under paragraphs (C)(3)(c), (C)(3)(d) and (C)(3)(e) of this rule shall be available during all periods of public water system operation.
- (2) Visits to all public water systems classified in accordance with this rule shall be performed by the owner, supplier, or a representative or agent of the owner or supplier seven days per week and noted in the operational and maintenance records required by rule 3745-7-09 of the Administrative Code. Visits shall not be necessary when the public water system is not in operation.
- (3) In the event a public water system can document the existence of automation and continuous monitoring which provides a greater level of reasonable assurance that a facility is maintaining compliance, the system may request a waiver of the visit requirement contained in paragraph (D)(2) of this rule. In order to request a waiver, the public water system shall submit a request on a form acceptable to the director. The public water system shall demonstrate the system continuously monitors flow, pH, turbidity, disinfection and fluoridation, if applicable, at the entry point to the distribution system. The public water system shall also demonstrate the system continuously monitors chlorination, if applicable, at representative points in the distribution system. The public water system shall document alarm set points for each parameter that are protective of human health. Set points shall be set in such a manner that an appropriately certified professional operator can respond to correct a problem prior to the violation of regulatory limits. The public water system shall document that the monitoring system has the ability to notify public water system personnel when a value outside a set point has been detected. The public water system shall demonstrate the ability for a professional operator, certified at a level equal to or higher than that of the public water system, to respond to the system within an hour of a value outside a set point being detected.

The meters shall be calibrated in accordance with Ohio EPA regulations or manufacturer standards, whichever is more stringent. At a minimum, the calibration of all continuous monitors shall be verified on a weekly basis. Flow meter readings shall be within a plus or minus ten per cent of the reading determined by the method for calibration verification. Readings for chemical monitors shall be within the acceptable limits established in the "Ohio EPA, Laboratory Manual for Chemical Analyses of Public Drinking Water 2014."

In the event the calibration verification determines the monitor is outside of acceptable limits, the public water system shall immediately notify the district office of the problem and return to having an owner's representative visit the facility seven days per week. Once the meter has been repaired or recalibrated, the facility may discontinue having an owner's representative visit seven days per week and return to the monitoring approved by the director.

All of the information required in paragraph (D)(3) of this rule, shall be documented in the facility's operation and maintenance records. In the event any of the following occur, the public water system shall return to having an owner's representative visit the facility on a daily basis:

- (a) Failure of the continuous monitoring equipment.
- (b) Failure to follow the procedures identified in paragraph (D)(3) of this rule.
- (c) Failure to maintain the appropriate records.
- (d) Enforcement is initiated against the public water system.

(E) The classification of a professional operator of record, and the numbers of days per week and hours per week for staffing requirements specified in paragraph (C) of this rule are minimum requirements. In order to protect public health and welfare and based on specific circumstances or treatment complexity at a public water system, the director may require a public water system to be operated by a professional operator of record with a higher classification than the minimum requirement, or may require one or more professional operator of record to visit a public water system or water treatment plant and distribution system within a public water system more frequently and for more hours per week than the minimums required by this rule.

[Comment: This rule incorporates the "Ohio EPA Laboratory Manual for the Chemical Analyses of Drinking Water 2014" by reference. Copies are available at [http://epa.ohio.gov/portals/28/documents/labcert/CHEMMAN%202014\\_final.pdf](http://epa.ohio.gov/portals/28/documents/labcert/CHEMMAN%202014_final.pdf) and at the "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215." Copies can also be obtained by contacting the laboratory certification office at 614-644-4245.]

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**3745-7-04 Treatment works and sewerage system classification and staffing requirements.**

In accordance with this rule, all treatment works, sewerage systems, or wastewater treatment facilities within a treatment works shall be classified as a class A, I, II, III, or IV treatment works or class I or II sewerage systems and shall provide the minimum staffing required for that classification of wastewater treatment facility. Industrial wastewater treatment plants shall be classified in accordance with paragraph (B)(3)(c) of this rule.

**(A) Applicability.**

- (1) The classification and staffing requirements in paragraphs (B)(1)(a), (B)(2), and (C) of this rule shall be incorporated into all new or renewed NPDES permits. The staffing requirements in paragraph (C) shall be fulfilled by either a professional operator of record pursuant to paragraph (A)(2) of rule 3745-7-02 of the Administrative Code or a backup professional operator pursuant to paragraphs (C)(2)(c), (C)(2)(d) and (C)(2)(e) of this rule. Until such time as an NPDES permit is renewed to incorporate the classification and minimum staffing requirements of this rule, the treatment works, sewerage system or wastewater treatment facility within a treatment works shall maintain the same level of classification and staffing as that on December 21, 2006.
- (2) The owner of a treatment works or sewerage system may request that the director reclassify the facility in accordance with the provisions of this rule at any time.
- (3) One, two, and three family dwellings with household sewage treatment systems shall be excluded from the requirements of this rule.

**(B) Classification****(1) Sewerage systems**

- (a) A class A treatment works includes the treatment plant and sewerage system.
- (b) Each public sewerage system that is a tributary to a class I treatment works shall be classified as a class I sewerage system. Each public sewerage system that is a tributary to a class II, III, or IV treatment works shall be classified as a class II sewerage system.
- (c) Each sewerage system for which an NPDES permit has been issued by the director, other than those sewerage systems described in paragraphs (B)(1)(a) and (B)(1)(b) of this rule, shall be classified as a class II sewerage system.
- (d) The director may classify a private sewerage system that is a tributary to a public treatment works or public sewerage system. Factors the director may consider include, but are not limited to, wet weather capacity problems, failure to properly operate and maintain the system and potential public health or environmental risks.

**(2) Treatment works.**

- (a) Treatment works classification shall be based on design flow of the treatment works and the final effluent limits for the treatment works for monthly average concentrations of carbonaceous biochemical oxygen demand, total suspended solids, and summer month ammonia nitrogen designated in the treatment works' NPDES permit. All treatment lagoon systems with a design flow greater than 0.025 million gallons per day (MGD) shall be classified as class I systems.

(b) Class A, I, II, III, and IV treatment works shall be classified according to the following tables:

Classification of treatment works where one or more of the final effluent limits for monthly average concentration is less than or equal to: 10 mg/L carbonaceous biochemical oxygen demand, 12 mg/L total suspended solids, or 1 mg/L ammonia nitrogen

Design Flow	Classification
Less than or equal to 0.025 MGD	Class A
Greater than 0.025 MGD but less than 0.15 MGD	Class I
0.15 MGD to less than 1.0 MGD	Class II
1.0 MGD to less than 5.0 MGD	Class III
5 MGD and above	Class IV

Classification of treatment works where all of the final effluent limits for monthly average concentration are greater than: 10 mg/L carbonaceous biochemical oxygen demand, 12 mg/L total suspended solids, and 1 mg/L ammonia nitrogen

Design Flow	Classification
Less than or equal to 0.025 MGD	Class A
Greater than 0.025 MGD but less than 0.25 MGD	Class I
0.25 MGD to less than 2.0 MGD	Class II
2.0 MGD to less than 7.5 MGD	Class III
7.5 MGD and above	Class IV

(3) The director may classify the following types of treatment works as class A, I, II, III, or IV treatment works. The classification may be included in a permit-to-install or NPDES permit issued to the following treatment works:

(a) Treatment works that do not discharge to waters of the state.

(b) Sewage sludge treatment works.

(c) An industrial water pollution control facility that is operated with biological treatment (except lagoons). For the purposes of this chapter activated sludge treatment works means a treatment works that produces an activated mass of microorganisms capable of stabilizing waste aerobically.

(d) Other treatment works.

(4) The director may raise the classification of a particular treatment works or sewerage system. Factors the director may consider include, but are not limited to, the complexity of treatment, downstream use designation as defined in Chapter 3745-1 of the Administrative Code, wet weather capacity problems, pretreatment program complexity, sewage sludge management complexity, past and present compliance with NPDES permit requirements, or potential public health or environmental risks.

(5) After the situation which caused an increase in classification due to paragraph (B)(4) of this rule is corrected, then a facility may request a permit modification to revert to their original classification in accordance with this rule. Such requests shall be made in writing to the appropriate district office.

(C) Staffing.



- (1) At a minimum, the professional operator of record shall be physically present at the treatment works and fulfill the time requirements in the following table and perform technical operation as assigned by the permittee of the treatment works. Time spent working on equipment within the service area of a treatment works, as part of a professional operator of record's normal job responsibilities, shall count toward the minimum staffing time requirements.

Minimum staffing requirements for the professional operator of record

System classification	Staffing requirement
Class A	2 days per week for a minimum of 1 hour per week
Class I	3 days per week for a minimum of 1.5 hours per week
Class II	5 days a week for a minimum of 20 hours per week
Class III and IV	5 days a week for a minimum of 40 hours per week

(2) Sewerage system staffing.

- (a) The owner of a class I sewerage system shall ensure that a professional operator of record or a professional operator that is certified in the field of wastewater collection or wastewater treatment, class A operators excluded, shall perform visits to any portion of the sewerage system at least three days per week. The owner of the sewerage system shall maintain documentation regarding their authorization of individuals other than the professional operator of record to perform these visits. The individual performing the visit shall document the visit in the log book and report any problems to the professional operator of record.
- (b) The owner of a class II sewerage system shall ensure that a professional operator of record or a professional operator that is certified in the field of wastewater collection or wastewater treatment, class A operators excluded, performs visits to any portion of the sewerage system at least five days per week. The owner of the sewerage system shall maintain documentation regarding the authorization of individuals other than the professional operator of record to perform these visits. The individual performing the visit shall document the visit in the log book and report any problems to the professional operator of record.

(3) Exceptions.

- (a) Upon application on a form acceptable to the director by the permittee and the director's approval of the operating plan described in paragraph (C)(3)(a)(i) of this rule, the director shall reduce the minimum staffing requirement for a professional operator of record of a class II, III, or IV treatment works to no less than five days a week for a minimum of ten hours per week. However, the director shall not grant a reduction to a treatment works where a professional operator of record cannot respond to operational problems within one hour. Nor will the director grant a reduction to a treatment works that has a history of noncompliance with sampling, reporting, effluent limits or any other violations related to the treatment process, including but not limited to, grit removal, primary clarification, aeration, secondary clarification, filtration, sludge, or biosolids handling. The director also shall not grant a reduction to a treatment works under formal enforcement excluding enforcement related to combined sewer overflows or sanitary sewer overflows.
- (i) Treatment works shall submit an operating plan for their facility as part of the application for a staffing reduction. The operating plan shall include a description of the level of automation and continuous monitoring at the facility, a standard operating procedure for any such automation or

continuous monitoring equipment, and a detailed operations schedule showing the number of professional operators, the certification level, and the number of hours spent at the treatment works. The description of the continuous monitoring shall include a description of the calibration frequency, verification of calibration and records maintenance. Reductions in minimum staffing for the professional operator of record may be granted in accordance with the criteria in tables A and B of this rule, either singly or in combination, based on the information provided in the wastewater treatment facility's operating plan. In no case shall a reduction of greater than thirty hours per week be granted to a class III or IV facility and ten hours per week for a class II facility.

Table A: Reductions in minimum professional operator of record staffing based on wastewater treatment facility staffing levels

	The professional operator of record staffing may be reduced by 5 hours per week if:	The professional operator of record staffing may be reduced by 10 hours per week if:	The professional operator of record staffing may be reduced by 15 hours per week if:	The professional operator of record staffing may be reduced by 20 hours per week if:
Plant staffing at class III and IV wastewater treatment facilities	There is another professional operator certified at a level no more than 2 classes below that of the treatment works or sewerage system onsite at the wastewater treatment facility 2 hours per day 5 days per week	There is another professional operator certified at a level no more than 2 classes below that of the treatment works or sewerage system onsite at the wastewater treatment facility 4 hours per day 5 days per week	There is another professional operator certified at a level no more than 2 classes below that of the treatment works or sewerage system onsite at the wastewater treatment facility 6 hours per day 5 days per week	There is another professional operator certified at a level no more than 2 classes below that of the treatment works or sewerage system onsite at the wastewater treatment facility 8 hours per day 5 days per week
Plant staffing at class II wastewater treatment facilities	There is a class I professional operator onsite at the wastewater treatment facility 3 hours per day 5 days per week	There is a class I professional operator onsite at the wastewater treatment facility 4 hours per day 5 days per week	Not applicable	Not applicable
Plant staffing at class II wastewater treatment facilities	There is a class I professional operator in training onsite at the wastewater treatment facility 6 hours per day 5 days per week	There is a class I professional operator in training onsite at the wastewater treatment facility 8 hours per day 5 days per week	Not applicable	Not applicable

Table B: Reductions in minimum professional operator of record staffing based on level of automation or continuous monitoring

	The professional operator of record staffing may be reduced by 5 hours per week if:	The professional operator of record staffing may be reduced by 10 hours per week if:	The professional operator of record staffing may be reduced by 15 hours per week if:	The professional operator of record staffing may be reduced by 20 hours per week if:
Automation or continuous monitoring at class III and IV wastewater treatment facilities	The wastewater treatment facility has supervisory control and data acquisition ("SCADA") and continuous monitoring equipment for monitoring the following: flow, pH, turbidity, dissolved oxygen, and temperature. Additionally monitor for UV intensity or chlorine residual, whichever is applicable.	The wastewater treatment facility is automated with continuous monitoring for the parameters required in the 5 hour reduction	The wastewater treatment facility is automated with continuous monitoring for the parameters required in the 5 hour reduction and the wastewater treatment facility must also have personnel onsite at the facility or an electronic notification system that notifies the professional operator of record when there are problems with the wastewater treatment facility	The wastewater treatment facility is automated with continuous monitoring for the parameters required in the 5 hour reduction and an electronic notification system or certified professional operators on each shift that will notify the professional operator of record when there are problems with the wastewater treatment facility; the wastewater treatment facility must also have the ability to be operated remotely or have a certified professional operator respond within 30 minutes
Automation or continuous monitoring at class II wastewater treatment facilities	The wastewater treatment facility has supervisory control and data acquisition ("SCADA") and continuous monitoring equipment for monitoring the following: flow,	The wastewater treatment facility is automated with continuous monitoring for the parameters required in the 5 hour reduction	Not applicable	Not applicable

Table B: Reductions in minimum professional operator of record staffing based on level of automation or continuous monitoring

	pH, turbidity, dissolved oxygen, and temperature. Additionally monitor for UV intensity or chlorine residual, whichever is applicable.			
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- (ii) Any change in the criteria under which the reduction was approved (e.g., retirement of a professional operator listed in the approved staffing plan, loss of the professional operator of record, reduction in the workforce, removal or failure of automation or continuous monitoring, etc.) will require that the treatment works immediately return to compliance with the minimum staffing requirements in paragraph (C)(1) of this rule. This provision shall not preclude a treatment works from submitting a modified operating plan.
  - (iii) For a system operating plan to receive director's approval under table B of this rule, continuous monitors shall be calibrated in accordance with manufacturer standards or applicable regulations, whichever is more stringent. Calibration verification shall be conducted at least once per week or in accordance with applicable regulations, whichever is more stringent. Records of the calibrations and verifications shall be maintained for three years.
- (b) The professional operator of record for a class II, III, or IV treatment works or class II sewerage system may be replaced by a backup professional operator with a certificate one classification lower than the treatment works or sewerage system for a period of up to thirty consecutive days. The use of this provision does not require notification to the agency. This provision may not be used to routinely circumvent minimum staffing requirements.
- (i) In the case of class III and IV systems which utilize an established flex work schedule of four ten-hour days, the use of a professional operator with a certificate one classification less than the facility to staff the facility on the fifth day of the week shall not be considered an attempt to circumvent the minimum staffing requirements.
  - (ii) In the case of class II systems which utilize an established flex work schedule of two eight hour days and a four hour day, the use of a professional operator with a certificate one classification less than the facility or an operator in training who has passed the class I examination to staff the facility on the fourth and fifth day of the week shall not be considered an attempt to circumvent the minimum staffing requirements.
- (c) Upon proper justification, such as military leave or long term illness, the director may authorize the replacement of the professional operator of record for a class II, III, or IV treatment works or class II sewerage system by a backup professional operator with a certificate one classification lower than the facility for a period of greater than thirty consecutive days. Such requests shall be made in writing to the appropriate district office.
- (d) If the designated professional operator of record is unable to meet the minimum staffing requirements at a class A or class I treatment works, then a professional operator with a certificate equal to or higher than that of the treatment works may serve as the professional operator of record until such

time as the designated professional operator of record is available. The use of this provision does not require notification to the agency unless the use of the backup professional operator exceeds thirty consecutive days. In the event the use of a backup professional operator under this provision exceeds thirty consecutive days, the owner or professional operator shall provide notice in accordance with paragraph (A)(2) of rule 3745-7-02 of the Administrative Code.

- (e) Any professional operator fulfilling the role of a backup professional operator shall be held responsible for any violations that occur during the period when they are acting as the backup professional operator.
- (f) In the event that an owner has two separate treatment works, permitted by two separate NPDES permits, within one hundred feet of each other's property line, the owner may submit a request on a form acceptable to the director, for a fifty per cent reduction of the hourly minimum staffing requirements for each treatment works. The request shall include documentation of the distance between the two facilities and documentation that the facilities are not under enforcement and have been in compliance with permit effluent limits, treatment techniques, sampling, reporting and professional operator certification requirements for the three years prior to the request. Upon receiving a complete application, the director may approve the minimum staffing reduction. Any change in the circumstances under which the reduction was approved (e.g., enforcement action entered, violation of the professional operator certification requirements, monitoring violations, etc.) will require that the system immediately return to compliance with the minimum staffing requirements in paragraph (C)(1) of this rule. This provision shall not preclude the treatment works from submitting a modified operating plan. A reduction granted under this provision in combination with any other reductions available in this rule shall not reduce the minimum staffing requirements at a class II, III, or IV facility to less than five days per week for a minimum of ten hours per week.
- (g) Upon submission of an application by the permittee and approval by the director, the staffing requirements of seasonal class A or class I treatment works may be reduced in the off season in accordance with the following system classification chart. In order to document seasonal operations, the permittee shall submit a form acceptable to the director documenting the system shut down date and the proposed reopening date. The application shall include documentation that enough wastewater has been removed from the system to prevent discharge to waters of the state and contain a contingency plan to lower the level in the plant in the event there is a potential to discharge effluent to waters of the state. Care should be taken by the owner and professional operator to ensure enough wastewater is left in the tanks to prevent the tanks from shifting.

System Classification	Staffing Requirement During the Off Season
Class A	1 visit every month
Class I	1 visit every 2 weeks

During the off season the professional operator of record shall visually confirm via flow monitoring, if applicable, that the treatment works is not discharging and does not have the potential to discharge wastewater. The verification shall be documented during the visits referenced above as part of the operation and maintenance records specified in rule 3745-7-09 of the Administrative Code. A discharge from the treatment works during the reduced staffing period is prohibited. The permittee shall notify the agency on a form acceptable to the director prior to resuming operations. Discovery of a discharge to waters of the state during a period of reduced staffing shall result in a revocation of the authorization for reduced staffing requirements and a prohibition on further approval for a period

of five years.

For the purposes of this rule, "seasonal operations" means the temporary ceasing of wastewater generating sources for a period of no less than sixty consecutive days.

(h) Controlled discharge lagoons shall only be required to meet the minimum staffing requirements above during periods of discharge. When discharge is not occurring, the professional operator of record shall visit the facility at least once every two weeks.

(i) Alternative for systems with design capacity less than or equal to fifteen hundred gallons per day.

(i) Systems may employ a service provider registered in accordance with rule 3701-29-03 of the Administrative Code in lieu of a class A operator as indicated in paragraph (B)(2) of this rule if the system has a design capacity of less than or equal to fifteen hundred gallons per day and are similar to a system authorized for installation as a household sewage treatment system with approval for that use in accordance with Chapter 3718. of the Revised Code and Chapter 3701-29 of the Administrative Code. The installation shall include the appropriate fail safe mechanisms established for the approved systems (e.g. telemetering or lockout) and tertiary treatment as appropriate. For systems operating under the terms and conditions of this alternate service provider provision, the permittee shall submit a copy of an active service contract with the service provider annually, in accordance with the conditions of the system's NPDES permit.

(ii) Systems operating under paragraph (C)(3)(i)(i) of this rule are not subject to the minimum staffing requirements in paragraph (C)(1) of this rule.

(4) Additional staffing requirements.

(a) The professional operator of record or backup professional operator allowed under paragraphs (C)(3)(b), (C)(3)(c) and (C)(3)(d) of this rule shall be available during all periods of treatment works operation.

(b) Visits to all treatment works shall be performed by the permittee, the permittee's representative, or agent five days a week and noted in the operational and maintenance records required by rule 3745-7-09 of the Administrative Code. Visits shall not be necessary when the treatment works is not in operation.

(D) The classification of the professional operator of record, and the numbers of days per week and hours per week for staffing requirements specified in paragraph (C) of this rule are minimum requirements. In order to protect public health and welfare and based on specific circumstances at a treatment works or sewerage system, the director may require a treatment works or sewerage system to be operated by a professional operator of record with a higher classification than the minimum requirement, or may require a professional operator of record to visit a treatment works or sewerage system more frequently and for more hours per week than the minimums required by this rule.

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### 3745-7-05 Classification of professional operator certification.

(A) The following are classifications for which professional operators may be certified under this chapter:

- (1) Public water system professional operator A (class A water supply professional operator).
- (2) Public water system professional operator I (class I water supply professional operator).
- (3) Public water system professional operator II (class II water supply professional operator).
- (4) Public water system professional operator III (class III water supply professional operator).
- (5) Public water system professional operator IV (class IV water supply professional operator).
- (6) Water distribution professional operator I (class I water distribution professional operator).
- (7) Water distribution professional operator II (class II water distribution professional operator).
- (8) Treatment works professional operator A (class A wastewater works professional operator).
- (9) Treatment works professional operator I (class I wastewater works professional operator).
- (10) Treatment works professional operator II (class II wastewater works professional operator).
- (11) Treatment works professional operator III (class III wastewater works professional operator).
- (12) Treatment works professional operator IV (class IV wastewater works professional operator).
- (13) Sewerage system professional operator I (class I wastewater collection professional operator).
- (14) Sewerage system professional operator II (class II wastewater collection professional operator).

(B) The certification of any individual to operate a particular class of public water system, sewerage system, or treatment works shall also authorize such individual to be the professional operator of record of any other public water system, sewerage system, or treatment works as indicated in the tables below.

Public water systems: If a professional operator holds a certification of the level below they may be the professional operator of record of those public water systems marked with an "X" below:

Classification of system	Class A/limited class A water supply professional operator	Class I water distribution professional operator	Class II water distribution professional operator	Class I water supply professional operator	Class II water supply professional operator	Class III water supply professional operator	Class IV water supply professional operator
Class A public water system	x			x	x	x	x
Class I		x	x	x	x	x	x



Public water systems: If a professional operator holds a certification of the level below they may be the professional operator of record of those public water systems marked with an "X" below:

water distribution							
Class II water distribution			x		x	x	x
Class I public water system				x	x	x	x
Class II public water system					x	x	x
Class III public water system						x	x
Class IV public water system							x

Sewerage systems and treatment works: If a professional operator holds a certification of the level below they may be the professional operator of record of those sewerage systems or treatment works with the classifications marked with an "X" below:

Classification of facility	Class A/limited class A wastewater works professional operator	Class I wastewater collection professional operator	Class II wastewater collection professional operator	Class I wastewater works professional operator	Class II wastewater works professional operator	Class III wastewater works professional operator	Class IV wastewater works professional operator
Class A treatment works	x			x	x	x	x
Class I sewerage system		x	x	x	x	x	x
Class II sewerage system			x		x	x	x
Class I treatment works				x	x	x	x
Class II treatment					x	x	x

Sewerage systems and treatment works: If a professional operator holds a certification of the level below they may be the professional operator of record of those sewerage systems or treatment works with the classifications marked with an "X" below:

works							
Class III treatment works						x	x
Class IV treatment works							x

- (C) A limited class A professional operator holds a facility-specific certificate and may not operate any other facilities or transfer the certificate to a different facility.
- (D) The following charts demonstrate the hierarchy of water and wastewater certificates. The highest level of certification is at the top of the chart and certificates supersede any of the certificates below them in the chart. Once a professional operator achieves a level of certification that supersedes the certificate that is currently held, the lowest level of certificate will be invalid.

Drinking Water Certificate Hierarchy Table

Class IV water supply			
Class III water supply			
Class II water supply			
Class I water supply			Class II water distribution
Class A water supply	Class I water distribution		Class I water distribution
Limited class A water supply			

Wastewater Certificate Hierarchy Table

Class IV wastewater treatment			
Class III wastewater treatment			
Class II wastewater treatment			
Class I wastewater treatment			Class II wastewater collection
Class A wastewater treatment	Class I wastewater collection		Class I wastewater collection
Limited class A wastewater treatment			

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**3745-7-06 Certification of professional operators.**

The director shall, in accordance with this chapter, provide for the examination of individuals applying for certification as professional operators and the issuance of appropriate certificates to applicants who meet the appropriate requirements and pass the appropriate examination.

**(A) Application.**

- (1) Applicants for examination and certification shall submit an application in a format approved by the director. The complete application and appropriate fees as set forth in section 3745.11 of the Revised Code shall be submitted at least ninety calendar days prior to the date on which the examination is scheduled.
- (2) When required by the council, the applicant shall be responsible for furnishing additional documentation to the agency to verify information provided on the application.
- (3) Any applicant who submits incomplete, false, or incorrect information on the application shall be disqualified from taking the examination as set forth in rule 3745-7-18 of the Administrative Code.

**(B) To be eligible for examination and certification in accordance with this chapter the applicant shall fulfill the following:**

- (1) Not have been convicted of, or plead guilty to, a criminal charge involving falsification, fraud, or terrorism.
- (2) At the time of application and prior to the examination date, not have a revoked or currently suspended Ohio professional operator certification.
- (3) Not have a professional operator certificate from any other state currently revoked or under suspension.
- (4) Not have performed the duties of a professional operator of record without a valid certificate of the appropriate field and classification, unless in accordance with the exemptions and exceptions contained in this chapter.
- (5) Have a high school diploma or the equivalent. Either of the following shall be considered equivalent to a high school diploma.
  - (a) Documentation of successfully passing the general education development test or a statement of high school equivalence.
  - (b) Completion of a vocational training program in the field of application.
- (6) Have the ability to do the following:
  - (a) Read and understand Chapters 6109. and 6111. of the Revised Code and the rules adopted thereunder.
  - (b) Perform mathematical calculations required to operate in the field for which certification is being sought.
  - (c) Complete and maintain records and regulatory reporting forms required to document the proper operation of a public water system, treatment works, or sewerage systems.
- (7) All applicants to be a professional operator shall acknowledge completion of a review of the "Ohio EPA

Professional Operator Certification Training" course. This course outlines rule requirements that are specific to certified professional operators.

- (8) Have operating experience related to the field for which the application is being considered in accordance with the minimums in table A of this rule.

Table A: Operating experience required

Certification	Operating experience required
Class A	See paragraph (B)(8)(c) of this rule
Class I	1 year of operating experience
Class II	3 years of operating experience
Class III	5 years of operating experience including at least 1 year of operating experience as a class II certified professional operator in the same field
Class IV	See paragraph (C)(2) of this rule

- (a) The director may accept post high school education or training in place of operating experience in qualifying for examination under this rule. However, except as provided in paragraph (B)(8)(c) of this rule, all applicants for examination are required to have at least one year of operating experience by the date of the scheduled examination in the field for which certification is sought unless waived in accordance with rule 3745-7-07 of the Administrative Code.
- (b) Applicants are required to describe in detail their operating experience at water treatment, water distribution, collection and wastewater treatment systems.
- (c) To be eligible to take the class A examination for certification, applicants shall have education, and operating or work experience in accordance with the following chart:

Education and experience requirements for class A professional operators

Years of Education	Operating Experience	Work Experience *
High school diploma or equivalent	1040 hours **	3 years **
Associate's degree***	780 hours **	2 years **
Bachelor's degree***	520 hours	1 year

\* Work experience means time spent at a job where a portion of duties involve dealing with a public water system or treatment works.

\*\* Successful completion of one or more of the Operator Training Committee of Ohio "Basic Water" or "Basic Wastewater" course, the California State University at Sacramento "Small Water System Operation and Maintenance" or "Small Wastewater System Operation and Maintenance, Volume I" course, or the equivalent shall reduce the experience requirement to one year of work experience or five hundred twenty hours of operating experience.

\*\*\*Degrees shall be obtained from an accredited institution in environmental, chemical, or civil engineering or a physical or natural science.

(C) Alternative eligibility requirements.

- (1) An applicant for a class II or class III public water or wastewater examination or for a class II water distribution or wastewater collection examination, who is certified at the same or a higher classification in the other field, may be granted a fifty per cent reduction in actual operating experience requirements in the field applied for, on the basis of operating experience obtained in the other field, except that a minimum of one year of actual operating experience in the field applied for is still required.
- (2) Applicants for class IV certification shall document three years of additional operating experience while in possession of a valid class III certification in the field for which the application is submitted, with two of those years consisting of management experience at a class III or IV facility in the field for which the application is submitted.
- (3) The director may allow the following reductions in the operating experience requirement for examination for certification. However, documented completion of at least one year of operating experience in the field for which they are applying is required to be certified as a class II professional operator. Similarly, documented completion of at least one year of operating experience in the field for which an applicant has applied and an additional twelve months operating experience as a class II professional operator in the field for which an applicant has applied is required to be eligible to take the class III examination.
  - (a) The operating experience requirement to take the examination for class II professional operator certification is reduced by two years if an applicant holds either of the following:
    - (i) A bachelor's degree from a four-year accredited institution in environmental, chemical, or civil engineering or a physical or natural science.
    - (ii) A two-year technical degree in the field of water or wastewater treatment.
  - (b) The operating experience requirement to take the examination for class III professional operator certification is reduced by three years if an applicant holds a bachelor's degree from a four-year accredited institution in environmental, chemical, or civil engineering or a physical or natural science.
  - (c) The director may accept substitution of each year of college completed by an applicant, not holding a bachelor's degree, for one year of required operating experience. Substitution shall only be granted provided that the applicant was pursuing a degree in environmental, chemical, or civil engineering, or a physical or natural science.
  - (d) The director may accept an applicant's completed drinking water or wastewater courses as a substitute for experience when applying for examination for class II or III professional operator certification on a case-by-case basis. The director may publish a list of courses that have been approved for substitution of experience.
  - (e) An applicant who passes the examination before showing the required operating experience shall be a professional operator in training, subject to the conditions of paragraph (C) of rule 3745-7-07 of the Administrative Code.
- (D) An applicant who does not meet the required operating experience in paragraph (B)(8) of this rule may take the examination in accordance with the provisions in rule 3745-7-07 of the Administrative Code.
- (E) Applicants who do not meet the examination prerequisites in the classification for which they requested may be permitted, without re-applying, to take an examination in a lower classification for which they do meet

the prerequisites.

(F) Exam format.

- (1) The examinations for each classification shall be in a format accepted by the director. Alternate examination methods may be accepted by the director if an applicant has a disability that would prevent them from taking the standard examination.
- (2) The director shall establish and publish criteria for exams and the associated score necessary to pass the exams.

(G) An applicant approved by the director to take the class IV certification examination shall submit the examination within two years of the date of the approval, unless an extension is granted prior to the end of the two-year period.

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**3745-7-07 Professional operator in training.**

The director may allow an applicant to defer completion of the onsite operating experience requirements for their classification of certificate required by rule 3745-7-06 of the Administrative Code until after successfully passing an examination for certification. Such applicants shall be designated as "professional operators in training" after successfully passing an examination until such time as the onsite operating experience requirements are fulfilled.

- (A) Eligibility for professional operator in training status shall be limited to applicants for the class A, I, or II examination.
- (B) Eligibility requirements for examination and designation as a professional operator in training are the same as the prerequisites in rule 3745-7-06 of the Administrative Code, except that the director may waive the onsite operating experience requirement in public water systems, sewerage systems, or treatment works until after the applicant has successfully passed an examination.
- (C) A professional operator in training shall complete the operating experience requirement within four years of passing an examination for which the professional operator applied.
- (D) Upon successfully completing the actual onsite operating experience requirements of rule 3745-7-06 of the Administrative Code, the applicant shall submit an application to be certified by the director as a professional operator in the classification for which the professional operator applied, subject to verification by the council.
- (E) Any person designated as a professional operator in training is not certified and shall not act as a professional operator of record.

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02/23/12

**3745-7-09      Recordkeeping requirements and responsibilities of owners, certified professional operators and certified professional operators of record.**

- (A) The owner and professional operator of record of a public water system, treatment works or sewerage system shall maintain or cause to be maintained operation and maintenance records for each public water system, distribution system, water treatment plant within a public water system, sewerage system, treatment works, or wastewater treatment facility within a treatment works. Records shall be maintained in hard bound books with consecutive page numbering; well organized computer logs, which automatically document the date, time and person making the entry and prevent the erasure or deletion of data; or an equivalent methodology sufficient to record the information set forth in this rule and approved by the director to ensure authenticity and accuracy. Separate log books or computer programs meeting the requirements above may be maintained for operation and maintenance activities. Records regarding operation and maintenance shall meet the following requirements:
- (1) The records shall be housed and maintained in such a manner as to be protected from weather damage and guarantee the authenticity and accuracy of the records contained within.
  - (2) The records shall be accessible onsite for twenty-four hour inspection by agency or emergency response personnel.
  - (3) At a minimum, the following information shall be recorded:
    - (a) Identification of the public water system, sewerage system, or treatment works.
    - (b) Date and times of arrival and departure in military time for the professional operator of record and any other professional operator required by this chapter. Failure to document times of arrival and departure shall constitute prima facie evidence that a violation of the minimum staffing requirements has occurred unless the professional operator can present evidence acceptable to the director to substantiate that the professional operator met minimum staffing requirements.
    - (c) Specific operation and maintenance activities that affect or have the potential to affect the quality or quantity of sewage or water conveyed, effluent or water produced.
    - (d) Results of tests performed and samples taken, unless documented on a laboratory or bench sheet.
    - (e) Performance of preventative maintenance and repairs or requests for repair of the equipment that affect or have the potential to affect the quality or quantity of sewage or water conveyed, effluent or water produced.
    - (f) Identification of the persons making entries.
  - (4) The records shall be kept up to date, contain a minimum of the previous three months of data at all times, and be maintained for at least three years.
- (B) A certified professional operator shall do the following:
- (1) Perform duties in a responsible and professional manner consistent with standard operating procedures and best management practices.
  - (2) Operate and maintain public water systems, sewerage systems, treatment works, and appurtenances so as not to endanger the health or safety of persons working in or around the facility, the public at large, or the environment due to negligence or incompetence.

- (3) Report all instances of noncompliance with applicable regulations to the professional operator of record or facility supervisor.
- (C) The duties of a professional operator of record shall include, but not be limited to, those outlined in paragraphs (B)(1) to (B)(3) of this rule and the following additional duties and responsibilities:
- (1) Responsible and effective on site management and supervision of the technical operation of the public water system, treatment works, or sewerage system.
  - (2) Immediately notifying the permittee or owner of a public water system, sewerage system, or treatment works, and ensuring the agency and, if applicable, the local regulatory agency, is notified of items that require notification in accordance with Chapter 6109. or 6111. of the Revised Code, the rules adopted thereunder, or the facility's NPDES permit.
  - (3) Ensuring the recordkeeping requirements of this rule are being met.
  - (4) Each professional operator of record identified in accordance with rule 3745-7-02 of the Administrative Code and each certified professional operator acting as a backup for a facility identified in accordance with rule 3745-7-03 or rule 3745-7-04 of the Administrative Code, shall ensure that the facility's minimum staffing requirements are being met either by themselves or in conjunction with other professional operators working at the facility.
  - (5) Displaying a copy of the professional operator's valid certificate and renewal card for public examination at the treatment plant or principal office of the owner.
  - (6) Reporting minimum staffing times to the agency on a form approved by the director.
- (D) In the event that there are issues related to paragraphs (A) to (C) of this rule that are within the area of responsibility of, but beyond a professional operator of record or a certified professional operator's ability to address, it shall be the responsibility of the professional operator of record or certified professional operator to document any efforts to rectify the problem.

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**3745-7-10 Professional operator certification advisory council.**

- (A) The director shall appoint a professional operator certification advisory council consisting of eight members as set forth in this rule.
- (1) Two members shall be employees of the Ohio environmental protection agency. One member shall be from the drinking water program and one from the surface water program.
  - (2) Two members shall hold valid class III or class IV public water system professional operator certifications and be actively employed by public water systems at the time of appointment.
  - (3) Two members shall hold valid class III or class IV wastewater works professional operator certifications and be actively employed by wastewater works at the time of appointment.
  - (4) Two members shall be registered professional engineers who are actively employed in the field of sanitary or environmental engineering at the time of appointment.
  - (5) Except for the two agency members, no two council members shall be employed by the same entity.
- (B) Members of the council shall be appointed for a term not to exceed five years and shall not serve longer than two consecutive terms, except as allowed in paragraph (C) of this rule.
- (C) Any vacancy occurring on the council shall be filled by the director's appointment of a member for the balance of the unexpired term. A council member appointed for the balance of an unexpired term may be appointed for up to two additional consecutive full terms.
- (D) The council meetings shall be administered by the members of the agency.
- (E) Terms of appointment pursuant to this rule shall expire on a staggered schedule as follows:
- (1) The two members who are employees of the agency shall have terms that expire on the thirtieth of June in years that end in four or nine.
  - (2) The two members who are employed by public water systems shall have terms that expire on the thirtieth of June in years that end in zero or five for one member and in years that end in two or seven for the other member.
  - (3) The two members who are employed by treatment works shall have terms that expire on the thirtieth of June in years that end in one or six for one member and in years that end in three or eight for the other member.
  - (4) The two members who are actively employed as sanitary or environmental engineers shall have terms that expire on the thirtieth of June in years that end in two or seven for one member and in years that end in three or eight for the other member.
- (F) Council members shall be reimbursed for reasonable expenses related to council activities.

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**3745-7-11 Duties of the council.**

The council may do the following:

- (A) Recommend to the director minimum professional operator requirements consistent with the classification systems for public water systems, treatment works and sewerage systems in rules 3745-7-03 and 3745-7-04 of the Administrative Code.
- (B) Review applications for examination and certification and advise the director as to which applicants meet the prerequisites for admission to the examination for which application is made.
- (C) Review applications for reciprocity and make recommendations to the director concerning the equivalency of non-Ohio EPA exams and the classifications of certification for which applicants qualify.
- (D) Assist in the development of examinations used to measure an applicant's competence for certification.
- (E) Recommend to the director the issuance, suspension, revocation, or reinstatement of certifications.
- (F) Advise the director on issues pertaining to the administration of the professional operator certification program, including developing guidance, policy, and procedures to implement the program on a day-to-day basis.
- (G) Advise the director on matters pertaining to contact hours.
- (H) Nothing in this rule shall be interpreted to require a recommendation from the council on any action of the director issued pursuant to this chapter.



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**3745-7-12      Suspension or revocation of certification.**

- (A) The director may suspend or revoke the certificate of a professional operator, issued under this chapter, upon finding that the professional operator has done any of the following:
- (1) Fraudulently obtained or attempted to obtain any certificate or renewal thereof.
  - (2) Performed the duties of a professional operator in a negligent or incompetent manner.
  - (3) Knowingly or negligently created, maintained or submitted misleading, inaccurate, or false reports, documents, or applications to any governmental organization or their employer.
  - (4) Operated in a manner endangering the public health or welfare.
  - (5) Operated in such a manner to have violated or caused to be violated any provisions of Chapter 6109. or 6111. of the Revised Code.
  - (6) Represented themselves as a certified professional operator without a valid certificate.
  - (7) Performed the duties of a professional operator of record without a valid certificate of the appropriate field and classification, unless in accordance with the exemptions and exceptions contained in this chapter.
  - (8) Had a certificate suspended or revoked in any other jurisdiction.
- (B) The council may review information and allegations regarding the performance of a certified professional operator, and may interview the professional operator, informant, or others. The council may request appearances before the council. The requests shall be sent by certified mail. Upon completion of such review the council may recommend that the director suspend or revoke one or more of a professional operator's certificates.
- (C) The director shall notify the certified professional operator, and may notify the employer thereof, of a proposed action under this rule. The notice shall be by certified mail and shall set forth the action proposed by the director, the reason therefor, the length of time the proposed action shall be applied, and the procedure for appealing the action. An action taken by the director under this rule does not preclude the director from pursuing additional civil or criminal enforcement. Suspension or revocation may include any or all professional operator certificates issued by the director under this chapter of the Administrative Code. In cases dealing with fraudulent or falsified information, the director shall take action on all certificates held by the certified professional operator.
- (D) Suspension of a professional operator's certificate shall be effective for an initial period of not more than five years, during which time the certificate is not valid. The suspension shall continue until the following conditions are met:
- (1) No earlier than thirty days before the end of a certificate suspension, a person may submit a request for reinstatement of a suspended certificate.  
  
A certificate shall remain suspended until such time as a request is submitted and reinstatement approved by the director.
  - (2) No earlier than thirty days before the end of a certificate suspension, a person seeking reinstatement of a certificate shall submit information to the agency regarding work activities during the period of suspension. During the period of suspension, the professional operator shall acquire the contact hours and pay all renewal fees required by this chapter. Upon review of the submittal, the council may

recommend to the director that the professional operator's certification be reinstated or that the suspension be extended.

- (E) The professional operator whose certificate has been suspended shall not be the professional operator of record of a public water system, treatment works, water distribution system, or sewerage system. Operating experience obtained during a period of suspension shall not be considered for meeting certification requirements.
- (F) Revocation of a professional operator's certificate shall be permanent.
- (G) Indictment in a criminal case for a crime related to the field of certification shall result in suspension of all certificates held by the certified professional operator until such time as the criminal case is resolved.
- (H) Conviction of a crime related to the field of certification shall result in suspension of all certificates held by the convicted certified professional operator until such time as all opportunities for appeal of such conviction have been exhausted, at which point, all certificates held by the certified professional operator shall be revoked.
- (I) A professional operator shall return any suspended or revoked certificates to the director by certified mail within seven days of the effective date of the suspension or revocation.
- (J) Actions affecting the status of a professional operator's certificate shall be taken in accordance with Chapters 3745-47 and 3745-49 of the Administrative Code.

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**3745-7-13 Reciprocity.**

The director may grant certification by reciprocity to an applicant holding valid certification or license issued by the certifying authority of another state or province or the "Association of Boards of Certification" (ABC).

(A) Eligibility for certification by reciprocity.

(1) The applicant shall make an application for certification by reciprocity on a form provided by the director.

(2) The applicant shall meet the requirements specified in rule 3745-7-06 of the Administrative Code for the level of certification applied for, and meet either of the following specifications:

(a) Hold a current, valid certification that was earned either by passing a written examination, through reciprocity, or through ABC while living or working in another state or province. The director shall be furnished with a representative copy of the examination passed by the applicant.

(b) Have held a certification issued by the state of Ohio within the ten years prior to application. Such applicants may receive the same level of certification previously held provided the applicant has maintained a certificate in the same field in another state and met that state's continuing education requirements.

(B) The council shall review and compare the representative out-of-state or ABC examination passed by an applicant with Ohio's examinations and determine the classification of examination with which the out-of-state or ABC examination is equivalent. Certification by reciprocity shall not be considered if a representative copy of the examination passed by the applicant cannot be obtained, unless the director has entered into a reciprocity agreement with the state in question.

(C) At the time of the request for reciprocity, the applicant shall pay a certification fee as required in section 3745.11 of the Revised Code. When the equivalent level of classification of the out-of-state or ABC examination has been determined by the council and approved by the director, the applicant will be notified and required to pay a fee that is equivalent to the examination fee for the level of certification at which reciprocity is granted according to the schedule listed in section 3745.11 of the Revised Code.

(D) Upon receipt of the fees, the director may issue a certificate to the applicant for certification as determined by this rule.

(E) In the event that an applicant is not eligible for reciprocity the applicant may request that the certification fee be used toward the fee required for the next available paper and pencil examination or the certification fee once the applicant passes a third party examination. The request shall be made in writing and shall indicate the exam classification that the applicant is requesting to take. Review and approval of the application shall be in accordance with rule 3745-7-06 of the Administrative Code.

(F) Applicants who, while a resident of Ohio, obtained certification by examination in another state, through ABC or an equivalent association for the purpose of bypassing Ohio's examination process, shall not be certified by reciprocity.

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**3745-7-15 Expiration and renewal of professional operator certification.**

- (A) All professional operator certificates shall expire on December thirty-first of the second year after the year in which the certification is issued or renewed. The certificate will expire unless renewed in accordance with this rule before the expiration date.
- (B) The director shall send a renewal notice to the certified professional operator's latest address of record prior to the expiration date of the certificate. Failure to receive such notice shall not relieve the certified professional operator of the responsibility to renew the certificate. The professional operator shall notify the agency of changes in contact information including but not limited to phone number, email address and street address.
- (C) Requirements for renewal.
- (1) Beginning with certificates that expire on December 31, 2018, all renewal applications shall be submitted electronically in a format approved by the director.
  - (2) In order to renew a certificate before it expires, a certified professional operator shall submit a complete application to the director by November thirtieth of the year the certification expires. The submission shall include the following:
    - (a) A complete application for renewal, in a format provided by the director.
    - (b) A nonrefundable, nontransferable fee as set forth in section 3745.11 of the Revised Code.
    - (c) When requested by the director, any documentation necessary to prove attendance at appropriate contact hour courses.
    - (d) Any other form required by state law.
  - (3) For a holder of multiple certificates within a category, the director shall only renew the certificate representing the highest classification within the field.
  - (4) To renew a certificate issued under this chapter, the certified professional operator shall complete the number of director-approved contact hours required by paragraph (D) of this rule during each renewal cycle.
- (D) Contact hours.
- (1) Professional operators holding a single certificate are required to complete the following contact hours:
    - (a) For a class A or a limited class A professional operator, a minimum of eight director-approved contact hours.
    - (b) For a public water system professional operator I, water distribution professional operator I, water distribution professional operator II, wastewater works professional operator I, wastewater collection system professional operator I, or wastewater collection system professional operator II, a minimum of twelve director-approved contact hours.
    - (c) For a public water system professional operator II, public water system professional operator III, public water system professional operator IV, wastewater works professional operator II, wastewater works professional operator III, or wastewater works professional operator IV, a minimum of twenty-four director-approved contact hours.

- (2) Professional operators holding multiple certificates shall have the number of contact hours required for the renewal of each certificate reduced by twenty-five per cent. The reductions shall be granted as follows:
  - (a) For persons holding a certificate as a class A water supply or limited class A water supply professional operator and a class A wastewater works or a limited class A wastewater works professional operator, not less than six hours of director-approved contact hours shall be completed for each of these certificates.
  - (b) For persons holding certificates as a public water system professional operator I, water distribution professional operator I, water distribution professional operator II, wastewater works professional operator I, wastewater collection system professional operator I, or wastewater collection system professional operator II, not less than nine hours of director-approved contact hours shall be completed for each of these certificates.
  - (c) For persons holding certificates as a public water system professional operator II, public water system professional operator III, public water system professional operator IV, wastewater works professional operator II, wastewater works professional operator III, or wastewater works professional operator IV, not less than eighteen hours of director-approved contact hours shall be completed for each of these certificates.
- (3) At least half of a professional operator's contact hours shall be those determined by the director to be directly related to operations and maintenance.
- (4) The minimum required number of director-approved contact hours shall be completed during the two-year period preceding the expiration date of the certificate, except as provided in paragraph (I) of this rule.
- (5) A maximum of one contact hour per renewal cycle may be earned if a certified professional operator provides proof of individual membership in a state or national trade organization related to the field in which the professional operator holds a certificate.
- (6) A contact hour course may only be used once per renewal cycle for credit toward the contact hour requirements established in this paragraph.
- (7) A professional operator holding multiple certificates may not use a contact hour course for credit on more than one certificate, unless that professional operator has attended multiple sessions of that course. However, a course's contact hours may be split among multiple certificate renewals.
- (8) In addition to the contact hour requirements above, all professional operators shall acknowledge completion of a review of the "Ohio EPA Professional Operator Certification Training" course. This course will outline rule requirements that are specific to certified professional operators.
- (9) Upon request, an applicant for renewal of a certificate shall submit documentation of attendance at approved contact hour training to the director with the renewal application.
- (10) The holder of a certificate expiring as the result of a failure to obtain the contact hours required by this rule may apply for renewal, provided that the certificate will not be renewed until the applicant has met the contact hour requirements and submitted a late fee in accordance with division (O) of section 3745.11 of the Revised Code. These contact hour requirements shall be met within six months after the expiration date of the certificate or the certificate shall not be renewed. If a professional operator has not submitted a renewal application by the expiration date of the certificate, the professional operator shall not be the professional operator of record of a public water system, treatment works, or sewerage system



until such time as a renewal certificate is issued. Contact hours accrued to meet the certificate renewal requirements pursuant to this paragraph shall not count as contact hours for the next certificate renewal.

(E) Contact hour course approval.

(1) All training for the purpose of obtaining contact hours shall be approved by the director.

(a) Training providers shall submit requests for approval of training prior to the training event or within thirty days after completion of the training event. Training providers or professional operators may request approval of college courses, out-of-state training, or correspondence courses within thirty days of the completion of the training in a format approved by the director.

(b) Approval of training shall be based on the following:

(i) The amount of time an operator receives active instruction. At a minimum, a course shall contain at least 0.5 hours of active instruction.

(ii) Identification and qualifications of the instructor, who shall have at least three years of experience in the subject for which they are providing training, or equivalent experience as determined by the director.

(iii) Content of the training, which for courses over one hour in length, shall include an agenda which distinguishes training time from breaks and syllabus which describes the course. The syllabus shall include one method for verifying attendance. The following methods may be used to verify attendance:

(a) Classroom course:

(i) A sign-in sheet with the date, course name, time of course in military time, printed name of operator, signed name of operator and core person ID of operator.

(ii) Completion certificate that includes the course date, course name, course approval number, name of training provider, signature of person verifying attendance, name of operator and core person ID of operator.

(iii) Any other method for verification approved by the director.

(b) Correspondence course:

Completion certificate that includes the course date, course name, name of training provider, signature of person verifying attendance and name of operator.

(c) Web-based course, which shall be interactive and not static or pre-recorded:

(i) Results of an interactive test given during the course for comprehension.

(ii) A report of how long a student had the course as their main screen. A student is considered in attendance for the course if the report indicates ninety per cent of the time was spent with the course as the main screen.

(iii) Completion certificate that includes the course date, course name, name of training provider, signature of person verifying attendance and name of operator.

(d) Webinars:

- (i) Documentation of periodic interactivity.
- (ii) Documentation that an operator has spent a minimum of ninety per cent of the time with the webinar as the active window on the computer or some other method for verification approved by the director.
- (iii) Completion certificate that includes the course date, course name, name of training provider, signature of person verifying attendance and name of operator.
- (iv) Applicability and relevance of the training to the operation or management of a public water system or treatment facility, water distribution system, treatment works, or sewerage system.

(c) Determination of course credit:

- (i) For classroom courses and webinars, course credit shall be based on the amount of active instruction during the course. A maximum of fifteen minutes of questions and answers may be counted as active instruction.
  - (ii) For correspondence and web-based courses, course credit shall be based on one of the following:
    - (a) A standardized process using two minutes of time per page of text, one minute of time for practice problems or exercises and one minute of time for quiz or exam questions.
    - (b) Documentation of beta-testing of at least one hundred individuals to determine the average length of time to complete the course.
    - (c) A method that provides equivalent evaluation of instructional time as approved by the director.
  - (d) Courses shall expire three years following the last scheduled date of the course.
  - (e) Training providers shall maintain all records associated with approved contact hour courses for a minimum of three years from the date of the course.
- (2) All training providers shall notify the agency of subsequent sessions of an approved training course either prior to or within thirty days of the training in a format approved by the director. Failure to notify may result in the withdrawal of approval for the course. Submission of a new training date shall extend the course expiration date by three years from the date of the training.
- (3) Within thirty days of the effective date of this rule, all training providers shall electronically submit attendance documentation in a format approved by the director. Course attendance records shall be submitted within sixty days of the completion of the course.
- (4) The director may approve courses that have been approved by other operator certification organizations, provided the process is consistent with Ohio EPA's process as identified in this rule. After Ohio EPA verifies consistency, the training provider shall electronically submit course applications and attendance data.
- (5) In the event training providers or professional operators, approved through the process described in paragraph (E) of this rule, do not follow the provisions in paragraph (E) of this rule, the director shall not approve new training courses for a period of up to two years. The director may refuse to recognize

an approved training course for contact hour credit if a training provider fails to meet the criteria listed in paragraphs (E)(1) and (E)(3) of this rule.

(F) Approval to issue trainer-specific contact hour course approval numbers.

- (1) As an alternative to the process listed in paragraph (E) of this rule, training providers may request approval to issue trainer-specific contact hour course approval numbers on a form acceptable to the director, provided the training providers do the following:
  - (a) Provide training that is applicable to the operation or management of a public water system, treatment works, or sewerage system.
  - (b) Use instructors who have at least three years experience in the subject for which they are providing training, or equivalent expertise as determined by the director.
  - (c) Have provided courses approved by the agency in accordance with paragraph (E) of this rule for a minimum of three years.
  - (d) Have been previously approved to provide a minimum of twelve contact hours.
  - (e) Assign each contact hour course provided with a unique number that identifies the provider, field, course number, and subject.
  - (f) Maintain attendance records, an agenda which distinguishes training time from breaks and lunches, a course syllabus and instructor qualifications for each course given for a period of three years from the date of training.
  - (g) Assign contact hours only for the amount of time spent on training. Training providers shall not issue certificates of completion for a number of hours different than that assigned to an approved training course.
  - (h) Assign a subject to each course (i.e., operation and maintenance or other).
  - (i) Provide the director with a list of scheduled training, in a format acceptable to the director, by the first day of the month for each month that training is offered. This list shall include the name of the course, the training provider's approval number, the instructor's name, subject, date, and location of the training, along with the number of contact hours assigned.
  - (j) Upon request, be capable of providing a record of student training to the agency or the student.
- (2) Training providers approved through the process described in paragraph (F)(1) of this rule shall be designated green leaf training providers.
- (3) In the event a green leaf training provider does not provide a list of scheduled training by the first day of the month, the green leaf training provider shall submit course approval applications in accordance with paragraph (E) of this rule. If course approval applications are not submitted, the training shall not be considered for the renewal of a certificate.
- (4) In the event a green leaf training provider has given a trainer-specific contact hour course number to a course that has not been given and the course changes, due to adjustments in the length of the presentation or instructor, the green leaf training provider shall notify Ohio EPA within two business days of the change.

- (5) When a green leaf training provider course has been previously provided to operators and changes due to adjustments in the length of the presentation, the green leaf training provider shall create a new approval number and notify Ohio EPA in accordance with the requirements set forth in this rule.
- (6) Green leaf training provider courses shall expire three years following the last scheduled date of the course.
- (7) Within thirty days of the effective date of this rule, all green leaf training providers shall electronically submit attendance documentation in a format provided by the director. Course attendance records shall be submitted within thirty days of the completion of the course.
- (8) Failure to meet any of the criteria in paragraph (F) of this rule may result in the withdrawal of the director's approval for all contact hour course training given by the green leaf training provider for a period of up to two years. For training providers who have not received approval in accordance with paragraph (F) of this rule, the director shall not approve new contact hour course training for a period of up to two years. The director may refuse to recognize contact hour credit for approved courses if a training provider fails to meet the requirements of paragraphs (F)(1) and (F)(2) of this rule.
- (G) All training providers shall allow agency representatives to attend courses at any time for the purpose of reviewing the length of training, training content and other relevant aspects of the training. Agency employees shall not use this provision to obtain contact hours.
- (H) The director shall not renew the professional operator certificate of an applicant failing to meet the requirements of this rule.
- (I) A renewal card indicating the valid dates of the renewed professional operator certificate shall be issued to all certified professional operators who have met the renewal requirements of this rule.
- (J) Upon submission of a complete application, an expired professional operator certificate can be renewed within six months of the expiration date, subject to all the requirements and conditions of paragraph (C) of this rule and division (O) of section 3745.11 of the Revised Code. In all cases the expiration date of the renewed professional operator certificate shall be the same as if the renewal requirements had been met on or before the date of expiration. After the expiration date and prior to renewal according to this paragraph, the professional operator shall not perform those activities requiring a certificate.
- (K) A professional operator's certificate that has not been renewed within six months of the expiration date shall not be renewed. In such cases, the former certificate holder shall apply for examination, pay all required fees, and pass the examination in order to obtain certification.
- (L) In the event that a professional operator is not able to meet the contact hour requirements of this rule due to a personal life threatening illness or military service the director may, upon request, grant an extension for achieving the required contact hours. However, the professional operator shall not be the professional operator of record of a public water system, treatment works, or sewerage system until such time as the contact hour requirements are fulfilled and a renewal certificate is issued.
- (M) The director shall audit a representative number of renewal applications in order to document compliance with the contact hour requirements.

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**3745-7-17 Professional operator certification fees.****(A) Examination fee.**

Upon application to the director for examination, the applicant shall pay an examination fee in accordance with section 3745.11 of the Revised Code.

**(B) Certification fee.**

Upon application to the director for certification as a professional operator who has passed an examination administered by an examination provider approved by the director, the applicant shall pay a certification fee in accordance with section 3745.11 of the Revised Code.

**(C) Reciprocity fee.**

Upon application to the director for certification as a professional operator through reciprocity, the applicant shall pay a certification fee in accordance with section 3745.11 of the Revised Code. Upon determination of the level of certification that can be granted through reciprocity, the applicant shall pay a fee that is equivalent to the examination fee for the level of certification at which reciprocity is granted in accordance with section 3745.11 of the Revised Code.

**(D) Renewal fee.**

- (1) An applicant shall pay a certification renewal fee in accordance with the schedule in section 3745.11 of the Revised Code.
- (2) If the certification renewal fee is received more than thirty calendar days but not more than one year after the expiration date, the applicant shall pay a late certification renewal fee in accordance with the schedule in section 3745.11 of the Revised Code.

**(E) Requests for replacement of lost, damaged, or destroyed certificates shall be submitted to the director in writing and shall be accompanied by a nonrefundable fee in accordance with section 3745.11 of the Revised Code.****(F) All fees shall be made payable to "Treasurer of the State of Ohio." All fees are nonrefundable.**

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**3745-7-18 Conduct during the application and examination process.**

- (A) No person shall engage in conduct that subverts or attempts to subvert the application, examination, or review process. Any such action shall cause a person's scores to be withheld and declared invalid.
- (1) Persons holding a certificate issued under this chapter shall be subject to suspension or revocation of such certificate in accordance with paragraph (A)(1) of rule 3745-7-12 of the Administrative Code, and shall also be disqualified from taking future water and wastewater exams for a period of up to five years.
  - (2) Persons who do not possess a certificate issued under this chapter shall be disqualified from taking future water and wastewater exams for a period of up to five years.
- (B) Conduct that subverts or attempts to subvert the application, examination, or review process includes, but is not limited to the following:
- (1) Conduct that violates the application process, such as falsifying or submitting incorrect information on the application for examination.
  - (2) Conduct that violates the security of the examination materials, such as removing from the examination room any of the examination materials; reproducing or reconstructing any portion of the examination; aiding by any means in the reproduction or reconstruction of any portion of or information from the examination; selling, distributing, buying, receiving, or having unauthorized possession of any portion of, or information from, a future or current examination.
  - (3) Conduct that violates the examination process, such as communicating with any other examinee during the administration of the examination; copying answers from another examinee or allowing answers to be copied by another examinee during the administration of the examination; writing on any materials other than the exam booklet or answer sheet; possessing during the administration of the examination any book, notes, written or printed materials or data of any kind, other than the examination materials distributed or specifically listed as approved materials for the examination room in the information provided to the examinee in advance of the examination date by the director. The examination process begins upon entering the location of the exam.
  - (4) Conduct that violates the credentialing process, such as falsifying or misrepresenting information required for admission to the examination, impersonating an examinee, or having an impersonator take the examination on behalf of the examinee.
  - (5) With respect to the class IV examination process, allowing individuals other than the applicant to write or edit the applicant's substantive work product or using information written by other individuals. This rule shall not be construed to prevent the applicant for a class IV examination to allow another individual to proofread the work product for minor spelling and grammatical errors.
- (C) Actions affecting the status of a person's examination or their eligibility to take future examinations because of conduct defined in paragraph (B) of this rule shall be taken in accordance with Chapters 3745-47 and 3745-49 of the Administrative Code.



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**3745-7-19 Examination providers.**

The director may approve an entity to be an examination provider.

(A) To be eligible for approval as an examination provider, the applicant shall do the following:

- (1) Submit an application on a form acceptable to the director.
- (2) In accordance with division (O) of section 3745.11 of the Revised Code, pay the agency an application fee.
- (3) Demonstrate the development of multiple classifications of water treatment, water distribution, wastewater collection and wastewater treatment examinations for the purpose of assessing the entry-level skills necessary for each professional operator classification. The examinations shall meet the requirements listed in paragraph (B) of this rule.
- (4) Be the responsible body for overseeing the development and scoring of the examinations.
- (5) Demonstrate the ability to proctor and enforce requirements for conduct during the examinations that are consistent with the provisions in rule 3745-7-18 of the Administrative Code.
- (6) Provide security guidelines for protecting the confidentiality and integrity of examination development, examination questions and the grading of examinations.
- (7) Demonstrate the ability to enforce the security guidelines documented in paragraph (A)(6) of this rule.
- (8) Document policy for the amount of time required before an examinee may retake an examination. Such policy shall at a minimum require an applicant to wait thirty days prior to retaking an examination.
- (9) Demonstrate an ability to provide computerized examinations at a minimum of four locations throughout the state of Ohio. The examinations shall be available at each location on multiple days and varying times throughout the year.
- (10) Demonstrate an ability to provide the examinee with immediate feedback and allow the examinee to provide feedback regarding questions on the examination they have taken. The feedback shall include the score achieved on the examination and identify core competencies or "Need to Know Criteria" where the examinee scored poorly. Examinees shall have the ability to print a hard copy of the examination results which identifies the examinee, examination classification, score and provider name.
- (11) Demonstrate the ability to provide examinations for examinees who document a disability that necessitates special accommodation.
- (12) Document the application process and that applicants are required to meet minimum eligibility requirements for taking examinations that are equivalent or more stringent than those contained in rule 3745-7-06 of the Administrative Code.
- (13) Submit copies of the question database and examinations to be used for each classification to the Ohio EPA. The professional operator certification advisory council and agency staff will determine the equivalency of the examinations to the Ohio EPA's previously administered examinations and consistency with professional standards. Examination questions and databases shall be treated as trade secrets and be exempt from the public records provisions of Chapter 149. of the Revised Code.
- (14) Demonstrate that questions and examinations are available for the Ohio EPA's class I and class II water

distribution and wastewater collection system classifications, as well as class A, class I, class II and class III water supply and wastewater treatment classifications. These examinations shall meet the criteria established in paragraph (B) of this rule.

(B) The applicant shall demonstrate the examinations meet the following:

- (1) The purpose of the examination shall be to test a professional operator's knowledge of entry-level standards of practice that shall be common to each water and wastewater professional operator classification.
- (2) Be developed based on a job analysis and survey process (updated at least every five years) conducted with individuals representative of the classification for the examination. The job analysis and survey process shall identify the core competencies and "Need to Know Criteria" for each classification.
- (3) Incorporate items based on "Need to Know Criteria" which serve as an outline for each examination classification. The content of the examinations shall be weighted so as to represent the most critical job duties performed by a professional operator in each classification.
- (4) Consist of questions which have been developed and validated in a manner consistent with the professional standards contained in the most recent version of "Standards for Educational and Psychological Testing (2014)".
- (5) Have been reviewed by a psychometrician to ensure consistency with psychometric principles regarding examination validation and cut score development.
- (6) The examinations and questions undergo statistical review following the administration of the examinations to ensure they are performing as intended. The procedures, process and the details associated with actions taken based on the statistical review shall be provided.

(C) Approval of an examination provider shall be based upon the criteria in paragraph A of this rule and an examination equivalency review by the Ohio EPA and the professional operator certification advisory council.

(D) Upon approval by the director, the approved examination provider shall do the following:

- (1) Begin giving examinations to Ohio professional operators within one year of the director's approval.
- (2) Upon delivering the first Ohio based examination, provide monthly reports to the professional operator certification program documenting analysis of the examination questions and the amount of fees collected during the month from professional operators seeking certification in Ohio. The monthly report shall be submitted within ten business days of the end of the reporting month.
- (3) Upon delivering the first Ohio based examination, provide a weekly report of individuals taking the examinations, the classification of the examination, and their scores in a format approved by the director.
- (4) Pay an annual fee in accordance with division (O) of section 3745.11 of the Revised Code. The fee shall be submitted no later than forty-five days after the end of the preceding calendar year. The fee shall be based on the amount of fees collected in the preceding calendar year from professional operator taking examinations who intend to seek certification in Ohio.
- (5) At a minimum of every three years, question databases and examinations for each classification will be

reviewed by the agency. Reviews may be conducted more frequently at the discretion of the director.

- (E) Written examinations developed by or for the agency may include trial test questions for the purpose of evaluating the statistical or psychometric qualities of new or revised questions prior to their use in an examination. Trial test questions will not be identified to the candidates as trial test questions on the examination.
- (1) The maximum number of trial test questions included in a single examination shall not exceed twenty per cent of the total number of questions on examination.
- (2) Trial test questions shall not be counted toward a candidate's score on the examination.
- (F) Failure to maintain the standards under which the provider was approved or meet the criteria above may result in the withdrawal of the director's approval and invalidation of examination scores.

[Comment: This rule incorporates, by reference the "Standards for educational and psychological testing (2014)." At the effective date of this rule, a copy may be obtained from "American Educational Research Association, 1430 K Street NW, Suite 1200, Washington, DC 20005," (202) 238-3200, <http://www.aera.net>. The reference is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215."]

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**3745-7-20      Certification of professional operators who pass an examination from an approved examination provider.**

The director shall, in accordance with this chapter, issue appropriate professional operator certificates to applicants who pass an examination from a director approved examination provider and meet the following requirements:

**(A) Application for certification.**

- (1) After notification of passing the examination from the examination provider, applicants for professional operator certification shall submit an application on a form provided by the director. Certification fees as set forth in section 3745.11 of the Revised Code shall be submitted with the application for certification.
- (2) Provide documentation of a passing score on an examination equivalent to the classification of professional operator certification requested.
- (3) When required by the professional operator certification advisory council, the applicant shall furnish additional documentation to the agency to verify information provided on the application.
- (4) Acknowledge completion of a review of the "Ohio EPA Professional Operator Certification Training" course. This course outlines rule requirements that are specific to certified professional operators.
- (5) Any applicant who submits incomplete, false, or incorrect information on the application shall be disciplined as set forth in rule 3745-7-12 of the Administrative Code and will not receive certification.
- (6) Fulfill the requirements contained in rule 3745-7-06 of the Administrative Code.

**(B) An applicant who passed an examination from a director approved examination provider before obtaining the required operating experience shall be designated a professional operator in training, subject to the conditions of paragraph (C) of rule 3745-7-07 of the Administrative Code.**

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**3745-7-21 Contract operations companies and contracted professional operators.**

- (A) Within thirty days of the effective date of this rule, any person acting as a contracted professional operator or contract operations company shall apply for approval as a contracted professional operator on a form provided by the director prior to providing any professional operator services. A person seeking to become a contracted professional operator or contract operations company shall apply for approval at least thirty days prior to initiating contract operations.

A sample contract which is representative of the type of contracts that would be executed with facilities shall be provided as part of the approval process. Contracts should include language which at a minimum, addresses who is responsible and the minimum expectations for all of the following:

- (1) Operation of the facility.
  - (2) Minimum staffing hours.
  - (3) Emergency operations.
  - (4) Maintenance (routine and preventative).
  - (5) Ensuring the operators comply with the responsibilities of a professional operator in accordance with this chapter.
  - (6) Sharing of correspondence from the agency including compliance letters, NPDES permits and public water system monitoring schedules between the facility owner and the contracted professional operator.
  - (7) Conducting all sampling for the facility.
- (B) All approved contract operations companies or contracted professional operators shall comply with the following:
- (1) Ensure that certified professional operators under their employment comply with provisions of Chapters 3745., 6111., and 6109. of the Revised Code and the rules promulgated thereunder.
  - (2) If required by the facility owner or agency, respond to emergencies within one hour of being notified.
  - (3) Provide an appropriately certified operator when the operator of record listed for the facility is unavailable.
  - (4) In a format approved by the director, provide a report of the facilities that are contracted to be operated by June thirtieth of each year. The report shall include the following information:
    - (a) Name of facility.
    - (b) Public water system identification number or NPDES permit number.
    - (c) Classification of facility.
    - (d) Name and certification numbers of the certified professional operators assigned to the facility differentiating the professional operator of record and backup operators.
    - (e) The minimum amount of time and days spent at each facility.
  - (5) Maintain a copy of the contracts onsite at the public water system or wastewater works for inspection by



Ohio EPA. Copies of contract kept onsite may have monetary compensation redacted or as an attachment to the contract which does not need to be available for review.

- (6) Maintain a copy of the contract for a period of three years after the end date of the contract.
  - (7) Provide a copy of the contract within five days of a request by Ohio EPA. Copies of the contract provided to Ohio EPA may have monetary compensation redacted or as an attachment to the contract which does not need to be provided.
  - (8) Ensure that all relevant personnel including but not limited to the owner and other professional operators associated with a facility, are notified of written correspondence from or to the Ohio EPA.
- (C) The director may hold a contract operations company or contract professional operator jointly and severally liable with a certified professional operator in its employ if the certified professional operator violates Chapters 3745., 6111. and 6109. of the Revised Code and the rules promulgated thereunder and the director determines one or more of the following:
- (1) The contract operations company or contract professional operator fails to take reasonable steps to comply with paragraph (B)(1) of this rule or the contract operations company's or contract professional operator's negligence or incompetence results in a violation of paragraph (B)(1) of this rule. In making this determination, the director may consider the following factors:
    - (a) Repeated violations by one or more of the certified professional operators in the employ of the contract operations company or contract professional operator.
    - (b) Patterns of violation.
    - (c) Any efforts to counsel, discipline, or adjust policies or procedures to address any violations.
    - (d) Any other relevant factors.
  - (2) The contract operations company or contract professional operator knew or should have known of a certified professional operator violation and failed to take reasonable steps to require the certified professional operator correct the violation within a reasonable timeframe or failed to take reasonable steps to ensure the violation does not occur again in the future.
- (D) Failure of the contract operations company or contract operator to comply with or ensure their employees comply with the provisions of Chapters 6111. and 6109. of the Revised Code and the rules promulgated thereunder may result in the withdrawal of the director's approval.

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3745-9-01      **Well standard definitions.**

Except as otherwise noted, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter.

(A)

- (1) "Abandoned well" means a well, test hole, or dry hole whose use has been permanently discontinued.
- (2) "Alter" or "alteration" means to make a substantial change in construction or configuration of a public water system, including without limitation: changing well pump design capacity; converting a well with a buried seal to a well with a pitless adapter or well house installation; converting a well that uses a well pit to a well with a pitless adapter or well house type of construction; deepening a well; installing a liner; or modifying, extending or replacing any portion of the casing or borehole.
- (3) "API" means American petroleum institute.
- (4) "ANSI" means American national standards institute.
- (5) "Anticipated permanent design pumping rate" means the rate at which the public water system anticipates pumping water from the well during normal operation using the permanent well pump.
- (6) "ASTM" means the American society for testing materials.
- (7) "AWWA" means American water works association.

(B)

- (1) "Bentonite" means a plastic, colloidal clay which has an extensive ability to absorb water and swell in volume, and which is composed predominantly of the mineral sodium montmorillonite.
- (2) "Brine" means water that has a total dissolved solids concentration greater than thirty-five thousand milligrams per liter, or greater than thirty-five thousand milligrams per liter multiplied by one and five tenths microsiemens per centimeter. [Comment: Thirty-five thousand parts per million or ppm total dissolved solids is seawater.]

(C)

- (1) "Casing" means an impervious durable pipe that is placed in a well and is used to prevent the walls from caving, and to exclude surface drainage, undesirable water or other fluids, or unwanted or harmful materials from a well. Casing includes pipe used for both primary or production casing, and secondary or surface casing.
- (2) "Coarse grade bentonite" means bentonite that has been crushed to a size of three-eighths to three-quarters of an inch.

- (3) "Conductor pipe--gravity" means allowing cement grout to flow by gravity through a funnel or hopper connected to a conductor pipe.
- (4) "Conductor pipe--pumped" means pressure grouting with a conductor pipe that is lowered to the bottom of the annular space with grout pumped from the bottom up in a continuous operation. The end of the conductor pipe remains submerged and full of grout at all times.
- (5) "Construction and demolition debris facility" means as defined in rule 3745-400-01 of the Administrative Code.

(D)

- (1) "Develop" or "development" means to physically remove, or the process of removing, all fine materials and sediment generated during construction of the well, by means including but not limited to surging, air surging or lifting, overpumping, backwashing, high velocity jetting or bailing of the completed well.
- (2) "Drinking water source protection area" means the surface and subsurface area surrounding a public water supply well, which will provide water from an aquifer to the well within five years as delineated or endorsed by the agency under Ohio's wellhead protection and source water assessment and protection programs.
- (3) "Drive shoe" means a hardened steel collar with a beveled cutting edge that is attached to the lower end of a casing by threading or welding to protect the casing as it is driven.
- (4) "Drop pipe" means a pipe or pipes within a well casing which conducts water from the well to the pitless adapter or pitless unit.
- (5) "Dry hole" means a well that does not produce water in sufficient quantity for the intended use.

- (E) "Effective grain size" means the ninety per cent retained size of a sediment as determined from a grain size analysis.

(F)

- (1) "FEMA" means federal emergency management agency.
- (2) "Floodplain" means the area adjoining any river, stream, watercourse or lake that has been or may be covered by flood water.
- (3) "Floodway" means the channel of a river or stream, and those portions of the floodplain adjoining the channel required to carry the flood discharge.
- (4) "Formation stabilizer" or "filter pack" means siliceous, well-rounded, clean and uniform sand or gravel that is free of contaminants and foreign matter, properly sized, washed and placed between the borehole wall and the well screen to prevent formation material from entering through the screen and to stabilize the borehole.

## (G)

- (1) "Granular bentonite" means bentonite that has been processed to coarse granular particles ranging in size from thirty-three to ninety-three thousandths of an inch.
- (2) "Grout" means a slurry of cement, bentonite, clay or other impervious material that is used to seal a well, test hole, dry hole or annular space. Grout specifications for sealing are in rule 3745-9-07 of the Administrative Code.
- (3) "Grout displacement" method means placing a calculated volume of grout sufficient to fill the annular space plus fifteen per cent extra grout into the borehole through a conductor pipe. The grout is then pressurized to force the grout into the annular space.
- (4) "Grout shoe--continuous injection" means pressure grouting by using a grout shoe with a check valve installed in the bottom of the permanent well casing and connected by a conductor pipe to the surface through which grout is pumped until the entire annular space is filled with grout. The conductor pipe is removed, the permanent casing set at the bottom of the borehole, and the grout allowed to set until cured.

## (H)

- (1) "Human or animal waste management facility" means any of the following:
  - (a) A class I, II, or III compost facility as defined in rule 3745-560-02 of the Administrative Code.
  - (b) A regional sewage sludge storage facility and other bulk storage facility for non-exceptional quality biosolids as defined in rule 3745-40-01 of the Administrative Code.
  - (c) A manure storage or treatment facility, fabricated manure storage structure, manure storage pond, or manure treatment lagoon as defined in rule 901:10-1-01 of the Administrative Code.
  - (d) A wastewater treatment facility as defined in rule 3745-33-01 of the Administrative Code, or storage facility as defined in rule 3745-42-13 of the Administrative Code.
- (I) "Inner management zone" means the surface and subsurface area within a drinking water source protection area for a public water supply system using ground water surrounding a public water supply well that will provide water to the well within one year as delineated or endorsed by the agency under Ohio's wellhead protection and source water assessment and protection programs.

## (J) [Reserved.]

## (K) [Reserved.]

## (L)

- (1) "Land application area", for the purposes of this chapter, means any of the following:
  - (a) A beneficial use site or area used for field storage for non-exceptional quality biosolids as defined in rule 3745-40-01 of the Administrative Code.
  - (b) A land application area, staging area or stockpiling area as defined in rule 901:10-1-01 of the Administrative Code.
  - (c) A wastewater land application area as defined in rule 3745-42-13 of the Administrative Code.
- (2) "Landfill" means a sanitary landfill, industrial solid waste landfill or residual waste landfill as defined in rule 3745-27-01, 3745-29-01 or 3745-30-01 of the Administrative Code.
- (3) "Lead free" means the same as defined in section 6109.10 of the Revised Code.
- (4) "Liner" means a well casing installed within another well casing. A liner may include a perforated section that extends into the open portion of a borehole to support the walls of the borehole and allow movement of ground water into the well.

## (M)

- (1) "Monitoring well" means an excavation by digging, boring, drilling, driving or other method that is done or used to extract samples of ground water or for the purpose of determining the quality, quantity or level of ground water.
- (2) "Monofill" means a scrap tire monofill as defined in rule 3745-27-01 of the Administrative Code.

## (N)

- (1) "Nonpotable well" means any well described in section 6111.42 of the Revised Code that is not used for the provision of water for human consumption. Nonpotable wells include, but are not limited to, wells used to provide water for irrigation, non-contact cooling water, water for use in commercial and industrial processes, and water for use in open-loop geothermal heating and cooling systems.
  - (2) "NSF" means the national sanitation foundation.
- (O) "One hundred year floodplain" means a portion of a designated floodplain that may be inundated by a flood having a one per cent chance of being equaled or exceeded in any given year.

## (P)

- (1) "Packer" means a rubber or inflatable device used to temporarily or permanently seal off a portion of the borehole, annular space or well casing.

- (2) "Pelletized bentonite" means bentonite that has been processed into pellets or tablets that have a diameter of one fourth to one half inch.
  - (3) "Permanent design pumping rate" means the nominal capacity of the installed pump, per the manufacturer's specifications.
  - (4) "Pitless adapter" means an assembly of parts which will permit water to pass through the casing or extension thereof; provides access to the well and to the parts of the water system within the well; and provides for the transportation of the water and the protection of the well and water therein from surface or near surface contaminants.
  - (5) "Pitless unit" means an assembly which extends the upper end of casing to above grade and prevents the entrance of contaminants into the well, to conduct water from the well, to protect water from freezing or extremes of temperature and to allow access to the well and components of the pumping equipment.
  - (6) "Point well" means a well with casing with an integral screen and drive point that is installed by driving or jetting.
  - (7) "Pressure grouting" means any of the following methods of placing a grout slurry into a well or the annular space of a well: conductor pipe-pumped; grout shoe-continuous injection; well seal with conductor pipe-pumped; and, grout displacement method.
  - (8) "Private water system" means the same as defined in division (A) of section 3701.344 of the Revised Code.
  - (9) "Public entity" means the federal government, the state, any political subdivision and any agency, institution or instrumentality thereof.
  - (10) "Public water system well" means a well, except a monitoring well, for use by a public water system.
- (Q) "Qualified ground water professional" means a scientist or engineer who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has at least five years relevant experience in ground water hydrology and related fields to enable that individual to make sound professional judgments regarding ground water resources; water well construction, testing and development; and identification and migration of contaminants.
- (R)
- (1) "Radial collector well" means a water collector that is constructed as a dug well that has been sunk as a caisson. Screens are installed radially and approximately horizontally from the caisson into the aquifer.
  - (2) "Repair" means any work performed on a well for the purpose of servicing or replacing a component with a comparable component. Repair includes, without limitation, servicing pumps or pumping equipment, and couplings. Repair does not include a modification to the casing or wall of a well.

## (S)

- (1) "Seal" means to close a well or to close a portion of a well or the annular space of a well.
- (2) "Shale trap" means a conical shaped rubber packer that is attached to the bottom of the casing to seal the annular space and prevent grout from entering the open borehole or screened area of the well.
- (3) "Soil absorption system" means the final treatment component of an onsite sewage treatment system that utilizes absorption and adsorption to treat and disperse the treated sewage into subsurface soils.
- (4) "Source water assessment and protection program" means Ohio EPA's program based on the Safe Drinking Water Act (or SDWA) as amended in 1996.
- (5) "Specific capacity" means the rate of discharge of a water well per unit of drawdown, commonly expressed in gallons per minute per foot. It varies with duration of discharge and the pumping rate.
- (6) "Standard dimension ratio (SDR)" means the ratio of average outside pipe diameter to minimum pipe wall thickness.
- (7) "Static water level" means the level of the water when measured from the established ground surface to the water surface in a well that is neither being pumped nor under the influence of pumping.
- (8) "Susceptibility" is the likelihood for the source of water used by a public water system to become contaminated, as determined through the source water assessment and protection program.

## (T)

- (1) "Test hole" means any excavation, regardless of design or method of construction, for the purpose of determining the most suitable site for removing ground water from an aquifer.
- (2) "Thermoplastic" means polyvinyl chloride (PVC) or acrylonitrile butadiene styrene (ABS).

(U) "Uniformity coefficient" means a ratio of the sieve-size opening that will pass sixty per cent of a representative sample of the filter material divided by the sieve-size opening that will pass ten per cent of the material.

(V) [Reserved.]

## (W)

- (1) "Well" means any excavation by digging, boring, drilling, driving or other method for the purpose of removing ground water from an aquifer, except a private water system well or a monitoring well.



- (2) "Well cap" or "cap" means a device used to enclose the atmospheric termination of the well casing, and a device that covers and encloses the upper termination of a pitless unit or the well casing and provides protection to the top, exposed portion of the well casing by being tamper resistant, forming a protective cover from the elements, and being resistant to the entry of vermin or contaminants.
- (3) "Wellhead protection program" means Ohio EPA's program based on the SDWA as amended in 1986.
- (4) "Well house" or "pumphouse" means a building designed and constructed solely to house pumping and water system equipment.
- (5) "Well screen" or "screen" means a manufactured intake structure with uniform openings designed to retain the aquifer formation, prevent collapse of the borehole adjacent to the screen, and accommodate a yield adequate for the intended use of the well.
- (6) "Well seal with conductor pipe--pumped" means pressure grouting by setting the permanent casing just above the bottom of the borehole and filling the casing and annular space with water, drilling mud or a bentonite slurry. Conductor pipe is then set inside the casing to the bottom of the borehole either through a watertight well seal or packer. Grout is pumped into the annular space displacing all other fluids in the annular space and the permanent casing set in place.
- (7) "Well vent" or "vent" means a screened opening in a well seal or cap to allow atmospheric pressure to be maintained in the well.
- (X) [Reserved.]
- (Y) [Reserved.]
- (Z) [Reserved.]

[Comment: SDWA means the "Safe Drinking Water Act," 88 Stat. 1660 (1974), Title 42 U.S.C. 300(f), as amended by the "Safe Drinking Water Act Amendments of 1977," 91 Stat. 1393, 42 U.S. C. 300(f), the "Safe Drinking Water Act Amendments of 1986," 100 Stat. 642, 42 U.S.C. 300(f), and the "Safe Drinking Water Act Amendments of 1996," 110 Stat. 1613, 42 U.S.C. 300(f), and regulations adopted under those acts. Copies of these codes may be obtained from the "U.S. Government Bookstore" toll-free at (866) 512-1800 or <https://www.gpo.gov/fdsys>, or from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752. The code is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street 700, Columbus, OH, 43215."]

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3745-9-02      **Scope and exemptions.**

- (A) In accordance with division (E) of section 6111.42 of the Revised Code, this chapter shall apply to the drilling, operation, maintenance and abandonment of a well or monitoring well to prevent the contamination of the ground water, except that these rules shall not apply to a private water system well as defined in Chapter 3701-28 of the Administrative Code. Unless otherwise noted, this chapter shall apply to the drilling, operation, maintenance and abandonment of a nonpotable well as defined in rule 3745-9-01 of the Administrative Code.
- (B) No provision of this chapter shall be construed so as to exempt any person from compliance with any section of the Revised Code, or any other rule of the Administrative Code, including the department of natural resources and the department of health, or any local ordinance or regulation.
- (C) No person shall provide water from a public water system well to the public following construction or alteration until plans therefor have been approved by the director in accordance with section 6109.07 of the Revised Code and Chapter 3745-91 of the Administrative Code.
- (D) After April 1, 2016, only private contractors holding a valid registration with the Ohio department of health, in accordance with Chapter 3701-28 of the Administrative Code, may do or oversee any of the following except as noted in paragraph (E) of this rule:
  - (1) Drill, construct, alter, repair or seal a public water system well.
  - (2) Install a pitless adapter or pitless unit into the casing of a public water system well.
- (E) After April 1, 2016, a community water system that is owned or operated by, or serves a public entity, may perform repairs on wells owned and operated by the public water system. Any contractor hired by a public entity must meet the requirements of paragraph (D) of this rule.
- (F) The director shall not issue a plan approval for a well serving a public water system, or alteration of such a well, in accordance with Chapter 3745-91 of the Administrative Code, that does not conform to the requirements of this chapter, or which will cause or contribute to contamination of the well or ground water.
- (G) The director may grant a variance of this chapter. A public water system requesting a variance shall submit a variance application as part of the application for plan approval. The variance application shall be reviewed as part of the plan approval in accordance with Chapter 3745-91 of the Administrative Code. The public water system shall include in the variance application a detailed explanation of the requested variance and a sufficient demonstration of at least the following information:
  - (1) Contamination of the ground water will not occur as a result of construction and operation of the well.
  - (2) The public health and welfare will not be endangered from contaminants because of

unsatisfactory location, protection, construction, operation or maintenance of the well, subject to requirements of the Safe Drinking Water Act (or SDWA).

- (H) Unless a well is otherwise required to comply with paragraph (A)(16)(b) of rule 3745-9-05 of the Administrative Code, a public water system shall comply with the rules in effect at the date of plan approval issued in accordance with Chapter 3745-91 of the Administrative Code, or the date of installation if no plan was approved, except for the following:
- (1) For a well installed prior to May 1, 2003, the casing shall terminate at least eight inches above finished grade and be equipped with a well cap, and the vent shall terminate at least three feet above the one hundred year floodplain elevation and be protected from damage.
  - (2) The director may require a plan approval for an alteration or other modification that is not inconsistent with this chapter, and chemical and microbiological monitoring, for a public water system that had been a private water system well that was constructed in accordance with Chapter 3701-28 of the Administrative Code.
  - (3) Any submersible well pump with a mercury seal in a public water system well shall be replaced, or modified to eliminate mercury seals, within thirty days of discovery; any submersible pump installed after May 1, 2003 shall not contain a mercury seal in accordance with paragraph (A)(14)(c) of rule 3745-9-05 of the Administrative Code.
  - (4) If a public water system well has a submersible pump with a mercury seal, the director may require sampling and analysis for mercury in the well and water system to ascertain if mercury has contaminated the ground water or water system.

[Comment: SDWA means the "Safe Drinking Water Act," 88 Stat. 1660 (1974), Title 42 U.S.C. 300(f), as amended by the "Safe Drinking Water Act Amendments of 1977," 91 Stat. 1393, 42 U.S.C. 300(f), the "Safe Drinking Water Act Amendments of 1986," 100 Stat. 642, 42 U.S.C. 300(f), and the "Safe Drinking Water Act Amendments of 1996," 110 Stat. 1613, 42 U.S.C. 300(f), and regulations adopted under those acts. Copies of these codes may be obtained from the "U.S. Government Bookstore" toll-free at (866) 512-1800 or <https://www.gpo.gov/fdsys>, or from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752. The code is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street 700, Columbus, OH, 43215."]

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3745-9-03      **Monitoring well.**

- (A) If not otherwise regulated by the director, or another Ohio agency, board or commission, the "Ohio EPA Technical Guidance Manual for Hydrogeologic Investigations and Ground Water Monitoring," or other standards adopted by the director, shall be used as a guide for monitoring well construction and sealing to prevent the contamination of ground water.
- (B) A monitoring well that is damaged or deteriorated shall be either repaired to a state consistent with construction requirements of paragraph (A) of this rule, or sealed in accordance with paragraph (A) of this rule.
- (C) A monitoring well that is no longer being used shall be sealed in accordance with paragraph (A) of this rule.

[Comment: This rule incorporates the "Ohio EPA Technical Guidance Manual for Hydrogeologic Investigations and Ground Water Monitoring," published in February 1995 and as amended through April 2015. This rule incorporates this guidance by reference. At the effective date of this rule, a copy may be obtained from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752, [www.epa.ohio.gov](http://www.epa.ohio.gov). The document is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

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3745-9-04      **Well siting.**

(A) Public water system and nonpotable wells as defined in rule 3745-9-01 of the Administrative Code shall be located in accordance with the following:

- (1) Other than a well for the removal of contaminants, shall be located the maximum practical distance from potential or known sources of contamination and only where it can be maintained in a sanitary condition.
- (2) Other than a well for the removal of contaminants, shall be located only where surface and subsurface conditions will not allow contaminants to be conducted into the well.
- (3) Shall be adequately protected from physical damage.
- (4) Shall not be located either within ten feet of or within the foundation of any building, except within a pumphouse.
- (5) Shall be located so the well is accessible for cleaning, treatment, repair, alteration, testing and such other actions as may be necessary.

(B) In addition to paragraph (A) of this rule, a public water system well shall meet the following:

- (1) A public water system shall own all the land or obtain an easement or lease of the sanitary isolation radius of a public water system well, and such easement or lease shall be recorded with the county recorder.

[Comment: The director recommends ownership by the public water system of land at least within the sanitary isolation radius.]

- (2) The sanitary isolation radius is determined from the estimated average daily water demand of the public water system well. Estimated average daily water demand may be determined by the director from the pumping design rate of the well, as illustrated in the following table:

Sanitary Isolation Radius	
Estimated Average Daily Water Demand (Q gallons per day)	Sanitary Isolation Radius (feet)
0 - 2500	50
2501 - 10000	square root of Q
10001 - 50000	$50 + Q/200$
Over 50000	300

- (3) The director may specify greater sanitary isolation requirements for a public water system well where conditions are determined to exist such that the sanitary isolation radius set forth in paragraph (B)(2) of this rule is insufficient to protect the public health and the public water system from contaminants.



- (4) Potential sources of contamination shall not be constructed or placed within the sanitary isolation radius of a public water system well.
- (5) A public water system well shall not be located in a floodway without prior acceptance of the director.

[Comment: An owner or operator of a public water system that proposes to locate a well in a one hundred year floodplain or floodway must also obtain approval from state or local floodplain management agencies as appropriate.]

- (6) A public water system well shall be located at a minimum in accordance with the following:
  - (a) Fifty feet from streams and lakes.
  - (b) Three hundred feet from a human or animal waste management facility.
  - (c) Three hundred feet from a land application area, stockpile, storage or staging area.
  - (d) One hundred feet from a land application area field if the waste is injected or three hundred feet if the waste is surface applied, but in no case within the sanitary isolation radius of the well.
  - (e) Three hundred feet from a soil absorption system handling more than ten thousand gallons per day.
  - (f) One thousand feet from a landfill or monofill.
  - (g) Five hundred feet from a construction and demolition debris facility.
- (7) A public water system well shall be sited such that no landfill or monofill is located within the proposed well's drinking water source protection area.
- (C) In addition to paragraphs (A) and (B) of this rule, a public water system well used by a community or nontransient noncommunity public water system shall be located such that the following are not located within the proposed well's inner management zone:
  - (1) Human or animal waste management facility, except when a well is used by the facility.
  - (2) Soil absorption system handling more than ten thousand gallons per day in an area where the Ohio environmental protection agency has determined the aquifer has a high susceptibility to contamination.
  - (3) Land application stockpile, storage or staging area where the Ohio environmental protection agency has determined the aquifer has a high susceptibility to contamination.
- (D) In instances where a proposed public water system well cannot be feasibly located such that the conditions specified in paragraphs (B)(2), (B)(6), (B)(7), and (C) of this rule are met, the director may grant a variance in accordance with paragraph (F) of rule

3745-9-02 of the Administrative Code. The applicant shall make an adequate demonstration that documents the site hydrogeology, engineering controls, or other physical barriers are sufficient to minimize the risk of contamination being drawn into the well.

- (E) The director may require a hydrogeologic investigation to select the location of a well to ensure that contaminants will not be drawn into the well and that a sufficient quantity of ground water exists for the intended purpose. These investigations may be required where, without limitation, one of these well siting circumstances exist: potential or known contaminant; hydrogeologic setting that may allow transport of contaminants; or initial development of a community well field. The investigation shall be conducted by a qualified ground water professional. A hydrogeological investigation is a study of the subsurface and geologic conditions. Information shall be collected, without limitation, about the type and thickness of geologic materials, the occurrence of ground water, how it flows in pore spaces and fractures, and the quantity and quality of the ground water.

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3745-9-05      **Well construction.**

Applicability. This rule applies to nonpotable wells, public water system wells and radial collector wells, all of which are defined in rule 3745-9-01 of the Administrative Code. Paragraph (A) of this rule applies to both public water system and nonpotable wells, and excludes monitoring wells described in rule 3745-9-03 of the Administrative Code. A nonpotable well shall be constructed in accordance with this rule. Paragraph (B) of this rule only applies to public water system wells. Paragraph (C) of this rule applies only to radial collector wells.

[Comment: "Lead free" is defined in section 6109.10 of the Revised Code.]

(A) Public water system wells and nonpotable wells. Material used in the drilling process or well construction shall meet the following:

- (1) All material used in the construction of the well shall be free of contaminants.
- (2) All drilling mud, additives and lubricants shall have either standard ANSI/NSF 60 or 61 certification. Drilling fluid or additives that contain guar gum, or other such biodegradable organic material, shall not be used during the drilling of a well.
- (3) Potable water shall be used for drilling purposes. Surface water shall not be used for drilling purposes. If necessary, the potable water shall be treated for drilling purposes in accordance with the drilling mud manufacturer recommendations.
- (4) Well casing, other than in a point well or radial collector well, shall meet the following:
  - (a) Nominal pipe size of permanent casing shall be a minimum of five inches and sized to allow the well to produce water that is adequate for the intended use, and to allow for the installation and maintenance of the well and related pumping equipment.
  - (b) Steel pipe or tubing used as permanent well casing or liners shall conform to the following:
    - (i) Be new pipe or tubing that has a minimum wall thickness in accordance with the following table:

Steel Well Casing

Nominal Pipe Size (inch)	Minimum Wall Thickness (inch)
< 8	0.280
8	0.322
10	0.365
12	0.375
14	0.375
16	0.375

Steel Well Casing

18	0.375
20	0.375
> 20	0.500

- (ii) Be manufactured in compliance with one of the following standards or specifications:
  - (a) ASTM A53/A53M-01, "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless" (2001).
  - (b) ASTM A589-96, "Standard Specification for Seamless and Welded Carbon Steel Water-Well Pipe" (1996).
  - (c) ASTM A106-99e1, "Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service" (1999), excluding pipe marked with "NH", which is pipe with neither a hydrostatic test nor a nondestructive electric test.
  - (d) API 5L, "Specification for Line Pipe, forty-second edition, effective date July 1, 2000, Product Number G05L42, Document Number API SPEC 5L."
  - (e) ASTM A500-01a, "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes" (2001), except this tubing shall not be used in a public water system well.
- (iii) Have standard ANSI/NSF 61 certification for use in a public water system well.
- (iv) Be greater than minimum wall thickness and weight when required either to withstand the stresses of installation, grouting and operation, or corrosion.
- (v) Be equipped with a drive shoe when driven.
- (vi) Be legibly marked on each length, by the manufacturer, with all of the following information:
  - (a) Name of the manufacturer.
  - (b) Kind of pipe (continuous welded, electric resistance welded or seamless).
  - (c) Weight or schedule.
  - (d) Nominal or outside diameter.
  - (e) Specification number.

- (f) Heat or lot number.
    - (g) A certification mark that verifies compliance with standard ANSI/NSF 61 certification.
  - (vii) Be structurally sound, watertight throughout its length, and shall have threaded and coupled or welded joints that meet the following:
    - (a) Well couplings shall have a design, taper, and type of thread that is consistent with the thread of the pipe. No more than three threads shall be exposed on fourteen thread pipe and no more than two threads shall be exposed on eight thread pipe. Threaded pipe and couplings shall meet one of these standards: ASTM A53/A53M-01, ASTM A589-96, or "API RP 5B1, Gauging and Inspection of Casing, Tubing, and Line Pipe Threads," fifth edition, August 1999, Product Number G05B15, Document Number API RP 5B1.
    - (b) Welded joints shall form a structurally sound and watertight joint. Welded joints may include butt-welds, band rings, flared joints or welding collars. Butt-welds shall be made using a guide. Steel pipe that is equal to or less than eight inches in diameter shall have a minimum of two weld passes. Steel pipe that is greater than eight inches in diameter shall have a minimum of three weld passes. Acceptable welding procedures are as follows:
      - (i) Plain end well casing pipe that is eight inches nominal pipe size or less, and with wall thickness up to 0.5 inch shall be in accordance with specifications in the "American Welding Society" manual, "AWS D10.12M/D10.12:2000, Guide for Welding Mild Steel Pipe."
      - (ii) Be in accordance with specifications in standard "AWWA C206-97, Field Welding of Steel Water Pipe", December 1, 1997, catalog number 43206.
- (c) Thermoplastic pipe that is used as permanent well casing, liners, well screen risers, blanks or tail pipes shall meet the following:
  - (i) Be new pipe that is manufactured in compliance with the standards of ASTM F480-00, "Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80" (2000), and ANSI/NSF 14, "Plastics Piping System Components and Related Materials", January 14, 2002, document number NSF/ANSI 14-2002. (See the appendix to this rule for the diameter and wall thickness of thermoplastic well casing for standard ASTM F480.)
  - (ii) Be standard dimension ratio (SDR) 21 or thicker pipe wall, for casings with diameters of five to eight inches.

- (iii) Be SDR 17 or thicker pipe wall, for casings that are either larger than eight inches in diameter or installed at two hundred feet or greater below ground surface.
- (iv) Be SDR 13.5 or thicker pipe wall, for casings that are installed at five hundred feet or greater below ground surface.
- (v) Have greater than minimum wall thickness and weight when required either to withstand stresses of installation, or grouting, or operation, or because of collapse considerations.
- (vi) Be legibly marked, by the manufacturer, with the following information:
  - (a) Nominal pipe size.
  - (b) Standard dimension ratio or schedule.
  - (c) Type of plastic.
  - (d) Words "well casing".
  - (e) Impact classification (IC).
  - (f) Specification number.
  - (g) Manufacturer's name or trademark.
  - (h) Lot number and date of manufacture.
  - (i) A certification mark that verifies compliance with standard.
- (vii) Be structurally sound and watertight throughout its length with casing joints or couplings meeting the following:
  - (a) Thermoplastic casing joints and couplings shall meet standards ASTM F480-00 and ANSI/NSF 14.
  - (b) Thermoplastic spline lock joints may be installed and need not meet standards ASTM F480-00 or ANSI/NSF 14. For purpose of this rule, a spline lock joint is a nonmetallic, watertight coupling designed for thermoplastic pipe which incorporates the use of a bell or coupling with machined grooves on the interior of the bell or coupling, and is joined by inserting thermoplastic pipe with an elastomeric sealing gasket which seats into the machined grooves, and is locked in place by insertion of a high-strength flexible thermoplastic spline to provide full three hundred sixty degree restraint with evenly distributed loading on the joint.
  - (c) Thermoplastic couplings shall be legibly marked as applicable with the nominal well casing pipe coupling size, type of plastic, designation of compliance with standards ASTM F480-00 and ANSI/NSF 14, and the

manufacturer's name or trademark.

- (viii) Not be installed where potential or known contaminants may degrade or permeate plastic.
  - (ix) Not be driven.
- (5) Defective, visibly damaged or reject pipe shall not be used as casing or liner pipe for wells.
  - (6) Casing shall extend continuously, at a minimum, either to the top of the aquifer or to the top of the non-water bearing consolidated formations above an aquifer.
  - (7) Casing and borehole shall be sufficiently straight and vertical to allow for normal installation and operation of the pump and uniform placement of grout.
  - (8) A pitless adapter or pitless unit may be installed when piping from the casing is below ground surface. The pitless adapter or pitless unit and installation procedures in above and below ground surface installations shall adequately prevent the entrance of surface water, dirt, animals, insects or other foreign matter.
  - (9) A pitless adapter or pitless unit connection to a well casing that is made either below ground surface or less than twelve inches above ground surface shall be installed through the following methods:
    - (a) The pitless adapter or pitless unit shall be connected by welding or threading as required by the type of unit and the manufacturer. A pitless adapter may be attached by clamping. Any hole penetrating the side of the casing for access by the pitless adapter or pitless unit shall be of the size and dimension as required by the manufacturer, and shall be made using a hole saw or other tool capable of making a clean and uniform hole to allow proper sealing. A cutting torch shall not be used to install a pitless adapter except for a non-circular hole in the casing where the manufacturer's recommended guide is used and all edges and the exterior casing surface are ground or filed to a smooth and uniform surface.
    - (b) The inside diameter of the pitless unit shall not be smaller than the inside diameter of the casing. No part of a pitless adapter or pitless unit shall extend into the inside diameter of a well casing so that setting or removal of the pump, pump piping or drop pipe, or the use of tools for well rehabilitation or disinfection is impeded.
    - (c) Upon installation of the pitless adapter or pitless unit below ground surface, the annular space that is required in accordance to paragraph (A)(17) of this rule surrounding the casing and pitless adapter or pitless unit shall be filled with either re-compacted clean cohesive native soil or grout.
    - (d) A pitless unit may be attached using a structural or mechanical joint that shall do the following:
      - (i) Provide for the well casing to extend at least 2.5 inches into the throat of the



pitless unit.

- (ii) Be composed of a cast steel unit with the collar held in place with a minimum of four corrosion-resistant bolts, nuts and washers spaced uniformly around the circumference of the coupling.
  - (iii) Have a collar with the same or better strength and rigidity as the well casing.
  - (iv) Use a ramped compression gasket seal that fits between the upper and lower portions of the coupling to ensure a watertight seal.
  - (v) Ensure that the coupling is centered over the joint.
  - (vi) Conform to ANSI/AWWA C219-11, "Bolted, Sleeve-Type Couplings for Straight-End Pipe" January 23, 2011, catalog number 43219.
- (e) Pitless adapter or pitless unit connections to thermoplastic pipe shall meet the following:
- (i) Where a pitless adapter is installed by clamping on thermoplastic casing, a backing plate, wide steel strap or casting shall be installed to protect the integrity of the thermoplastic casing at the point of the pitless adapter connection.
  - (ii) Steel well casing pipe extension, pitless unit and pitless adapter shall not be welded after they are attached to thermoplastic well casing. Thermoplastic coupling shall be threaded onto the pitless unit before it is solvent cemented to the top of the casing.
  - (iii) Threaded connections shall only be installed on a pitless unit or pitless adapters after attachment to the well casing pipe.
- (f) When steel well casing pipe is not terminated at the desired depth for the installation of a pitless unit, the well casing pipe shall be cut off at the desired height, and the pitless unit may be welded or threaded and coupled to the top of the well casing pipe by one of the following methods:
- (i) Cutting of the well casing pipe squarely, providing a bevel for the top of the well casing pipe and welding the beveled end of the unit to the beveled end of the well casing pipe.
  - (ii) Welding a pipe nipple, having threads at one end and beveled on the other end, to the cut off top beveled end of the well casing pipe and threading a full length standard recessed coupling watertight to the threaded end of the unit and to the nipple. The top of the well casing pipe and the bottom of the pipe nipple to be welded shall both have beveled ends. If the pitless unit has female threads, the unit may be threaded watertight to the threaded end of the pipe nipple.
  - (iii) Reaming out the threads of a full standard recessed coupling at least

one-third the length of the coupling, and welding the coupling to the top of the cut off well casing pipe.

- (10) A connection to a well casing that is made above ground shall be installed through the following methods:
  - (a) Threaded connection.
  - (b) Welded connection.
  - (c) Bolted flanges with rubber gaskets at twelve inches or greater above ground surface.
  - (d) Extension of the casing at least 0.5 inch into the base of a pump mounted on and sealed to a concrete pedestal.
- (11) Well casing height above finished grade shall be at least twelve inches, and at least twelve inches above the well house floor or concrete apron surface, per the following:
  - (a) Where a well house is constructed, the floor surface shall be at least six inches above the finished grade.
  - (b) The finished grade shall be sloped for surface water runoff away from the well.
- (12) A well shall have a well cap or seal to prevent the entrance of water, dirt, animals, insects or other foreign matter. The top of the casing at its finished height shall be cut so that the surface will fit flush with the well cap and provide a tight seal. The well cap or seal shall fit securely to the top of the well casing, be secured with screws or other appropriate connections, and vent to the atmosphere. A point well that is not a public water system well may have a watertight well cap that does not vent to the atmosphere. Electrical conduit connections on the well cap or seal shall be threaded and sealed to prevent the entrance of insects and water.
- (13) A room housing pumping equipment, well house or pumphouse, shall conform to the following:
  - (a) Allow access for maintenance, alteration, removal and repair of the public water system components.
  - (b) Be constructed above ground surface.
- (14) Pump construction, installation, design and maintenance shall comply with the following:
  - (a) A pump shall be constructed so that there are no unprotected openings into the interior of the pump or well casing.
  - (b) If an above ground pump or line shaft pump are used, it shall be attached to the casing, or suction or discharge line by a watertight connection, or shall have a base plate that conforms to paragraph (A)(10) of this rule.

- (c) A submersible pump motor shall not have a mercury seal.
  - (d) Below ground water service pipe shall be maintained under system pressure at all times. A check valve shall not be installed between a pitless adapter or pitless unit and the pressure tank.
  - (e) To prevent contaminants from entering the well, a temporary watertight well cap or seal shall be provided until the pumping equipment is installed.
- (15) A vent shall be provided on all well caps and seals except for those used on deep well single pipe packer jet installations, or flowing wells where the flow rate is greater than the pumping rate of the permanent pump. A well vent shall be self-draining, screened with a noncorroding mesh screen of fifteen to thirty mesh, pointed downward at or above the top of the casing or pitless unit. A vent shall terminate not less than twelve inches above ground surface, and at least twelve inches above the well house floor or concrete apron surface. The well vent shall extend a minimum of three feet above the one hundred year floodplain elevation, or highest known flood elevation, whichever is higher.
- (16) Maintenance, modification and alteration of a well shall comply with the following:
- (a) Casing and top of well shall be protected against contamination or inadvertent damage.
  - (b) A well shall be altered, modified or repaired in accordance with this chapter, or a well shall be sealed in accordance with rule 3745-9-10 of the Administrative Code, if one or more of the following situations exist:
    - (i) The pump or any part of a well malfunctions or is defective.
    - (ii) The top of the casing is buried below ground surface.
    - (iii) Potential or actual risk of contamination of ground water exists due to casing deterioration or the condition of the well.
- (17) If the casing is not driven and the drilling method requires the drilling of an oversized borehole, the annular space shall be a minimum of 1.5 inches for a well less than or equal to fourteen inches in diameter, and a minimum of two inches for a well greater than fourteen inches in diameter.
- (18) A casing may be extended to meet the requirements in paragraph (A)(11) of this rule using a structural or mechanical joint that shall do all of the following:
- (a) Provide for the well casing to extend at least 2.5 inches into the throat of the coupling.
  - (b) Be composed of a cast steel unit with the collar held in place with a minimum of four corrosion-resistant bolts, nuts and washers spaced uniformly around the circumference of the coupling.

- (c) Have a collar with the same or better strength and rigidity as the well casing.
  - (d) Ensure that the coupling is centered over the joint.
  - (e) Conform to ANSI/AWWA C219-11, "Bolted, Sleeve-Type Couplings for Plain-End Pipe" January 23, 2011, catalog number 43219.
- (19) Shall be constructed in accordance with the requirements in rule 3745-9-06 of the Administrative Code.
- (B) Public water system wells. In addition to the requirements of paragraph (A) of this rule, the material used in the drilling process or the construction of a public water system well shall meet the following:
- (1) Unless otherwise noted in this chapter, all chemicals, substances, and materials added to or brought in contact with water in a public water system well shall have either standard ANSI/NSF 60 or 61 certification in accordance with rule 3745-83-01 of the Administrative Code.
  - (2) Tubing per ASTM A500-01a shall not be used in a public water system well.
  - (3) Well casings shall extend at least twenty-five feet below ground surface. If nonpotable water is encountered, one of the following must be completed:
    - (a) Above an aquifer containing potable water, the casing shall extend to the bottom of the aquifer containing the nonpotable water and shall be grouted as deep as necessary to prevent the nonpotable water from entering the aquifer containing potable water.
    - (b) Below an aquifer containing potable water, the lower portion of the well shall be filled with cement grout or bentonite grout, to a height sufficient to prevent entrance of nonpotable water into the aquifer containing potable water.
  - (4) For a public water system well with vertical turbine or line shaft pumps, the well shall be tested for plumbness and alignment in accordance with appendix D of standard "AWWA A100-97, Water Wells", February 1, 1998, catalog number 41100, or alternative procedures acceptable to the director.
  - (5) The maximum allowable horizontal deviation from vertical shall not exceed two thirds of the smallest inside diameter of that part of the well being tested per one hundred feet of depth.
  - (6) Well screens shall be installed in a public water system well in unconsolidated or incompetent geologic formations per the following:
    - (a) Screen shall be constructed of steel, stainless steel, thermoplastic or lead free brass. A lead free brass screen shall have a dielectric connection to the casing to reduce corrosion.
    - (b) Thermoplastic screens shall have standard ANSI/NSF 61 certification.

- (c) Lead free brass screens shall meet a director approved standard, including but not limited to ANSI/NSF 61 certification.
  - (d) For a well with a design pumping rate greater than three hundred fifty gallons per minute, the screen shall have size of openings determined upon sieve analysis of the aquifer formation or filter pack in accordance with standard AWWA A100-97, "Water Wells", and the screen shall have uniform openings and a maximum entrance velocity of 0.1 feet per second.
  - (e) The screen shall provide sufficient column and collapse strength to withstand installation and borehole pressures.
  - (f) Screen joints between screen sections and blank casing shall be welded, or threaded and coupled.
  - (g) Screen installation using telescoping methods shall be attached either directly to the bottom of the casing or to a packer.
  - (h) Screens shall be installed that minimize corrosion caused by contact with dissimilar steel casing. Thermoplastic screen may be attached to steel casing with the use of an appropriate coupler.
  - (i) Screen shall be provided with a bottom plate or washdown bottom fitting of the same material as the screen. Neither lead shot nor lead wool shall be installed to seal the screen bottom.
  - (j) Where filter pack or formation stabilizer is installed, the screen shall have centralizers outside the top and bottom of the screen to ensure an even filter pack.
- (7) Filter pack or formation stabilizer for a public water system well shall consist of well-rounded particles that conform to the following:
- (a) Ninety-five per cent siliceous in composition.
  - (b) Smooth, uniform and free of foreign matter.
  - (c) Properly sized, washed and disinfected prior to installation in the well.
- (8) Filter pack shall be installed in a well where the formation is nonhomogeneous, the uniformity coefficient of the aquifer formation is less than 3.0, and the effective grain size is less than 0.01 inches. Filter pack or formation stabilizer installed in unconsolidated or incompetent formations shall be placed in accordance with the following specifications:
- (a) Filter pack or formation stabilizer shall extend a minimum of two feet above the screen for a well less than or equal to six inches in diameter, or a minimum of four feet above the screen for a well greater than six inches in diameter. Filter pack or formation stabilizer shall be at least twenty-five feet below ground surface.

- (b) Filter pack or formation stabilizer shall be no less than three inches thick and no more than eight inches thick, to facilitate proper well development.
  - (c) Filter pack effective grain size shall be determined by a sieve analysis of the aquifer formation. The seventy per cent retained size of the filter pack shall be four to six times greater than seventy per cent retained size of the aquifer formation. The uniformity coefficient of the filter pack shall not exceed 2.5.
  - (d) If installed, filter pack refill pipes shall be standard weight steel or plastic pipe incorporated within the pump foundation and terminate with screwed or welded caps at least twelve inches above the pumphouse floor or concrete apron. Filter pack refill pipes shall pass through the grouted annular space where they shall be surrounded by a minimum of 1.5 inches of grout.
- (9) Packers and shale traps shall be constructed of materials that have standard ANSI/NSF 61 certification. Lead packers shall not be used.
- (10) The pitless adapter or pitless unit shall meet the following:
- (a) Be lead free.
  - (b) Conform with "Water System Council Pitless Adapter Standard PAS-97, Performance Standards and Recommended Installation Procedures for Sanitary Water Well Pitless Adapters, Pitless Units, and Well Caps," (2012) or with an alternative standard acceptable to the director.
  - (c) If welded, have connections to steel well casing made watertight in accordance with welding procedures in the "American Welding Society Structural Welding Code, AWS D1.1/D1.M:2002" (2002).
- (11) The well cap shall conform with "Water System Council Pitless Adapter Standard PAS-97" or with an alternative standard acceptable to the director.
- (12) A well located in a floodplain shall comply with the following:
- (a) The casing, well cap, well vent and pumphouse floor shall extend a minimum of three feet above the one hundred year floodplain elevation or highest known flood elevation, whichever is higher. With prior acceptance of the director, in lieu of extending the casing a minimum of three feet above the one hundred year floodplain, a noncommunity public water system well may have both a watertight well cap and a well vent extending a minimum of three feet above the one hundred year floodplain elevation or highest known flood elevation, whichever is higher.
  - (b) The one hundred year flood elevation shall be determined by reference to the FEMA flood map for the well location. The director may require the wellhead and floodplain elevations to be determined by a professional surveyor or professional engineer. For purposes of this rule, professional surveyor and professional engineer shall have the same meanings as defined in section

## 4733.01 of the Revised Code.

(C) Radial collector wells. A radial collector well shall comply with the following:

- (1) The caisson shall be constructed of watertight reinforced portland cement concrete with watertight joints.
- (2) The caisson wall shall be reinforced to withstand the forces to which it will be subjected.
- (3) Lateral collectors shall be in areas and at depths accepted by the director. The area around the laterals shall be under the control of the public water system for a distance of three hundred feet beyond the laterals.
- (4) Provisions shall be made to assure that collectors are essentially horizontal.
- (5) The top of the caisson shall be covered with a watertight floor.
- (6) All openings in the floor shall be curbed and protected from entrance of foreign material.
- (7) The pump discharge piping shall not be placed through caisson walls.

[Comment: "Standard ANSI/NSF 60, Drinking Water Treatment Chemicals - Health Effects", December 11, 2009, Document Number NSF/ANSI 60-2009a; and "Standard ANSI/NSF 61, Drinking Water System Components - Health Effects", February 15, 2010, Document Number NSF/ANSI 61-2010; and, "Standard ANSI/NSF 14, Plastics Piping System Components and Related Materials", January 14, 2002, Document Number NSF/ANSI 14-2002. This rule incorporates these standards or specifications by reference. A copy may be obtained from "NSF International, 789 N. Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48105," (734) 769-8010, [www.nsf.org](http://www.nsf.org). The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Standard API 5L, Specification for Line Pipe", forty-second edition, effective date July 1, 2000, Product Number G05L42, Document Number API SPEC 5L; and "Standard API RP 5B1, Gauging and Inspection of Casing, Tubing, and Line Pipe Threads", fifth edition, August 1999, Product Number G05B15, Document Number API RP 5B1. This rule incorporates these standards or specifications by reference. A copy may be obtained from "API, 1220 L Street NW, Washington, DC 20005-4070," (202) 682-8000, [www.api.org](http://www.api.org). The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Standard ASTM A53/A53M-01, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless", and "ASTM A589-96, Standard Specification for Seamless and Welded Carbon Steel Water-Well Pipe"; and "ASTM A106-99e1, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service"; and "ASTM F480-00, Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios

(SDR), SCH 40 And SCH 80"; and "ASTM A500-01a, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes". This rule incorporates these standards or specifications by reference. A copy may be obtained from "ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959," (610) 832-9585, [www.astm.org](http://www.astm.org). The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "AWS D10.12M/D10.12:2000, Guide for Welding Mild Steel Pipe;" and "AWS D1.1/D1.M:2002, American Welding Society Structural Welding Code Steel." This rule incorporates these standards or specifications by reference. A copy may be obtained from "American Welding Society, 8669 Northwest 36 Street, #130, Miami, FL, 33166-6672," (305) 443-9353, [www.aws.org](http://www.aws.org). The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "ANSI/AWWA C219-11, Bolted, Sleeve-Type Couplings for Plain-End Pipe" January 23, 2011, catalog number 43219. This rule incorporates these standards or specifications by reference. A copy may be obtained from "AWWA Bookstore, 6666 W. Quincy Avenue, Denver, CO, 80235," (303) 794-7711, [www.awwa.org](http://www.awwa.org). The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Standard AWWA C206-97, Field Welding of Steel Water Pipe", effective date December 1, 1997, catalog number 43206; and "AWWA A100-97, Water Wells", effective date February 1, 1998, catalog number 41100. This rule incorporates these standards or specifications by reference. A copy may be obtained from "AWWA Bookstore, 6666 W. Quincy Avenue, Denver, CO, 80235," (303) 794-7711, [www.awwa.org](http://www.awwa.org). The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "The Water System Council Pitless Adapter Standard PAS-97, Performance Standards and Recommended Installation Procedures for Sanitary Water Well Pitless Adapters, Pitless Units, and Well Caps". This rule incorporates this standard or specification by reference. A copy may be obtained from "Water Systems Council, 1101 30th Street NW, Suite 500, Washington, DC, 20007," (202) 625-4387, [www.watersystemscouncil.org](http://www.watersystemscouncil.org). This document is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]



Replaces: 3745-9-05

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Table 1: Diameter and Wall Thickness of Thermoplastic  
Well Casing for Standard ASTM F480

Nominal Pipe Size (inch)	Outside Diameter (inch)	Wall Thickness SDR 21 (inch)	Wall Thickness SDR 17 (inch)	Wall Thickness SDR 13.5 (inch)	Wall Thickness SCH 80 (inch)
5	5.563	0.265	0.327	0.412	0.375
6	6.625	0.316	0.390	0.491	0.432
8	8.625	0.410	0.508	--	0.500
10	10.750	--	0.632	--	--
12	12.750	--	0.750	--	--
14	14.000	--	--	--	0.750
16	16.000	--	--	--	0.843

Where schedule 80 pipe is used, the wall thickness shall be at least as thick as required in accordance with paragraph (A)(4)(c) of this rule.

3745-9-06      **Well construction, specific geologic conditions.**

- (A) In addition to the requirements of rule 3745-9-05 of the Administrative Code, a well completed in specific geologic conditions shall be constructed according to the following procedures:
- (1) Where consolidated formations are encountered within twenty-five feet of the ground surface, an oversized borehole shall be drilled and the annular space shall be filled with grout by pressure grouting.
  - (2) A well completed where multiple aquifers are present shall have the casing extend through aquifers that are not contributing to the water supply of the well. The annular space contiguous to aquifers that are not contributing to the water supply of the well shall be filled with grout by pressure grouting.
  - (3) A well completed in confined aquifers shall have the casing extend through the confining layer to the top of the aquifer. The annular space contiguous to the confining formation shall be filled with grout by pressure grouting. Filter packs and formation stabilizers shall not extend significantly into a confining formation or allow interconnection of two separate aquifers along the annular space.
  - (4) A well completed in aquifers with hydrostatic heads greater than the land surface elevation shall have casing and grout installed to protect the aquifer, prevent erosion of the overlying geologic materials and confine the flow to within the casing, and shall be constructed according to the following procedures:
    - (a) If the anticipated flow at the ground surface is not excessive, after the borehole is drilled, and the casing set, the water in the casing may be pumped to lower the water level in the casing and the annular space. The annular space shall then be filled with cement grout by pressure grouting. The density of cement grout shall be sufficient to control flow in the annular space, but no less than that required by rule 3745-9-07 of the Administrative Code.
    - (b) If the water flow at the ground surface is anticipated to exceed five gallons per minute, an upper enlarged borehole shall be drilled partially into the confining formation. The upper enlarged borehole shall be at least four inches in diameter larger than the nominal diameter of the outer well casing. The annular space between the upper enlarged borehole and outer well casing shall be filled with cement grout by pressure grouting. The outer casing may be left as permanent casing once the well is completed, or it may be removed. Where outer casing is not removed, the casing shall be withdrawn at least five feet to ensure grout contact with the formation.
    - (i) If the confined aquifer is consolidated, a smaller diameter borehole shall be drilled through the upper enlarged borehole, the inner casing shall be firmly seated into the bedrock, and the remaining annular space shall be filled with cement grout by pressure grouting. The density of cement grout shall be sufficient to control flow in the annular space, but no less than that required by rule 3745-9-07 of the Administrative Code.

- (ii) If the confined aquifer is unconsolidated, a smaller diameter borehole shall be drilled through the upper enlarged borehole, with casing and a screen installed into the confined aquifer. The well shall be double-cased, and the remaining annular space filled with cement grout by pressure grouting. The density of cement grout shall be sufficient to control flow in the annular space, but no less than that required by rule 3745-9-07 of the Administrative Code.
- (5) A well completed in a cavernous formation or mine shall be constructed according to the following:
  - (a) A cavernous formation or mine that is not being used as a source of water shall have casing installed through the formation or mine, as follows:
    - (i) If a cavernous formation or mine is greater than twenty-five feet below ground surface, then the formation or mine shall be filled with cuttings, clean gravel or grout. Packers or shale traps shall be installed at the top and bottom of the formation or mine. The annular space shall then be filled with grout by pressure grouting.
    - (ii) If a cavernous formation or mine is less than twenty-five feet below ground surface, casing shall be installed in an enlarged borehole and the annular space shall be filled with a cement grout containing additives that promote bridging of the cavernous formation or mine by pressure grouting to a depth of at least five feet beyond the formation or mine.
  - (b) If a cavernous formation or mine will be the source of water supply, then a packer or shale trap shall be installed at the top of the formation or mine and the annular space shall be filled by pressure grouting with grout.
- (6) A well encountering brine producing formations shall be constructed according to these procedures. Brine producing formations that are encountered during drilling shall have casing installed throughout the entire formation. The annular space contiguous to the brine producing formation shall be filled with grout by pressure grouting, or the well shall be sealed to an elevation higher than the top of the brine producing formation. Grout that is not adversely affected by the brine water shall be used for sealing the well or annular space.
- (7) Except when a well is completed in the upper-most weathered portion of a consolidated formation, a well completed in a consolidated formation shall have the casing extend into the formation so that the well casing will not settle or shift, and will have a proper annular seal.

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3745-9-07      **Well grouting for construction or sealing.**

(A) One of the following grouts shall be used for sealing a well, test hole, dry hole or annular space:

- (1) Cement grouts that meet standard ASTM C150-00, Standard Specification for Portland Cement, have standard ANSI/NSF 61 certification, and include one of the following types of cement:
  - (a) Type I, general purpose cement.
  - (b) Type II, for use in water with moderate sulfate content between one hundred fifty to fifteen hundred milligrams per liter, and conditions requiring lower heat of hydration.
  - (c) Type III, for use in conditions requiring high early strength.
  - (d) Type IV, for use in conditions requiring low heat of hydration.
  - (e) Type V, for use in ground water with a high sulfate content greater than fifteen hundred milligrams per liter.
- (2) Bentonite grouts that have standard ANSI/NSF 60 certification, and include one of the following:
  - (a) High solids bentonite grout using powdered bentonite clay or granular bentonite.
  - (b) Coarse grade or pelletized bentonite.

Bentonite grout shall not contain bentonite drilling mud or cuttings.

(B) Grout shall be processed and placed in a well, test hole, dry hole or annular space in accordance with the following:

- (1) Cement grout shall be mixed using potable water and cured according to the following specifications:
  - (a) Type I, II, IV and V cement shall be mixed by adding not more than 5.2 gallons of water per ninety-four pounds of cement, with a minimum density of fifteen pounds per gallon.
  - (b) Type III cement shall be mixed by adding 6.3 to seven gallons of water per ninety-four pounds of cement.
  - (c) Concrete with a minimum density of 17.5 pounds per gallon shall be mixed by adding ninety-four pounds of cement, an equal amount of sand, and not more than six gallons of water.
  - (d) Cement with a minimum density of fifteen pounds per gallon that has calcium chloride added as an accelerator to speed up the rate of curing shall be mixed by adding two to four pounds of calcium chloride per ninety-four pounds of cement

and not more than six gallons of water.

- (e) Cement grout shall cure a minimum of twenty-four hours before drilling operations are resumed either when standard type I and type II cement is used or when calcium chloride additive is used. Cement grout shall cure a minimum of twelve hours before drilling operations are resumed when high early type III cement grout is used.
- (2) Bentonite grout shall be mixed according to the manufacturer's recommendations to achieve at least twenty per cent solids. Synthetic organic polymers that have standard ANSI/NSF 60 certification may be added to bentonite grout to suppress hydration of the bentonite particles and shall be mixed according to the manufacturer's recommendations.
- (3) When using coarse grade or pelletized bentonite, the bentonite shall be poured slowly into the top of the well to prevent bridging in the casing or borehole, in accordance with the following procedures:
  - (a) Coarse grade or pelletized bentonite shall be poured over a wire one fourth inch mesh screen to keep the fine bentonite powder from entering the well. Fine bentonite particles that accumulate in the shipping container shall not be used.
  - (b) Coarse grade or pelletized bentonite shall be poured at a continuous rate, no faster than fifty pounds per three minutes.
  - (c) The pouring process shall be halted intermittently in order to lower a weighted measuring tape into the well to determine the top of the grout and confirm that bridging has not occurred. Where possible, a tamping device shall be used to break any bridges that may form.
  - (d) Coarse grade or pelletized bentonite shall be periodically hydrated when poured above the static water level.
- (4) When pressure grouting, the grout shall be placed in a continuous operation without interruption until the cement or bentonite grout of approximately the same density as the grout being placed into the borehole is coming out of the annular space.
- (5) After grout has been placed, the grout shall cure a minimum of twelve hours to assess whether any settling of the grout has occurred. If settling has occurred, then additional grout shall be placed.
- (C) An annular space shall be completely filled with grout from the bottom of the annular space, or from the top of the filter pack or formation stabilizer, upward to the ground surface. (See the appendix to this rule for the volume of annular space between casing and borehole.) The annular space shall be completely filled in accordance with the following:
  - (1) If a pitless adapter or pitless unit will be installed and if well construction is not completed when casing is set, compacted clean clay may be temporarily used from

the expected point of attachment to the ground surface.

- (2) Except as otherwise provided in this rule, and rule 3745-9-06 of the Administrative Code, the annular space shall be filled with cement grout or bentonite grout, which shall be placed in the annular space of a well by pressure grouting.
- (3) An annular space between a permanent casing and a temporary casing shall be filled with grout during temporary casing removal. Where temporary casing removal is not possible or practical, temporary casing shall be withdrawn at least five feet to ensure grout contact with the formation.
- (4) Cement grout may be placed into the annular space of a well using the conductor pipe-gravity method where the annular space is greater than or equal to two inches, no greater than fifty feet below ground surface, and where a minimal amount of water is in the borehole. The conductor pipe shall be lowered to the bottom of the annular space and the grout placed from the bottom up with the conductor pipe submerged at all times.
- (5) Coarse grade or pelletized bentonite may be poured into the annular space where the annular space is greater than or equal to two inches, no greater than fifty feet below ground surface, and where a minimal amount of water is in the borehole. Coarse grade bentonite may be poured into the annular space between a permanent casing and temporary casing during temporary casing removal.
- (6) The dry driven grouting method may be used. Well construction using a cable tool, driven casing hammer or any other method where the permanent casing is driven, and where temporary outer casing or an oversized borehole is not used, a collar, flared joint or well bead shall extend beyond the outside diameter of the permanent casing and dry granular bentonite shall be poured around the permanent casing as it is being driven. The well site shall be where thick deposits of low permeable clayey glacial till or other low permeable materials overlie the aquifer and where the well site is not located in an area of microbiological or chemical contamination. The dry driven grouting method may be used for a public water system well only with prior acceptance by the director.

[Comment: "Standard ASTM C150-00, Standard Specification for Portland Cement." This rule incorporates this standard or specification by reference. A copy may be obtained from "ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959," (610) 832-9500, [www.astm.org](http://www.astm.org). The standard is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Standard ANSI/NSF 60, Drinking Water Treatment Chemicals - Health Effects," December 11, 2009, Document Number NSF/ANSI 60-2009a; and "Standard ANSI/NSF 61, Drinking Water System Components - Health Effects," February 15, 2010, Document Number NSF/ANSI 61-2010. This rule incorporates these standards or specifications by reference. A copy may be obtained from "NSF International, 789 N. Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48105,"



(734) 769-8010, [www.nsf.org](http://www.nsf.org). These standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

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Table 1: Volume of Annular Space Between Casing and Borehole

Nominal Pipe Size (inch)	Borehole Size (inch)	Volume per Foot of Well Depth (cubic feet)	Volume per Foot of Well Depth (gallon)
5 (5.563 OD)	8	0.18	1.38
5	9	0.28	2.07
6 (6.625 OD)	9	0.20	1.51
6	10	0.31	2.29
8 (8.625 OD)	11	0.25	1.90
8	12	0.38	2.84
10 (10.75 OD)	13	0.29	2.18
10	14	0.44	3.28
12 (12.75 OD)	16	0.51	3.81
14 (14.0 OD)	18	0.70	5.22
16 (16.0 OD)	20	0.79	5.87

This calculation does not include the volume occupied by couplings.

3745-9-08      **Well disinfection.**

- (A) A public water system well shall be disinfected after completion of construction, installation, development, alteration or repair, and before supplying water for human consumption.
- (B) The standard "AWWA C654-13, Disinfection of Wells," shall be used as a guide except for the topics presented in sections 4.2, 4.5 and 5, that are otherwise specified in paragraphs (C), (D) and (E) of this rule.
- (C) The following disinfection procedures shall apply:
  - (1) Disinfectant shall be slowly poured into the well by wetting the inside casing circumference, drop pipe and electrical cable.
  - (2) Disinfectant concentration in the water column shall be initially at least one hundred milligrams per liter chlorine. A public water system may use an alternative disinfectant concentration following consultation with the office staff of the district in which the public water system is located, provided the disinfection procedure will ensure complete disinfection and includes the following:
    - (a) A mechanical cleaning of the well casing and screen to remove loose debris, sediment, mineral encrustation and bacterial slime before disinfection.
    - (b) Monitoring of the pH and chlorine residual.
    - (c) Maintaining at least fifty milligrams per liter free chlorine residual throughout the water column.
  - (3) Water in the well shall be agitated or surged to ensure even dispersal of the disinfectant throughout the entire water column.
  - (4) Disinfectant contact time shall be at least eight hours.
  - (5) Disinfectant shall be thoroughly flushed or dissipated from the well before supplying water for human consumption.
  - (6) When calcium hypochlorite is used for disinfection, the tablets or granules shall be completely dissolved in water prior to placement into the well. Sodium hypochlorite solution shall be used within the manufacturer's posted expiration date. Sodium hypochlorite solution with fragrance additives shall not be used for disinfection.
  - (7) A buffering chemical that has standard ANSI/NSF 60 certification may be used to enhance disinfection efficacy. The director may require submission of chemical disinfection procedures with specifications for the method, equipment, chemicals and testing for residual chemicals.
  - (8) Disinfectant shall have ANSI/NSF 60 certification.
- (D) After disinfection, a well shall be flushed for a minimum of fifteen minutes and total

chlorine undetectable before sampling for total coliform. The well may be placed into service when two consecutive samples collected from the well at least thirty minutes apart are total coliform-negative. Microbiological and total chlorine samples shall be analyzed in accordance with Chapter 3745-89 and rule 3745-81-27 of the Administrative Code.

(E) If a sample is reported positive for total coliform, a system shall do one of the following:

(1) Continue to flush the well and collect total coliform samples to achieve compliance with paragraph (D) of this rule.

(2) Repeat the well chlorination procedures as described in paragraph (C) of this rule if necessary to achieve compliance with paragraph (D) of this rule.

(F) A system with a well unable to meet paragraph (D) of this rule after the second chlorination must consult with the director for corrective action, which may include compliance with paragraph (B) of rule 3745-81-42 of the Administrative Code.

[Comment: "Standard ANSI/NSF 60, Drinking Water Treatment Chemicals - Health Effects, December 11, 2009, Document Number NSF/ANSI 60-2009a." This rule incorporates this standard or specification by reference. A copy may be obtained from "NSF International, 789 N. Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48105," (734) 769-8010, [www.nsf.org](http://www.nsf.org). This standard is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Standard AWWA C654-13, Disinfection of Wells," effective date July 1, 2013. This rule incorporates this standard or specification by reference. A copy may be obtained from "AWWA Bookstore, 6666 W. Quincy Avenue, Denver, CO, 80235," (303) 794-7711, [www.awwa.org](http://www.awwa.org). This standard is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215."]

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3745-9-09      **Well development and pumping test.**

- (A) A public water system well shall be developed upon completion to remove the native silts and clays, drilling mud or finer fraction of the filter pack until turbidity or sand content in the well is minimal.
  - (1) Mechanical development shall be performed so as not to cause damage to the components of the well. Mechanical development techniques include: mechanical surging; air surging or air lifting; overpumping and backwashing; high velocity jetting; bailing; and hydrofracturing.
  - (2) With prior consultation with the district office, chemical development procedures may be used in conjunction with mechanical procedures. Chemical development techniques include use of an acid or dispersant that has standard ANSI/NSF 60 certification. The director may require submission of chemical development procedures with specifications for the method, equipment, chemicals, and testing for residual chemicals.
    - (a) Dispersants that contain phosphorous compounds shall not be used during the development of a well.
    - (b) Dispersant may be used to disaggregate clay particles to enhance removal. Dispersant shall be immediately flushed from the well and aquifer to prevent bacterial growth in the aquifer.
    - (c) Dispersant shall be premixed and used according to the manufacturer's recommendations.
    - (d) Acid shall be used according to the manufacturer's recommendations. Proper pH shall be maintained in the borehole to ensure the effective action of the acid.
- (B) A pumping test shall be conducted upon completion of development of the public water system well and conform to the following:
  - (1) Be used to estimate the specific capacity of the well at the anticipated permanent design pumping rate.
  - (2) Be used to demonstrate that the well can supply water at the anticipated permanent design pumping rate while at a minimum maintaining the operational capacity of the well field and without degrading the water quality of any well in the well field.
  - (3) The determination of a permanent design pumping rate for a new public water system well shall include analysis of the effects of interference drawdown from other wells owned by the public water system as well as other high capacity wells not owned by the public water system. Operational practices and the potential to cause degradation of water quality at the well field should also be considered when establishing a permanent design pumping rate for a new public water system well.
  - (4) The pumping test classification is determined from the estimated average daily water demand of the well and type of water system, as illustrated in the following table.

Estimated average daily water demand may be determined by the director from the design pumping rate of the well. With prior consultation, the director may accept an alternative constant rate pumping test that is conducted under the supervision of a qualified ground water professional or person with demonstrated competency in performing pumping or aquifer tests.

Pumping Test Classification	Estimated Average Daily Demand of the Well (gallons per day)
Low use	0 to 10000
Medium use	10001 to 100000
High use	greater than 100000

Acceptable pumping tests for low, medium and high use classifications are as follows:

- (a) For low or medium use wells, the pumping test shall be conducted at a constant rate for a period of at least normal operation either at the peak hourly demand, or at least 1.5 times the anticipated permanent design pumping rate if the well cannot sustain peak hourly flow. For a community water system well, the duration of the constant rate pumping test shall be no less than twenty-four hours.
- (b) For all high use wells, a step-drawdown test shall be conducted, followed by a constant rate pumping test.
  - (i) The step-drawdown test shall be used to obtain sufficient hydrogeologic information to design an appropriate constant rate pumping test for the well. The step-drawdown test shall, at a minimum conform to the following:
    - (a) Consist of three or more steps of progressively increasing pumping rates.
    - (b) Each step shall be of approximately equal duration.
    - (c) Each step shall be run at a constant pumping rate for no less than forty-five minutes.
  - (ii) The constant rate pumping test shall be conducted for at least twenty-four hours at a pumping rate of at least 1.5 times the anticipated permanent design pumping rate. The constant rate pumping test shall not commence until the water level has recovered to at least ninety per cent of the drawdown caused by the step-drawdown test or twenty-four hours after the completion of the step-drawdown test, whichever comes first.
- (c) The public water system shall consult with the Ohio environmental protection agency to determine if the constant rate pumping test will need to extend beyond twenty-four hours if any of the following conditions exist at the time a new well site is proposed or can be expected to result from the well's operation:



- (i) Pumping at the new well may cause interference with existing wells.
- (ii) Prolonged pumping at the new well may cause changes in water quality.
- (iii) The well will have special design criteria such as a radial collector well.
- (iv) Information about the aquifer's response to pumping is needed for ground water modeling.

[Comment: If any of these conditions exist, the public water system should consult with a qualified ground water professional to design and implement a pumping test or tests which will address the noted condition.]

- (d) For low, medium or high use wells, the constant rate pumping test may be conducted at a lower pumping rate if there is concern that pumping the well at 1.5 times the anticipated permanent pump design rate will be overly excessive, will not be possible, or will have adverse effects on the long-term performance of the well or aquifer. The test may be conducted at a lower pumping rate if the following criteria are met:

- (i) The constant rate pumping test is conducted at no less than 1.2 times the pump design rate.
- (ii) A demonstration is provided that supports the reasoning for a lower pumping rate that even under adverse conditions, including but not limited to severe drought, the well will likely be able to supply water at the anticipated permanent design pumping rate over the anticipated functional life of the well.

[Comment: If the permanent pump design rate will not be known until after the constant rate test, then the maximum permanent pump design rate will be based on back-calculation of the pumping rate used for the constant rate test. For example, if the constant rate test is performed at three hundred gallons per minute, the maximum permanent pump design rate will then be two hundred gallons per minute if the 1.5 times factor is used or two hundred and fifty gallons per minute if the 1.2 times factor is used.]

- (5) The pumping test shall include the following:

- (a) The flow rate shall be measured using an orifice weir with manometer, or equivalent method acceptable to the director.
- (b) During a step-drawdown or constant rate pumping test, water level measurements shall be taken from the well starting with the static water level and continuing during drawdown to the nearest 0.1 foot, as measured from an identified datum.
  - (i) Water level measurements shall be at the following time intervals:

Time After Test Started (minutes)	Time Interval Between Measurements (minutes)
0 - 15	1
16 - 60	5
61 - 120	10
121 - 180	20
181 - 300	30
Greater than 300	60

- (ii) Recovery water level measurements shall be taken immediately after termination of the constant rate pumping test at time intervals of five minutes for the first hour and every thirty minutes thereafter until the water level has recovered to at least ninety per cent of the drawdown caused by the pumping test, twenty-four hours after the completion of the pumping test, or recovery is interrupted by pumping of another well, whichever occurs first.
  - (iii) For high use wells, all pumping tests shall include water level measurements from observation or surrounding wells. An observation well shall be selected or sited such that the water level measurements obtained before, during and after the pumping test will, upon analysis, provide information about the aquifer's response to pumping. The selection or siting process shall consider the distance between the observation well and the pumping well, the type of aquifer from which water is being withdrawn, the hydraulic gradient and other aquifer characteristics.
- (6) The well owner shall submit a report of the pumping tests with their results, interpretations and conclusions.
- (a) The pumping test report shall include the following:
    - (i) The date and times of starting through ending the pumping test.
    - (ii) A data table for each well used to observe the drawdown and recovery water level measurements, as required by paragraph (B)(5)(b) of this rule, showing the time after the pump test started and the corresponding water level measurements to the nearest 0.1 foot.
    - (iii) The height above ground (in feet) of the water level measurement reference point.
    - (iv) The pumping rate and depth at which the pump used for the test was set.
    - (v) The anticipated permanent pump setting depth (in feet below ground).
    - (vi) The specific capacity of the well at the tested pumping rates.

- (vii) The specific capacity of the well at the anticipated permanent design pumping rate when drawdown is stabilized.
  - (b) In addition to paragraph (B)(6)(a) of this rule, the report for a high use well pumping test report shall include the following:
    - (i) A map showing the location of the pumping wells and the location of other wells used to observe drawdown. The map shall, at a minimum, include the names of the wells as used in the report and the distance between the pumping well and other wells used to observe drawdown.
    - (ii) Graphs plotted on semi-logarithmic graph paper showing the drawdown measurements on the arithmetic scale and time on the logarithmic scale.

Graphs must be submitted for the pumping well and any other wells used to observe drawdown and recovery during the pumping test.
    - (iii) Graphs plotted on semi-logarithmic graph paper showing the recovery measurements on the arithmetic scale and time on the logarithmic scale.

Graphs must be submitted for the pumping well and any other wells used to observe drawdown and recovery during the pumping test.
    - (iv) Arithmetic graphs showing all water-level data collected during the pumping test and recovery period from the pumping well and all observation wells.
  - (c) In addition to paragraph (B)(6)(b) of this rule, when a high use community water system well is part of a multiple-well system the report shall include documentation that the well meets the demonstration requirements in paragraphs (B)(2) and (B)(3) of this rule.
- (C) Samples shall be collected and analyzed from a public water system well for contaminants at the conclusion of the pumping test performed in accordance with paragraph (B) of this rule.
- (1) A community water system well shall be sampled and analyzed for the contaminants that are listed in appendix A of this rule, "Required Analyses for Wells Utilized by Community Public Water Systems."
  - (2) A nontransient noncommunity water system well shall be sampled and analyzed for the contaminants that are listed in appendix B of this rule, "Required Analyses for Wells Utilized by Nontransient Noncommunity Public Water Systems."
  - (3) A transient noncommunity water system well shall be sampled and analyzed for the contaminants that are listed in appendix C of this rule, "Required Analyses for Wells Utilized by Transient Noncommunity Public Water Systems."
  - (4) The director may reduce or add to the contaminants that are listed in the appendices to this rule because of well siting, well construction, treatment, promulgated drinking water standards, or other criteria to assess if the ground water is acceptable for

human consumption.

- (5) Samples that are collected from a public water system well in accordance to this rule shall be analyzed in a laboratory certified to analyze drinking water for contaminants in accordance with Chapter 3745-89 of the Administrative Code. The analytical methods shall be the same as required by the entry point to the distribution system monitoring in accordance with rule 3745-81-27 of the Administrative Code and shall include all the volatile organic and synthetic organic analytes that are quantified by the laboratory for the organic analytical method.

[Comment: "Standard ANSI/NSF 60, Drinking Water Treatment Chemicals - Health Effects, December 11, 2009, Document Number NSF/ANSI 60-2009a." This rule incorporates this standard or specification by reference. A copy may be obtained from "NSF International, 789 N. Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48105," (734) 769-8010, [www.nsf.org](http://www.nsf.org). This standard is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

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Appendix A 3745-9-09

Required Analyses for Wells Utilized by Community Public Water Systems

Inorganic

Alkalinity, total (as CaCO <sub>3</sub> )	Cyanide	Nitrite-(as N)
Antimony, total	Fluoride, total	pH
Arsenic, total	Iron, total	Selenium, total
Barium, total	Lead, total	Silver, total
Beryllium, total	Magnesium, total	Sodium, total
Cadmium, total	Manganese, total	Sulfate
Calcium, total	Mercury, total	Thallium, total
Chloride	Nickel, total	Total Dissolved Solids
Chromium, total	Nitrate-(as N)	Zinc, total
Copper, total	Nitrate-Nitrite-(as N)	

Radiological

Gross Alpha	
Gross Beta	
Radium-228	
Radium-226	(if either gross alpha analysis exceeds 5pCi/L or radium-228 analysis exceeds 1 pCi/L)
Uranium	(if gross alpha analysis exceeds 15 pCi/L)

Synthetic Organic Chemicals (SOC)

Alachlor
Atrazine
Simazine

Bacteria Standards

Total Coliform (2 samples collected at least 30 min. apart)	1 Positive = Standard Exceeded
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## Volatile Organic Chemicals (VOC)

Benzene	Ethylbenzene	trans-1,2-Dichloroethene (or –ethylene)
Carbon Tetrachloride (tetrachloromethane)	Monochlorobenzene (chlorobenzene)	Trichloroethene (or –ethylene)
cis-1,2-Dichloroethene (or –ethylene)	ortho-Dichlorobenzene (1,2-Dichlorobenzene)	1,1,1-Trichloroethane (methyl chloroform)
Dichloromethane (methylene chloride)	para-Dichlorobenzene 1,4-Dichlorobenzene	1,2,4-Trichlorobenzene
1,1-Dichloroethene (or –ethylene, 1,1-DCE)	Styrene	1,1,2-Trichloroethane
1,2-Dichloroethane	Tetrachloroethene (or –ethylene, perchloroethylene)	Vinyl Chloride
1,2-Dichloropropane	Toluene	Xylenes, total

## Appendix B 3745-9-09

## Required Analyses for Wells Utilized by Nontransient Noncommunity Public Water Systems

## Inorganic

Alkalinity, total (as CaCO <sub>3</sub> )	Cyanide	Nitrite-(as N)
Antimony, total	Fluoride, total	pH
Arsenic, total	Iron, total	Selenium, total
Barium, total	Lead, total	Silver, total
Beryllium, total	Magnesium, total	Sodium, total
Cadmium, total	Manganese, total	Sulfate
Calcium, total	Mercury, total	Thallium, total
Chloride	Nickel, total	Total Dissolved Solids
Chromium, total	Nitrate-(as N)	Zinc, total
Copper, total	Nitrate-Nitrite-(as N)	

## Radiological

Gross Alpha
Gross Beta

## Synthetic Organic Chemicals (SOC)

Alachlor
Atrazine
Simazine

## Bacteria Standards

Total Coliform (2 samples collected at least 30 min. apart)	1 Positive = Standard Exceeded
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## Volatile Organic Chemicals (VOC)

Benzene	Ethylbenzene	trans-1,2-Dichloroethene (or –ethylene)
Carbon Tetrachloride (tetrachloromethane)	Monochlorobenzene (chlorobenzene)	Trichloroethene (or –ethylene)
cis-1,2-Dichloroethene (or –ethylene)	ortho-Dichlorobenzene (1,2-Dichlorobenzene)	1,1,1-Trichloroethane (methyl chloroform)
Dichloromethane (methylene chloride)	para-Dichlorobenzene 1,4-Dichlorobenzene	1,2,4-Trichlorobenzene
1,1-Dichloroethene (or –ethylene, 1,1-DCE)	Styrene	1,1,2-Trichloroethane
1,2-Dichloroethane	Tetrachloroethene (or –ethylene, perchloroethylene)	Vinyl Chloride
1,2-Dichloropropane	Toluene	Xylenes, total

## Appendix C 3745-9-09

## Required Analyses for Wells Utilized by Transient Noncommunity Public Water Systems

## Inorganic

Alkalinity, total (as CaCO <sub>3</sub> )	Fluoride, total	Nitrate-Nitrite-(as N)
Arsenic, total	Iron, total	Nitrite-(as N)
Barium, total	Lead, total	pH
Calcium, total	Magnesium, total	Sodium, total
Chloride	Manganese, total	Sulfate
Copper, total	Nitrate-(as N)	Total Dissolved Solids

## Radiological

Gross Alpha
Gross Beta

## Bacteria Standards

Total Coliform (2 samples collected at least 30 min. apart)	1 Positive = Standard Exceeded
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**3745-9-10      Abandoned well sealing.**

- (A) An abandoned well shall be sealed in accordance with this rule and rule 3745-9-07 of the Administrative Code.
  - (1) "The State of Ohio Regulations and Technical Guidance For Sealing Unused Water Wells and Boreholes (2015)" shall be used as a guide.
  - (2) Plan approval is not required in accordance with Chapter 3745-91 of the Administrative Code to seal an abandoned well, test hole or dry hole. A public water system may apply to the director for a variance from this rule in accordance with rule 3745-9-02 of the Administrative Code.
- (B) A test hole shall either be permanently sealed or converted into a well upon completion of testing.
- (C) An abandoned well shall be sealed in accordance with the following:
  - (1) All obstructions shall be removed from the abandoned well, including the pump and related equipment, drop pipe, pitless adapter, suction line, trash or other debris. Unless permanently attached, all liner pipe shall be removed from the well prior to placement of sealing materials.
  - (2) Casing shall be removed, ripped or perforated, or with prior consultation with the district office the casing may be left intact or in place.
    - (a) Casing shall be removed to a depth of at least three feet below ground surface, except for a dug or bucket augered well covered by paragraph (C)(13)(b)(ii) of this rule. The remaining borehole shall be filled with clean clay.
    - (b) If possible, casing shall be removed by overdrilling when the annular seal is inadequate, or water is flowing from around the outside of the casing, or gravel packing connects two or more hydraulic zones.
  - (3) Where evidence of microbiological growth is present, an abandoned well shall be disinfected by slowly wetting the casing or borehole with a solution of sodium hypochlorite or calcium hypochlorite. Disinfectant concentration in the water column shall be at least fifty milligrams per liter total chlorine.
    - (a) Disinfectant shall have standard ANSI/NSF 60 certification. .
    - (b) Contact of disinfectant with bentonite shall be avoided.
  - (4) Cement grout may be gravity poured into a dry hole where no water is present.
  - (5) After the sealing material and grout have been placed into the abandoned well, the grout shall cure a minimum of twelve hours to assess whether any settling of the sealing material has occurred. If settling has occurred, then additional grout shall be placed into the remaining borehole.

- (6) The finished grade shall ensure that surface water runoff drains away from the sealed abandoned well.
- (7) An abandoned well that is less than two hundred feet deep and greater than four inches in diameter may be sealed using coarse grade bentonite.
- (8) An abandoned well that is less than one hundred feet deep and greater than four inches in diameter may be sealed using pelletized bentonite or coarse grade bentonite.
- (9) An abandoned well that is constructed into or through a single aquifer that is not flowing at the surface shall be sealed in accordance with the following:
  - (a) Clean and disinfected sand or gravel may be placed either from the bottom of the abandoned well to the top of the aquifer, or to twenty-five feet below ground surface, whichever is encountered first.
  - (b) An abandoned well shall be sealed by either pressure grouting, or pouring coarse grade bentonite from twenty-five feet below ground surface to the ground surface.
  - (c) If casing is removed, sealing material and grout shall be placed while casing is being removed from the borehole.
- (10) An abandoned well that is constructed into or through multiple aquifers that is not flowing at the surface shall be sealed in accordance with the following requirements:
  - (a) An abandoned well shall be sealed by pressure grouting.
  - (b) Pelletized bentonite or coarse grade bentonite may be poured.
  - (c) If detailed construction and geologic data is available, then clean and disinfected sand or gravel may be placed adjacent to the aquifer zones and grout placed adjacent to the confining units. The abandoned well shall then be sealed from the top of the uppermost aquifer or from twenty-five feet below ground surface, whichever is encountered first, to the surface with either cement grout or bentonite grout.
- (11) An abandoned well that is flowing shall be sealed in accordance with the following requirements:
  - (a) If practical, the casing may be extended until the flow of water over the top of the casing stops. An abandoned well shall be sealed by pressure grouting, or coarse grade or pelletized bentonite may be poured.
  - (b) If casing extension is impractical because of the hydraulic head, one of the following shall be met:
    - (i) An inflatable packer shall be installed at the top of the producing formation to stop or restrict the flow of water. The abandoned well shall be sealed by

pressure grouting through the packer from the bottom of the hole to the bottom of the packer. The packer shall then be deflated and pressure grouting shall continue to the ground surface.

- (ii) A shut-in device shall be installed at the top of the abandoned well to prevent flow. A conductor pipe shall be inserted through the shut-in device and the abandoned well shall be sealed by pressure grouting from the bottom of the hole to the ground surface.
  - (iii) Disinfected gravel shall be poured into the abandoned well to reduce the flow of water and the abandoned well shall be sealed by pressure grouting from the top of the aquifer, or from twenty-five feet below ground surface, whichever is encountered first.
  - (iv) If additives are used to increase the density of cement grout to control the flow of water, appropriate placement techniques shall be used to ensure that separation does not occur.
- (12) An abandoned well drilled through fractured or cavernous formations or a mine shaft, shall be sealed in accordance with the following:
  - (a) The depth and thickness of the fractured, cavernous zone or mine shaft shall be determined, if possible, and the fractured, cavernous zone or mine shaft shall be sealed in accordance with the following:
    - (i) Where the fractured, cavernous zone or mine shaft is greater than twenty-five feet from the ground surface, a packer, shale trap, or another similar device shall be installed at the top of the fractured, cavernous zone or mine shaft and the well shall then be sealed by pressure grouting up to the ground surface. In lieu of installing a packer, shale trap, or another similar device, the fractured, cavernous zone or mine shaft may be filled with clean and disinfected gravel, or cement grout, and the abandoned well shall then be sealed by pressure grouting up to the ground surface.
    - (ii) Where the fractured, cavernous zone or mine shaft is less than twenty-five feet from the ground surface, the abandoned well shall be filled with cement grout with additives that promote bridging across the fractured, cavernous zone or mine shaft.
  - (b) The remainder of the abandoned well shall be sealed by pressure grouting.
- (13) A dug or bucket augured abandoned well that is greater than twenty-four inches in diameter and less than twenty-five feet deep shall be sealed in accordance with the following:
  - (a) The static water level shall be measured and the abandoned well pumped dry, if possible.
  - (b) If the static water level is less than five feet below ground surface, then the

following apply:

- (i) The abandoned well shall be filled with clean clay or cement grout to the elevation of the static water level.
  - (ii) The liner shall be removed to the depth of the static water level, and the borehole shall be excavated radially six inches beyond the original borehole.
  - (iii) A one foot layer of bentonite or cement grout shall be placed in the abandoned well at the elevation of the static water level. If the abandoned well is dry and bentonite is used, it shall be hydrated with five gallons of water per fifty pounds of bentonite.
  - (iv) The remaining borehole shall be filled with clean clay to ground surface.
- (c) If the static water level is greater than five feet below ground surface, then the following apply:
- (i) The abandoned well shall be filled with clean clay or cement grout to the elevation of the static water level.
  - (ii) At least the top three feet of casing, wall or liner material shall be removed and the borehole shall be excavated radially six inches beyond the original borehole.
  - (iii) A one foot layer of bentonite or cement grout shall be placed in the abandoned well at the elevation of the static water level. If the abandoned well is dry and bentonite is used, it shall be hydrated with five gallons of water per fifty pounds of bentonite.
  - (iv) A layer of clean clay or cement grout shall be added above the grout until the level in the abandoned well is three feet below ground surface.
  - (v) Another one foot thick layer of bentonite or cement grout shall be added at the level at which the casing, wall or liner material was removed. If the abandoned well is dry, the bentonite shall be hydrated with five gallons of water per fifty pounds of bentonite.
- (14) A dug or bucket augured abandoned well that is greater than twenty-four inches in diameter and greater than twenty-five feet deep shall be sealed in accordance with either paragraph (C)(9) or (C)(10) of this rule.
- (D) A copy of the well sealing report that is required by section 1521.05 of the Revised Code shall be submitted to the district office within thirty days of sealing a public water system well. The abandoned well location shall be clearly noted on a site map with reference to highways, streets, corporate boundaries and local physical landmarks.

[Comment: "Standard ANSI/NSF 60, Drinking Water Treatment Chemicals - Health Effects, December 11, 2009, Document Number NSF/ANSI 60-2009a." This rule incorporates this standard or specification by reference. A copy may be obtained from

"NSF International, 789 N. Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48105," (734) 769-8010, [www.nsf.org](http://www.nsf.org). The standard is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: The "State of Ohio Regulations and Technical Guidance For Sealing Unused Water Wells and Boreholes, 2015." This rule incorporates this guidance by reference. A copy may be obtained from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752, [www.epa.ohio.gov](http://www.epa.ohio.gov). The document is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

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3745-34-01      **Underground injection control definitions.**

(A)

- (1) "Abandoned well" means a well whose use has been permanently discontinued or that is in a state of disrepair such that it cannot be used for its intended purpose or for observation purposes.
- (2) "Application" means the Ohio EPA standard forms for applying for a permit, including any additions, revisions or modifications to the forms; or forms approved by Ohio EPA, including any approved modifications or revisions. For a Class I hazardous waste facility, application also includes the information already required by the director under section 3734.05 of the Revised Code.
- (3) "Appropriate act and regulations" means the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) or Safe Drinking Water Act (SDWA), whichever is applicable; Chapter 3734. of the Revised Code and sections 6111.043 and 6111.044 of the Revised Code and all rules promulgated thereunder.
- (4) "Aquifer" means a geologic formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring.
- (5) "Area of review" means the area surrounding an injection well described according to the criteria set forth in rule 3745-34-32 of the Administrative Code, or in the case of an area permit, the project area plus a circumscribing area of a width that is either one-quarter of a mile or a number calculated according to the criteria set forth in rule 3745-34-32 of the Administrative Code.

(B) [Reserved.]

(C)

- (1) "Casing" means a pipe or tubing of appropriate material, of varying diameter and weight, lowered into a borehole during or after drilling in order to support the sides of the hole and thus prevent the walls from caving, to prevent loss of drilling mud into porous ground, or to prevent water, gas, or other fluid from entering or leaving the hole.
- (2) "Catastrophic collapse" means the sudden and utter failure of overlying strata caused by removal of underlying materials.
- (3) "Cementing" means the operation whereby a cement slurry is pumped into a drilled hole or forced behind the casing.
- (4) "Cesspool" means a "well" other than a "septic system" or a "subsurface fluid distribution system" that receives untreated sanitary waste containing human excreta, and which sometimes has an open bottom or perforated sides.
- (5) "Cone of influence" means that area around the well within which increased injection zone pressure caused by injection into the hazardous waste injection well would be

sufficient to drive fluids into an underground source of drinking water (USDW).

- (6) "Confining bed" means a body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.
- (7) "Confining zone" means a geological formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection zone.
- (8) "Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.
- (9) "Conventional mine" means an open pit or underground excavation for the production of minerals.

(D)

- (1) "Director" means the director of the Ohio EPA or the director's duly authorized representative.
- (2) "Disposal well" means a well used for the disposal of waste into a subsurface formation.
- (3) "Draft permit" means a draft action as provided in rule 3745-49-02 of the Administrative Code.
- (4) "Drilling mud" means a heavy suspension used in drilling an injection well, introduced down the drill pipe and through the drill bit.
- (5) "Drywell" means a well, other than an improved sinkhole or subsurface fluid distribution system, completed above the water table so its bottom and sides are typically dry except when receiving fluids.

(E)

- (1) "Effective date of a UIC program" means the date that a state of Ohio UIC program is approved or established by the United States environmental protection agency.
- (2) "Emergency permit" means a UIC permit issued in accordance with rule 3745-34-19 of the Administrative Code.
- (3) "Exempted aquifer" means an aquifer or its portion that meets the criteria in the definition of underground source of drinking water but that has been exempted according to the procedures in 40 CFR 144.7.
- (4) "Experimental technology" means a technology that has not been proven feasible under the conditions that are being tested.

(F)

- (1) "Facility" or "activity" means any hazardous waste facility as defined in section 3734.01 of the Revised Code, UIC injection well, or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under Chapter

3734. or 6111. of the Revised Code and all rules promulgated thereunder.

- (2) "Fault" means a surface or zone of rock fracture along which there has been displacement.
- (3) "Federal Water Pollution Control Act" or "FWPCA" means the Federal Water Pollution Control Act, 86 Stat. 816 (1972), 33 U.S.C. 1251-1387, as amended through 1987.
- (4) "Flow rate" means the volume per time unit given to the flow of gases or other fluid substance that emerges from an orifice, pump, turbine, or passes along a conduit or channel.
- (5) "Fluid" means material or substance that flows or moves whether in a semisolid, liquid, sludge, gas, or any other form or state.
- (6) "Formation" means a body of rock characterized by a degree of lithologic homogeneity that is prevailingly, but not necessarily, tabular and is mappable on the earth's surface or traceable in the subsurface.
- (7) "Formation fluid" means fluid present in a formation under natural conditions as opposed to introduced fluids, such as drilling mud.

(G)

- (1) "Generator" means any person, by site location, whose act or process produces hazardous waste identified or listed in Chapter 3745-51 of the Administrative Code.
- (2) "Ground water" means water below the land surface in a zone of saturation.

(H)

- (1) "Hazardous waste" means a hazardous waste as defined in rule 3745-51-03 of the Administrative Code.
- (2) "Hazardous waste management facility" or "HWM facility" means all contiguous land, structures, other appurtenances, and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (for example, one or more landfills, surface impoundments, or combination of them).

(I)

- (1) "Improved sinkhole" means a naturally occurring karst depression or other geologic setting which has been modified by man for the purpose of directing and emplacing fluids into the subsurface.
- (2) "Industrial waste" means any liquid, gaseous, or solid waste substance resulting from any process of industry, manufacture, trade, or business, or from the development, processing, or recovery of any natural resource, together with such sewage as is present.

- (3) "Injection interval" means that part of the injection zone in which the well is screened, perforated or in which the waste is otherwise directly emplaced.
- (4) "Injection well" means a well into which fluids are being injected.
- (5) "Injection zone" means a geological formation, group of formations, or part of a formation receiving fluids through a well.
- (6) "Innovative technology" means any proposed innovative and experimental hazardous or industrial waste treatment technology or process for which research and development are necessary to establish technical or operational validity.

(J) [Reserved.]

(K) [Reserved.]

(L)

- (1) "Large capacity cesspool" means a multiple dwelling, community or regional cesspools, or other devices that receive sanitary wastes, containing human excreta that have an open bottom and sometimes have perforated sides. The UIC requirements do not apply to single-family residential cesspools nor to non-residential cesspools that receive solely sanitary wastes and have the capacity to serve fewer than twenty persons per day.
- (2) "Lithology" means the description of rocks on the basis of their physical and chemical characteristics.

(M)

- (1) "Manifest" means the shipping document originated and signed by the generator which contains the information required by Chapter 3745-52 of the Administrative Code.
- (2) "Motor vehicle waste disposal well" means a well that has the potential to receive, receives, or has received fluids from vehicular repair or maintenance activities, such as an auto body repair shop, automotive repair shop, new and used car dealership, specialty repair shop (e.g. transmission and muffler repair shop), or any facility that does any vehicular repair work. Fluids disposed in these wells may contain organic and inorganic chemicals in concentrations that exceed the maximum contaminant levels (MCLs) established by the primary drinking water regulations. These fluids also may include waste petroleum products and may contain contaminants, such as heavy metals and volatile organic compounds, which pose risks to human health, safety or the environment.

(N) [Reserved.]

(O)

- (1) "Other wastes" means garbage, refuse, decayed wood, sawdust, shavings, bark, and other wood debris, lime, sand, ashes, offal, night soil, oil, tar, coal dust, dredged or

fill material, or silt, other substances that are not sewage, sludge, sludge materials, or industrial waste, and any other "pollutants" or "toxic pollutants" as defined in the Federal Water Pollution Control Act that are not sewage, sludge, sludge materials, or industrial waste.

- (2) "Owner or operator" means the owner or operator of any facility or activity subject to regulation under Chapters 3734. and 6111. of the Revised Code and all rules promulgated thereunder.

(P)

- (1) "Packer" means a device lowered into a well to produce a fluid-tight seal.
- (2) "Permit" means an authorization, license, or equivalent document issued by Ohio EPA to implement the requirements of Chapter 6111. of the Revised Code. Permit does not include a draft permit, a permit issued by the hazardous waste facility approval board under Chapter 3734. of the Revised Code, or rule 3745-34-11 of the Administrative Code.
- (3) "Person" means an individual, association, partnership, the State of Ohio or any agency or employee thereof, the federal government or any agency or employee thereof, any other state or agency or employee thereof, any interstate agency, any municipal corporation, political subdivision, public or private corporation, or other entity.
- (4) "Plugging" means the act or process of stopping the flow of water, oil or gas into or out of a formation through a borehole or well penetrating that formation.
- (5) "Plugging record" means a systematic listing of permanent or temporary abandonment of water, oil, gas, test, exploration and waste injection wells, and may contain a well log, description of amounts and types of plugging material used, the method employed for plugging, a description of formations that are sealed and a graphic log of the well showing formation location, formation thickness, and location of plugging structures.
- (6) "Point of injection" means the last accessible sampling point prior to waste fluids being released into the subsurface environment through a class V injection well. For example, the "point of injection" of a class V septic system might be the distribution box, which would be the last accessible sampling point before the waste fluids drain into the underlying soils. For a dry well, it is likely to be the well bore itself.
- (7) "POTW" or "publicly owned treatment works" means any device or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature which is owned by a state or municipality. This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.
- (8) "Pressure" means the total load or force per unit area acting on a surface.
- (9) "Project" means a group of wells in a single operation.

(Q) [Reserved.]

(R)

- (1) "Radioactive waste" means any waste that contains radioactive material in concentrations which exceed those listed in 10 CFR Part 20, "Appendix B," Table II, column 2.
- (2) "Resource Conservation and Recovery Act" or "RCRA" or "Solid Waste Disposal Act" means Resource Conservation and Recovery Act, 90 Stat. 2795 (1976), 42 U.S.C. 6901, as amended through 2012.

(S)

- (1) "Safe Drinking Water Act" or "SDWA" means Safe Drinking Water Act, 88 Stat. 1660 (1974), 42 U.S.C. 300(f), as amended through 1996.
- (2) "Sanitary waste" means liquid or solid waste originating solely from humans and human activities, such as wastes collected from toilets, showers, wash basins, sinks used for cleaning domestic areas, sinks used for food preparation, cloths washing operations, and sinks or washing machines where food and beverage serving dishes, glasses, and utensils are cleaned. Sources of these wastes may include single or multiple residences, hotels and motels, restaurants, bunkhouses, schools, ranger stations, crew quarters, guard stations, campgrounds, picnic grounds, day-use recreational areas, other commercial facilities, and industrial facilities provided the waste is not mixed with industrial waste.
- (3) "Schedule of compliance" means a schedule of remedial measures included in a permit, including an enforceable sequence of interim requirements (for example, actions, operations, or milestone events leading to compliance with the appropriate act and regulations).
- (4) "Septic system" means a "well" that is used to emplace sanitary waste below the surface and is typically comprised of a septic tank and subsurface fluid distribution system or disposal system.
- (5) "Sewage" means any liquid waste containing sludge, sludge materials, or animal or vegetable matter in suspension or solution, and may include household wastes as commonly discharged from residences and from commercial, institutional, or similar facilities.
- (6) "Site" means the land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.
- (7) "Sole source aquifer" means any aquifer which has been so designated by the administrator of the United States environmental protection agency pursuant to section 1424 (a) or (e) of the SDWA.
- (8) "Stratum (plural strata)" means a single sedimentary bed or layer, regardless of thickness, that consists of generally the same kind of rock material.

- (9) "Subsidence" means the lowering of the natural land surface in response to: earth movement; lowering of fluid pressure; removal or underlying supporting material by mining or solution of solids, either artificially or from natural causes; compaction due to wetting (hydrocompaction); oxidation of organic matter in soils; or added load on the land surface.
- (10) "Subsurface fluid distribution system" means an assemblage of perforated pipes, drain tiles, or other similar mechanisms intended to distribute fluids below the surface of the ground.
- (11) "Surface casing" means the first string of well casing to be installed in the well.

(T)

- (1) "Total dissolved solids (TDS)" means the total dissolved (filterable) solids as specified in 40 CFR part 136.
- (2) "Transmissive fault or fracture" is a fault or fracture that has sufficient permeability and vertical extent to allow fluids to move between formations.

(U)

- (1) "UIC" means the underground injection control program under part C of the Safe Drinking Water Act, or under sections 6111.043 and 6111.044 of the Revised Code.
- (2) "Underground injection" means a well injection.
- (3) "Underground source of drinking water" or "USDW" means an aquifer or its portion and is not an exempted aquifer, which does one of the following:
  - (a)
    - (i) Supplies any public water system as defined by Chapter 3745-81 of the Administrative Code.
    - (ii) Contains a sufficient quantity of ground water to supply a public water system as defined by Chapter 3745-81 of the Administrative Code and is one of one following:
      - (a) Currently supplies drinking water for human consumption.
      - (b) Contains fewer than ten thousand mg/l total dissolved solids.

(V) [Reserved.]

(W)

- (1) "Well" means any one of the following:
  - (a) A bored, drilled, or driven shaft whose depth is greater than the largest surface dimension.

- (b) A dug hole whose depth is greater than the largest surface dimension.
  - (c) An improved sinkhole.
  - (d) A subsurface fluid distribution system as defined in this rule.
- (2) "Well injection" means the subsurface emplacement of fluids through a well.
  - (3) "Well plug" means a watertight and gastight seal installed in a borehole or well to prevent movement of fluids.
  - (4) "Well stimulation" means several processes used to clean the well bore, enlarge channels, and increase pore space in the interval to be injected, thus making it possible for wastewater to move more readily into the formation, and includes (1) surging, (2) jetting, (3) blasting, (4) acidizing, and (5) hydraulic fracturing.
  - (5) "Well monitoring" means the measurement, by on-site instruments or laboratory methods, of the quality of water in a well.
  - (6) "Well work over" means any work performed on a class I injection well which involves maintenance, repair or removal and reinstallation of injection tubing string.

(X) [Reserved.]

(Y) [Reserved.]

(Z) [Reserved.]

[Comment: This rule references the following "Code of Federal Regulations or CFR and United States Code or U.S.C.": 40 CFR 144.7, last amended December 10, 2010; 10 CFR Part 20, last amended September 30, 2015; 40 CFR Part 136, last amended August 19, 2014. This rule also references the Resource Conservation and Recovery Act, 90 Stat. 2795 (1976), 42 U.S.C. 6901, as amended through 2012. Also, this rule references the following sections and part of the Safe Drinking Water Act (SDWA), as amended through 1996: Section 1424 (a) or (e) and Part C of the SDWA. Copies of these codes may be obtained from the "U.S. Government Bookstore" toll-free at (866) 512-1800 or <https://www.gpo.gov/fdsys>, or from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752. The codes are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]



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Five Year Review (FYR) Dates: 08/24/2016 and 07/14/2021

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Prior Effective Dates: 12/15/82, 07/25/84, 12/16/91, 03/11/02, 04/23/09

**3745-34-03 Confidentiality of information.**

- (A) Any record, report, or other information obtained by the Ohio environmental protection agency shall be made available to the public unless making such record, report, or other information, or particular part thereof, would divulge methods or process entitled to protection as trade secrets in accordance with this rule.
- (B) Information submitted to Ohio EPA pursuant to these regulations may be claimed as a trade secret by the submitter. Any such claim shall be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words "confidential business information" or "trade secret" on each page containing such information. If no claim is made at the time of submission, or if a claim is made in a manner inconsistent with rule 3745-49-03 of the Administrative Code, Ohio EPA may make the information available to the public without further notice. If a claim is properly asserted, the information will be treated in accordance with rule 3745-49-03 of the Administrative Code.
- (C) Ohio EPA considers the information below public under all circumstances:
  - (1) The name and address of any permit applicant or permittee.
  - (2) Information which deals with the existence, absence, or level of contaminants in drinking water.

Replaces: 3745-34-03

Effective: 11/1/2018

Five Year Review (FYR) Dates: 11/01/2023

Promulgated Under: 119.03

Statutory Authority: 6111.04

Rule Amplifies: 6111.04

Prior Effective Dates: 07/25/1984

3745-34-04      **Classification of wells.**

Injection wells are classified as follows:

(A) Class I.

- (1) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to inject hazardous waste beneath the lowermost formation containing an underground source of drinking water (USDW) within one-quarter mile of the well bore.
- (2) Other industrial and municipal disposal wells that inject fluids beneath the lowermost formation containing a USDW within one-quarter mile of the well bore.
- (3) Radioactive waste disposal wells that inject fluids below the lowermost formation containing a USDW within one-quarter mile of the well bore.

(B) Class II. Wells that may inject brines and other fluids associated with oil and gas production, and hydrocarbons for storage. Requirements of this type of injection well are referenced in Chapter 1509. of the Revised Code and division 1509:9 of the Administrative Code.

(C) Class III. Wells that may inject fluids associated with solution mining of minerals beneath the lowermost USDW. Requirements for this type of injection well are referenced in Chapter 1509. of the Revised Code and division 1509:9 of the Administrative Code.

(D) Class IV.

- (1) Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste into a formation which contains a USDW within one-quarter mile of the well.
- (2) Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste above a formation that within one-quarter mile of the well contains a USDW.
- (3) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to dispose of hazardous waste, which cannot be classified under paragraph (A)(1) or paragraphs (D)(1) and (D)(2) of this rule.

(E) Class V. Injection wells not included in class I, II, III, or IV. Typically, class V wells are shallow wells used to place a variety of fluids directly below the land surface into or above formations that contain USDWs. However, if the fluids placed in the ground qualify as a hazardous waste under the Resource Conservation and Recovery Act (RCRA), then the well is either a class I or class IV well, not a class V well. Class V wells include, but are not limited to the following:

- (1) Air conditioning return flow wells used to return to the supply aquifer the water used

for heating or cooling in a heat pump.

- (2) Large capacity cesspools including multiple dwelling, community or regional cesspools, or other devices that receive sanitary wastes, containing human excreta, that have an open bottom and sometimes have perforated sides. The underground injection control requirements do not apply to single-family residential cesspools nor to non-residential cesspools that receive solely sanitary wastes and have the capacity to serve fewer than twenty persons a day.
- (3) Cooling water return flow wells used to inject water previously used for cooling.
- (4) Drainage wells used to drain surface fluid, primarily storm runoff, into a subsurface formation.
- (5) Dry wells used for the injection of wastes into a subsurface formation.
- (6) Recharge wells used to replenish the water in an aquifer or used as part of an aquifer storage and recovery project.
- (7) Salt water intrusion barrier wells used to inject water into a fresh water aquifer to prevent the intrusion of salt water into the fresh water.
- (8) Sand backfill and other backfill wells used to inject a mixture of water and sand, mill tailings or other solids into mined out portions of subsurface mines whether what is injected is a radioactive waste or not.
- (9) Septic system wells used to inject the waste or effluent from a multiple dwelling, business establishment, community or regional business establishment septic tank. The underground injection control requirements do not apply to single-family residential septic system wells, nor to non-residential septic system wells that are used solely for the disposal of sanitary waste and have the capacity to serve fewer than twenty persons a day.
- (10) Subsidence control wells (not used for the purpose of oil or natural gas production) used to inject fluids into a non-oil or gas producing zone to reduce or eliminate subsidence associated with the overdraft of fresh water.
- (11) Injection wells associated with the recovery of geothermal energy for heating, aquiculture and production of electric power.
- (12) Radioactive waste disposal wells other than class IV or class I wells that inject radioactive material listed in 10 CFR part 20, "appendix B," "table II," column 2.
- (13) Wells used for solution mining of conventional mines such as stopes leaching.
- (14) Wells used to inject spent brine into the same formation from which it was withdrawn after extraction of halogens or their salts.
- (15) Injection wells used in experimental technologies.
- (16) Injection wells used for in-situ recovery of lignite, coal, tar sands, and oil shale.

(17) Motor vehicle waste disposal wells as defined in rule 3745-34-01 of the Administrative Code.

(18) Wells used to inject fluids for the remediation of contaminated soils or ground water.

[Comment: This rule references the following "Code of Federal Regulations": 10 CFR Part 20, appendix B, table II, column 2, last amended September 30, 2015. Copies of this code may be obtained from the "U.S. Government Bookstore" toll-free at (866) 512-1800 or <https://www.gpo.gov/fdsys>, or from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752. The code is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

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Statutory Authority: 6111.043  
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**3745-34-05 Identification of underground sources of drinking water.**

The director may identify (by narrative description, illustrations, maps, or other means) and shall protect, as an underground source of drinking water, all aquifers or parts of aquifers which meet the definition of an underground source of drinking water in rule 3745-34-01 of the Administrative Code. Even if an aquifer has not been specifically identified by the director, it is an underground source of drinking water if it meets the definition in rule 3745-34-01 of the Administrative Code.

Effective: July 25, 1984

Promulgated Under: RC Chapter 119.

Rule Amplifies: RC Section 6111.043



**3745-34-06 Prohibition of unauthorized injection.**

Any underground injection, except as authorized by permit or rule issued under this chapter is prohibited. The construction of any well required to have a permit is prohibited until the permit has been issued.

Effective: July 25, 1984

Promulgated Under: RC Chapter 119.

Rule Amplifies: RC Section 6111.043

Prior Effective Dates: 12/15/82

**Prohibition of movement of fluid into underground sources of drinking water.**

- (A) No owner shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into an underground source of drinking water, if the presence of that contaminant may cause an exceedance in the underground source of drinking water of any primary drinking water standard established under Chapter 3745-81 of the Administrative Code or may otherwise adversely affect the health of persons. The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met.
- (B) Injection into a Class V well shall not cause the migration of contaminants in a manner or at concentrations that cause an exceedance of water quality standards as established in Chapter 3745-01 of the Administrative Code.
- (C) For class I wells, if any water quality monitoring of an underground source of drinking water indicates the movement of any contaminant into the underground source of drinking water, except as authorized under this chapter, the director shall prescribe such additional requirements for construction, corrective action, operation, monitoring, or reporting (including closure of the injection well) as are necessary to prevent such movement. These additional requirements shall be imposed by modifying the permit in accordance with rule 3745-34-23 of the Administrative Code or the permit may be terminated under rule 3745-34-24 of the Administrative Code if cause exists, or appropriate enforcement action may be taken if the permit has been violated.
- (D) For class V wells, if at any time the director learns that a class V well may cause an exceedance of any primary drinking water standard established under Chapter 3745-81 of the Administrative Code or cause an adverse ecological impact per paragraph (B) of this rule, the director shall:
  - (1) Require the injector to obtain an individual permit;
  - (2) Order the injector to take such actions (including where required closure of the injection well) as may be necessary to prevent or correct the violation; or
  - (3) Take enforcement action.
- (E) Whenever the director learns that a class V well may be otherwise adversely affecting the health of persons, the director may prescribe such actions as may be necessary to prevent the adverse effect, including any action authorized under paragraph (C) of this rule.

- (F) Notwithstanding any other provision of this rule, the director may take emergency action upon receipt of information that a contaminant which is present in or is likely to enter a public water system may present an imminent and substantial endangerment to the health of persons.

Effective: 04/23/2009

Five Year Review (FYR) Dates: 07/14/2016 and 07/14/2021

Promulgated Under:	119.03
Statutory Authority:	6111.043
Rule Amplifies:	6111.043
Prior Effective Dates:	12/15/82, 7/25/84

**3745-34-08 Prohibition of class IV wells.**

- (A) The construction, operation or maintenance of any class IV well, as classified under rule 3745-34-04 of the Administrative Code is prohibited, except as provided in paragraph (C) of this rule.
- (B) The owner or operator of a class IV well shall comply with the closure and post-closure requirements of paragraph (B) of rule 3745-34-09 of the Administrative Code. All class IV wells shall be closed in compliance with rule 3745-34-07 of the Administrative Code. Any soil, gravel, sludge, liquids, or other materials removed from or adjacent to the well being closed shall be disposed of or managed in accordance with all applicable federal, state or local regulations and requirements.
  - (1) The owner or operator of a class IV well shall notify the director of the intent to close the class IV well at least thirty days prior to commencing closure of the well. The intent to close notification shall include the submission of a plan for closing the well per the requirements of this paragraph. The submitted plan shall be approved by the director prior to implementation and shall be followed during closure of the well. This plan shall include the following:
    - (a) A copy of the information required in paragraph (L) of rule 3745-34-11 of the Administrative Code.
    - (b) Procedures for the removal of any solids and sludge from the class IV well being closed.
    - (c) Procedures for plugging the class IV well. This procedure shall be consistent with paragraph (A) of rule 3745-34-07 of the Administrative Code and all other applicable federal, state or local regulations and requirements.
    - (d) Any other information deemed necessary by the director.
  - (2) Upon completion of closure, the owner or operator shall certify to the director in a report per rule 3745-34-17 of the Administrative Code that the class IV well was closed in compliance with this rule.
- (C) Injection wells used to inject contaminated ground water that has been treated and is being reinjected into the same formation from which it was drawn are authorized by rule for the life of the well despite the requirements of paragraphs (A) and (B) of this rule, if such subsurface emplacement of fluids is approved by the director or U.S. EPA as part of a remediation program pursuant to provisions for cleanup of releases under Chapter 3734. of the Revised Code and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9601-9675, as amended through 2002 or pursuant to requirements and provisions under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901-6992k, as amended through 2012. The owner or operator shall submit to the director the information about the well required within paragraph (L) of rule 3745-34-11 of the Administrative Code.

[Comment: This rule references the following "United States Code or U.S.C.": the

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, 42 U.S.C. 9601-9675, as amended through 2002; the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901-6992k, as amended through 2012. Copies of these codes may be obtained from the "U.S. Government Bookstore" toll free at (866) 512-1800 or <https://www.gpo.gov/fdsys>, or from "Ohio EPA Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752. This code is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

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Rule Amplifies: 6111.043

Prior Effective Dates: 12/15/82, 07/25/84, 12/16/91, 03/11/02, 04/23/09

**Requirements for wells injecting hazardous waste.**

- (A) Applicability. The requirements in this rule apply to all generators of hazardous waste, and to the owners or operators of all hazardous waste management facilities, using any class of well to inject hazardous wastes (see also rule 3745-34-08 of the Administrative Code).
- (B) Requirements. In addition to complying with the applicable requirements of this chapter, the owner or operator of each facility meeting the requirements of paragraph (A) of this rule shall comply with the following:
  - (1) Notification. The owner or operator shall comply with the notification requirements of paragraph (C) of rule 3745-50-40 of the Administrative Code.
  - (2) Identification number. The owner or operator shall comply with the identification number requirements of rule 3745-54-11 of the Administrative Code.
  - (3) Manifest system. The owner or operator shall comply with the applicable recordkeeping and reporting requirements for manifested wastes in rule 3745-54-71 of the Administrative Code.
  - (4) Manifest discrepancies. The owner or operator shall comply with discrepancy requirements in rule 3745-54-72 of the Administrative Code.
  - (5) Operating record. The owner or operator shall comply with record requirements in paragraphs (A), (B)(1), and (B)(2) of rule 3745-54-73 of the Administrative Code.
  - (6) Annual report. The owner or operator shall comply with report requirements in rule 3745-54-75 of the Administrative Code.
  - (7) Unmanifested waste report. The owner or operator shall comply with report requirements in rule 3745-54-76 of the Administrative Code.
  - (8) Personnel training. The owner or operator shall comply with the applicable personnel training requirements of rule 3745-54-16 of the Administrative Code.
  - (9) Financial responsibility. The owner or operator shall comply with the financial responsibility requirements of rules 3745-55-42 to 3745-55-51 or rules 3745-66-42 to 3745-66-48 of the Administrative Code.



- (10) Closure. The owner or operator shall comply with closure requirements of rules 3745-34-36 and 3745-66-11 to 3745-66-15 or rules 3745-55-11 to 3745-55-15 of the Administrative Code.
- (11) Post-closure. The owner or operator shall comply with post-closure requirements of rules 3745-34-36 and 3745-66-17 to 3745-66-20 or rules 3745-55-17 to 3745-55-20 of the Administrative Code.

Effective: 04/23/2009

R.C. 119.032 review dates: 04/23/2014 and 4/24/2019

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Prior Effective Dates: 7/25/84, 3/11/02

**3745-34-10 Waiver of requirement by director.**

- (A) When injection does not occur into, through or above an underground source of drinking water, the director may authorize a well or project with less stringent requirements for area of review, construction, mechanical integrity, operation, monitoring, and reporting than required in this chapter or rule 3745-34-27 of the Administrative Code to the extent that the reduction in requirements will not result in an increased risk of movement of fluids into an underground source of drinking water.
- (B) When injection occurs through or above an underground source of drinking water, but the radius of endangering influence when computed under paragraph (A) of rule 3745-34-32 of the Administrative Code is smaller or equal to the radius of the well, the director may authorize a well or project with less stringent requirements for operation, monitoring, and reporting than required in this chapter or rule 3745-34-27 of the Administrative Code to the extent that the reduction in requirements will not result in an increased risk of movement of fluids into an underground source of drinking water.
- (C) When reducing requirements under paragraph (A) or (B) of this rule, the director shall prepare a fact sheet under rule 3745-49-09 of the Administrative Code explaining the reasons for the action. Such fact sheet shall include, but not be limited to, an explanation for the following criteria:
- (1) Impact on the zone of endangering influence.
  - (2) Nature and volume of injection fluid.
  - (3) Nature of native fluids or by-products of injection.
  - (4) Potentially affected population.
  - (5) Geology.
  - (6) Hydrology.
  - (7) History of the injection operation.
  - (8) Completion and plugging records.
  - (9) Abandonment procedures in effect at the time the well was abandoned.
  - (10) Hydraulic connections with underground sources of drinking water.
  - (11) Surface waste handling operations.
  - (12) Mechanical integrity test results.
  - (13) Demonstration that operating, monitoring, or reporting requirements can be reduced with no adverse health or environmental impact.

Effective: 8/15/2018

Five Year Review (FYR) Dates: 5/16/2018 and 08/15/2023

Promulgated Under: 119.03

Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: 12/15/1982, 07/25/1984

- (A) No person shall inject sanitary waste, sewage, industrial wastes or other wastes, into or above a USDW without first obtaining a UIC permit to drill and a permit to operate in accordance with rule 3745-34-12 of the Administrative Code. Examples of industrial waste include, but are not limited to, the following:
- (1) Hair salon chemicals;
  - (2) Surgical or medical wastes;
  - (3) Chemicals or insecticides used for flea dips;
  - (4) Wastewater resulting from the treatment of drinking water unless authorized without a permit in accordance with paragraph (E) of this rule;
  - (5) Contact cooling water;
  - (6) Fluids and blood from embalming processes; and
  - (7) Animal wastes from slaughter houses or food processing operations.
- (B) Operation of and injection into large capacity cesspools is prohibited. All existing large capacity cesspools shall be closed in accordance with paragraph (O) of this rule.
- (C) Operation of and injection into a motor vehicle waste disposal well is prohibited. All existing motor vehicle waste disposal wells shall be closed in accordance with paragraph (O) of this rule.
- (D) The injection of sanitary waste or sewage into a class V well is authorized without a permit if all of the following conditions are satisfied:
- (1) Only sanitary waste or sewage is injected. Examples of sanitary waste or sewage include, but are not limited to, the following:
    - (a) Wastes from toilets and showers;
    - (b) Fluids from sinks used for food preparation;
    - (c) Fluids discharged to floor drains during the cleaning of floors in food preparation areas;

- (d) Fluids from sinks or washing machines used to clean food and beverage serving dishes, glasses, or utensils; and
    - (e) Fluids from the cleaning of animal cages, kennel runs, or livestock trailers.
  - (2) One of the following conditions has been met prior to the commencement of injection:
    - (a) A permit to install has been issued by the director in accordance with section 6111.44 or 6111.45 of the Revised Code; or
    - (b) An installation permit and operation permit have been obtained in accordance with Chapter 3701-29 of the Administrative Code.
  - (3) The information required by paragraph (M) of this rule is submitted to the director.
- (E) The injection of wastewater resulting from the treatment of drinking water into a class V well is authorized without a permit if all of the following conditions are satisfied:
- (1) For wastewater resulting from ion exchange treatment:
    - (a) Less than two thousand five hundred gallons per month is injected into the class V well;
    - (b) The information required by paragraph (M) of this rule is submitted to the director; and
    - (c) The injection of the fluid will comply with paragraph (A) of rule 3745-34-07 of the Administrative Code.
  - (2) For wastewater resulting from a filter system for removal of iron or manganese or both:
    - (a) The information required by paragraph (M) of this rule is submitted to the director; and
    - (b) The injection of fluid will comply with paragraph (A) of rule 3745-34-07 of the Administrative Code.
- (F) No person shall inject treated water as part of an aquifer storage and recovery operation, into or above a USDW without first obtaining a UIC permit to drill and a permit to operate in accordance with rule 3745-34-12 of the Administrative Code.

- (G) Unless otherwise authorized under paragraph (C) of rule 3745-34-08 of the Administrative Code or under paragraph (H) of this rule, a permit to drill and a permit to operate shall be obtained in accordance with rule 3745-34-12 of the Administrative Code prior to construction of a class V well and prior to injection of fluids into a class V well for purposes of remediating ground water or soil contamination.
- (H) Unless otherwise authorized under paragraph (C) of rule 3745-34-08 of the Administrative Code, the injection of fluids into a class V well for purposes of remediating ground water or soil contamination is authorized without a permit if all of the following conditions are satisfied:
- (1) The injection of the fluid will comply with paragraph (A) of rule 3745-34-07 of the Administrative Code;
  - (2) At least thirty days prior to the commencement of injection activities a work plan is submitted to the director that includes at least the following information:
    - (a) A description of the nature of the ground water or soil contamination;
    - (b) A description of the hydrogeology of the injection site;
    - (c) A detailed description of the proposed remediation;
    - (d) A description of the injection well or well point construction including a description of all materials used;
    - (e) A complete chemical analysis of the fluids to be injected;
    - (f) The volume of fluid to be injected and rate of injection; and
    - (g) Ground water quality analysis results for the aquifer being treated.
  - (3) The owner submits to the director all the following information monthly while fluids are being injected:
    - (a) A description of the fluids injected into the class V well;
    - (b) The volume of fluid injected into the class V well;
    - (c) The rate of injection of fluid into the class V well; and
    - (d) Any monitoring results.

- (4) The owner submits to the director the information required by paragraph (M) of this rule with the first report required by paragraph (H)(3) of this rule; and
  - (5) The owner complies with paragraph (O) of this rule upon cessation of injection activities.
- (I) Injection of fluids not specified in paragraphs (A) to (G) of this rule into class V wells is authorized without a permit pursuant to section 6111.043 of the Revised Code. Such injection is not authorized without a permit until the information required under paragraph (M) of this rule is submitted to the director. Authorization expires upon proper closure of the class V well in accordance with paragraph (O) of this rule.
- (J) All class V injection wells used to dispose of storm water runoff constructed after the effective date of this rule shall be constructed so as to minimize the injection of contaminants including, but not limited to, sediment, fecal matter, motor vehicle fluids, fertilizer, and pesticides.
- (K) A class V well is not authorized to operate without a permit if:
- (1) The owner failed or is failing to comply with paragraph (A) of rule 3745-34-07 of the Administrative Code;
  - (2) The director requires a permit in accordance with rule 3745-34-12 of the Administrative Code or closure in accordance with paragraph (O) of this rule. The authorization to inject into a well without a permit expires upon receiving the director's notification of the requirement to apply for a permit unless the director's notification includes conditions to be followed by the owner for injecting into the well until a permit is issued. Authorization to inject into the well without a permit ceases if the director determines that the conditions issued with the permit application notification are not being followed and notifies the owner of this determination.
  - (3) The owner fails to submit the information about the well in accordance with paragraph (M) of this rule. Authorization for injection into the class V well without a permit resumes upon submittal of the information in accordance with paragraph (M) of this rule.
- (L) The director may require the owner or operator of any class V injection well otherwise authorized by this rule to apply for and obtain an individual or area UIC permit. Cases where individual or area UIC permits may be required include:

- (1) The injection well is not in compliance with any requirement of this chapter pertaining to class V wells;
  - (2) The injection well is not or no longer is within a category of wells and types of well operations authorized in this rule; or
  - (3) The protection of the USDWs requires that the injection operation be regulated by requirements, such as for corrective action, monitoring and reporting, or operation, that are not contained in this rule; or
  - (4) The injection well is present in the drinking water source protection area for a public water supply.
- (M) The owner or operator of any class V well shall notify the director of the existence of any well under the owner's or operator's control meeting the definition of a class V well contained within paragraph (E) of rule 3745-34-04 of the Administrative Code. The owner of a new class V well shall submit the notification within thirty days of installing the well. Unless the owner has previously submitted inventory information for a class V well to the director prior to the effective date of this rule, the owner shall submit the following information for each well under the owner's control with the notification:
- (1) Facility name, postal address of the well location, and location of each well given by latitude and longitude to the nearest second;
  - (2) Name and address of legal contact;
  - (3) Identification of the owner and operator of the well;
  - (4) Nature and type of well;
  - (5) Operating status of injection well;
  - (6) Date of completion of each well;
  - (7) Total depth of each well;
  - (8) Construction narrative;
  - (9) Nature of the injected fluid;
  - (10) Maintenance and inspection schedule; and
  - (11) Average and maximum injection rate.



- (N) The director may require the owner of a class V well to collect and submit other information determined to be necessary to protect underground sources of drinking water.
- (1) Such information collection and submittal requirements may include, but are not limited to:
    - (a) Analyzing the ground water chemistry from the underground source of drinking water for constituents that may be elevated in concentration due to the injection of fluids into the class V well and periodically submitting the analysis results to Ohio EPA;
    - (b) Analyzing the fluids being injected into the well and periodically submitting the results of the analysis;
    - (c) Describing the geological layers through which and into which the injection is taking place; and
    - (d) Conducting other analyses and submitting other information, if needed to protect underground sources of drinking water.
  - (2) If the director requires the collection and submittal of information in paragraph (N)(1) of this rule, the director shall request the information in writing, along with a brief statement on why the information is required to be collected and submitted. This written notification shall specify when the information is required to be collected and submitted.
  - (3) The owner is prohibited from using the injection well if the information required under paragraph (N)(1) of this rule is not submitted within the time frame specified by the director under paragraph (N)(2) of this rule. The owner shall only resume injection into the well upon receiving a permit under rule 3745-34-12 of the Administrative Code.
- (O) All class V wells undergoing closure shall be closed in compliance with rule 3745-34-07 of the Administrative Code. Any soil, gravel, sludge, liquids, or other materials removed from or adjacent to the well being closed shall be disposed of or managed in accordance with all applicable federal, state, or local regulations and requirements.
- (1) The owner of a class V well shall notify the director of the intent to close the class V well at least thirty days prior to commencing closure of the well.
  - (2) The intent to close notification for class V wells used to inject industrial or other wastes shall include the submission of a plan for closing the well

that meets the requirements of this paragraph. The submitted plan shall be followed during closure of the well. This plan shall include:

- (a) A copy of the information required in paragraph (M) of this rule;
  - (b) Procedures for the removal of any solids and sludge from the class V well being closed;
  - (c) Procedures for plugging the class V well. This procedure shall be consistent with paragraph (A) of rule 3745-34-07 of the Administrative Code and all other applicable federal, state, or local regulations and requirements; and
  - (d) Any other information deemed necessary by the director to protect underground sources of drinking water.
- (3) Upon completion of closure, the owner of class V wells that were used to inject industrial or other wastes shall, in accordance with rule 3745-34-17 of the Administrative Code, certify to the director in a report that the class V well was closed in compliance with this rule.

Effective: 05/02/2011

R.C. 119.032 review dates: 04/24/2019

Promulgated Under: 119.03

Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: 12/19/82, 07/25/84, 01/20/95, 03/11/02, 04/23/2009

**3745-34-12 Application by permit; authorization by permit.**

**(A) Permit application.**

- (1) Except for owners of class V wells authorized in accordance with the provisions of rule 3745-34-11 of the Administrative Code, all underground injection activities, including construction and operation of an injection well, are prohibited unless authorized by permit or rule.
- (2) Pursuant to sections 6111.043 and 6111.044 of the Revised Code, an underground injection control well owner must apply for a permit to drill or a permit to operate, as applicable. Obtaining a permit to drill under section 6111.044 of the Revised Code and Chapter 3745-34 of the Administrative Code satisfies the requirements of division (J) of section 6111.03 and section 6111.45 of the Revised Code.
- (3) Obtaining a permit for a class II or class III well under Chapter 1509. of the Revised Code exempts the permit holder from permit requirements under this rule.
- (4) Authorization for class V well injections for which permit applications have been submitted shall lapse for a particular class V well injection or project upon the effective date of the permit or permit denial for that well injection or project.

**(B) Who applies.** The owner of the proposed or existing underground injection well shall apply for the permit to drill and the permit to operate. The permit application shall be signed pursuant to rule 3745-34-17 of the Administrative Code.

**(C) Time to apply.** Any person who proposes an underground injection for which a permit will be required shall apply for and receive a permit to drill prior to drilling and constructing the underground injection well. Any person who proposes an underground injection for which a permit will be required shall apply for and receive a permit to operate before commencing injection into a well.

**(D) Completeness.** The director shall not issue a permit before receiving a complete application for a permit except for emergency permits. An application for a permit is complete when the director receives an application form and any supplemental information completed to the director's satisfaction. The completeness of any application for a permit shall be judged independently of the status of any other permit application or permit for the same facility or activity.

**(E) Information requirements.** All applicants for permits shall provide the following information to the director, using the application form provided by the director:

- (1) The activities conducted by the applicant which require it to obtain permits under the following federal or state laws:
  - (a) The Resource Conservation and Recovery Act (RCRA), (1976), 42 U.S.C. Section 321 et seq. as amended in 1986.
  - (b) The national pollution discharge elimination system (NPDES) program under the Clean Water Act (CWA), (1977), 33 U.S.C. Section 1252 et seq. as

amended in 2002 if liquid or semi-liquid waste are discharged as a publicly owned treatment works (POTW). The applicant shall provide the POTW NPDES permit number.

- (c) Chapter 6111. of the Revised Code.
  - (d) The prevention of significant deterioration program (PSD) under the Clean Air Act (CAA), (1970), 42 U.S.C. Section 7401 et seq. as amended in 1990.
  - (e) Chapter 3704. of the Revised Code.
- (2) Name, mailing address, and location of the facility.
  - (3) Up to four standard industrial classification (SIC) codes which best reflect the principal products or services provided by the facility.
  - (4) The operator's name, address, telephone number, ownership status of federal, state, private, public or entity, and if a corporation, the name and address of the statutory agent.
  - (5) Whether the facility is located on Indian lands.
  - (6) A listing of all permits or construction approvals received or applied for under any of the following programs:
    - (a) Hazardous waste management program under RCRA and Chapter 3734. of the Revised Code.
    - (b) Underground injection control (UIC) program under the Safe Drinking Water Act (SDWA), (1974), 42 U.S.C. Section 300 f et seq. as amended in 1996 and Chapter 6111. of the Revised Code.
    - (c) NPDES program under the CWA and Chapter 6111. of the Revised Code.
    - (d) Prevention of significant deterioration (PSD) program under the CAA and Chapter 3704. of the Revised Code.
    - (e) Nonattainment program under the CAA and Chapter 3704. of the Revised Code.
    - (f) National emissions for hazardous pollutants (NESHAPS) preconstruction approval under the CAA and Chapter 3704. of the Revised Code.
    - (g) Ocean dumping permits under the Marine Protection Research and Sanctuaries Act (MPRSA), (1972); 33 U.S.C. Sections 1411, 1414b, 1415, and 1417 as amended in 1988.
    - (h) Dredge and fill permits under Section 404 of CWA and Chapter 3745-32 of the Administrative Code.
    - (i) Other relevant environmental permits, including state permits.

- (7) The location of the well or the location where the well is proposed to be drilled given by the latitude and longitude to the nearest second, and the location of the tract on which the well is to be drilled identified by section or lot number, city, village, township, and county.
- (8) Designation of the well by name and number.
- (9) The name of the geological formation to be tested or used and the proposed total depth of the well.
- (10) The type of drilling, completion, and injection equipment to be used.
- (11) The plan for disposal of water and other waste substances resulted, obtained, or produced in connection with drilling, conversion, or testing.
- (12) The chemical composition and physical properties of the substance to be injected.
- (13) A topographic map (or other map if a topographic map is unavailable), on a scale not smaller than four hundred feet to the inch, prepared by an Ohio registered surveyor and extending one mile beyond the property boundaries of the source, shall depict the location of all of the following:
  - (a) The facility.
  - (b) Each of the facilities intake and discharge structures.
  - (c) The proposed injection wells.
  - (d) Each of the facilities hazardous waste treatment, storage, and disposal units.
  - (e) Solid waste disposal units at the facility.
  - (f) Each well where fluids from the facility are injected underground.
  - (g) All wells permitted to inject fluids underground.
  - (h) Active, closed, and temporarily abandoned oil and gas wells.
  - (i) Those wells, springs, and other surface water bodies; and drinking water wells listed in public records or otherwise known to the applicant including the drinking water source protection area for all public water supply wells identified.
  - (j) If the injection well is currently or is proposed to be located within the excavations and workings of an active mine, the map shall include all of the following:
    - (i) The location of the mine.
    - (ii) The name of the mine.
    - (iii) The name of the person operating the mine.

- (k) If the well is currently or is proposed to be located within the excavations and workings of an abandoned mine, the map shall include all of the following:
  - (i) The location of the mine.
  - (ii) The name of the mine, if known.
  - (iii) The dates the mine operated, if known.
- (14) A brief description of the nature of business.
- (15) A plugging and abandonment plan that meets the provisions of either of the following:
  - (a) Rule 3745-34-36 of the Administrative Code for class I wells.
  - (b) Paragraph (H) of rule 3745-34-11 of the Administrative Code for class V wells.
- (16) A plan for the testing, drilling, and construction of the proposed new injection well shall be included within all permit to drill applications. The director may require a demonstration of knowledge and experience by the designer for projects containing a high degree of complexity, non-standard technology, unusual features, or deviations from standards and guidelines used by the agency.
- (F) Record keeping. Applicants shall keep records of all data used to complete permit applications and any supplemental information submitted under this rule for a period of at least three years from the date the application is signed or for the duration of the permitted life of the well, whichever time period is longer. This period may be extended by request of the director at any time.
- (G) Permit application fee.
  - (1) An application for an injection well permit to drill for a class V well or a new class I well shall be accompanied by a nonrefundable fee of three thousand dollars. An application for an injection well permit to operate for a class V well or a new class I well shall be accompanied by a non-refundable fee of three thousand dollars. No application fee shall be assessed for an application for an existing class I well.
  - (2) An application for a modification to a permit to operate for a class V well submitted pursuant to rule 3745-34-23 of the Administrative Code shall be accompanied by a nonrefundable fee of seven hundred and fifty dollars.

[Comment: This rule references the following "United States Code or U.S.C.": the Clean Water Act (CWA) of 1977, 33 U.S.C. Section 1252 et seq. as amended in 2002; the Clean Air Act (CAA) of 1970, 42 U.S.C. Section 7401 et seq. as amended in 1990; the Safe Drinking Water Act (SDWA) of 1974, 42 U.S.C. Section 300 f et seq. as amended in 1996; the Marine Protection Research and Sanctuaries Act (MPRSA) of 1972, 33 U.S.C. Sections 1411, 1414b, 1415, and 1417 as amended in 1988. Copies of these codes may be obtained from the "U.S. Government Bookstore" toll free at (866) 512-1800 or <https://www.gpo.gov/fdsys>, or from "Ohio EPA Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614)

644-2752. This code is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

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Prior Effective Dates: 07/25/84, 09/15/92, 01/24/00, 10/17/03, 04/23/09



**Class I permit application.**

In addition to the information required in accordance with rule 3745-34-12 of the Administrative Code, the owner shall include the following in a permit application for a permit to drill or permit to operate a class I injection well:

- (A) A statement of the relative expertise of the owner or operator of the proposed class I injection well in the operation of class I injection wells. Within the statement include:
  - (1) A listing of all class I injection wells that the owner or operator has operated and is operating;
  - (2) The date that each listed class I injection well was first placed in service or if the well was placed in service before the applicant acquired the well, the date that applicant acquired the well; and
  - (3) The date of issuance, identification number, and expiration date of the permits issued for each listed class I injection well by the United States or the state in which the listed injection well is located and, for each such permit, the name and address of the federal or state agency that issued the permit.
- (B) The owner or operator of any facility containing one or more active class I injection wells must conduct such preliminary site investigations as are necessary to determine whether a release outside the permitted injection zone is occurring, has occurred, or is likely to have occurred.
- (C) Owners and operators of facilities with existing class I injection wells or that are re-permitting a currently operating class I injection well shall submit all of the following information:
  - (1) For each active class I injection well at a facility seeking a permit, both the following:
    - (a) Dates the well was operated; and
    - (b) Specification of all wastes that have been injected into the well.
  - (2) All available information pertaining to any release of hazardous waste or constituents from any active injection well at the facility.
- (D) Area of review. The owner shall identify the location of all known wells within the injection wells' area of review that penetrate the injection zone. The owner shall

submit all of the following:

- (1) A calculation of the area of review of the proposed injection well. This shall include a description of the method of determination of the area of review including all relevant calculations and data used in the calculations. The area of review shall be calculated in accordance with rules 3745-34-32 and 3745-34-52 of the Administrative Code.
- (2) A description of the procedures that were used to identify all wells penetrating the confining zone or injection zone within the area of review and that were used to determine if the identified wells are adequately completed or plugged.
- (3) A map showing the class I injection wells for which the permit is sought and the applicable area of review. The map must show the number or name, and the location of all of the following within the area of review:
  - (a) The location of all known wells that penetrate the injection zone within the injection well's area of review;
  - (b) Actively producing oil and gas wells;
  - (c) Active, temporarily abandoned, and abandoned injection wells;
  - (d) Abandoned oil and gas wells including non-producing wells and boreholes;
  - (e) Surface bodies of water;
  - (f) Springs;
  - (g) Mines (surface and subsurface);
  - (h) Quarries;
  - (i) Water wells;
  - (j) Other pertinent surface features including residences and roads;
  - (k) Seismic areas and faults, if known or suspected; and

(l) Boundaries of the facility.

[Note: Only information of public record is required to be included on the map.]

(4) A tabulation of data on all wells within the area of review that penetrate into the proposed injection zone and are completed within three hundred vertical feet of the permitted injection interval. Such data shall include the following:

(a) Name of the well;

(b) Name of the owner and operator;

(c) Description of each well's type;

(d) Construction data including casing size, setting depth and cementing data for surface, intermediate and long string casings;

(e) Date drilled;

(f) Location in latitude and longitude to the nearest second;

(g) Depth; and

(h) Record of plugging and/or completion.

(i) Note the wells that were inadequately plugged or abandoned.

(ii) Note the wells for which there are incomplete records and include all available records.

(5) The drilling logs and completion logs for all known wells within the injection well's area of review that penetrate the injection zone that were completed within three hundred vertical feet of the permitted injection interval.

(6) An applicable plan and compliance schedule for corrective action pursuant to rules 3745-34-30 and 3745-34-53 of the Administrative Code for all wells that are improperly sealed, completed, or abandoned and consisting of such steps or modifications as are necessary to prevent movement of fluid into or between USDW. The following information, criteria, and factors shall be

included in the plan for corrective action:

- (a) Nature and volume of injected fluid;
  - (b) Nature of native fluids or by-products of injection;
  - (c) Potentially affected population;
  - (d) Geology;
  - (e) Hydrology;
  - (f) History of the injection operation;
  - (g) Completion and plugging records;
  - (h) Abandonment procedures in effect at the time the well was abandoned;
  - (i) Hydraulic connections with USDW; and
  - (j) Surface waste handling operations.
- (7) A report describing all actions taken to date in implementing the plan of corrective action, including the status of corrective action on defective wells in the area of review and the schedule for completion of all actions described within the plan.
- (8) Any additional information the director deems necessary to protect USDW.
- (E) Geologic evaluation. The owner shall submit the following:
- (1) Maps and cross sections indicating the general vertical and lateral limits of all USDW within the area of review, their position relative to the injection formation and the direction of water movement, where known, in each USDW that may be affected by the proposed injection;
  - (2) Maps and cross sections detailing the geologic structure of the local area;
  - (3) Generalized maps and cross sections illustrating the regional geologic setting;

- (4) Maps showing the location of, but not limited to, seismic areas, wetlands, flood hazard areas, carbonate formations that result in caverns, and underground mines, both active and abandoned;
  - (5) A plan for injectivity testing, including provisions to test for pressure/time relationships to determine permeability, transmissivity, and reservoir limits, if any; and
  - (6) A description of the lithology of the injection and confining intervals.
- (F) The owner shall submit an analysis of the geologic suitability of the proposed location of the well. This analysis shall include:
- (1) An analysis of the structural and stratigraphic geology, the hydrogeology, and the seismicity of the region;
  - (2) An analysis of local geology and hydrogeology of the well site, including, at a minimum, detailed information regarding stratigraphy, structure and rock properties, aquifer hydrodynamics and mineral resources;
  - (3) A determination that the geology of the area can be described confidently and that limits of waste fate and transportation can be accurately predicted through the use of models;
  - (4) Lithology, permeability, porosity, thickness and areal extent of the injection and confining intervals;
  - (5) Maps and cross sections detailing the geologic structure and stratigraphy of the local area. Cross-sections should note the location of faults, major fractures, and carbonate formations that are known to contain or that may contain caverns;
  - (6) Generalized maps and cross sections illustrating the regional geologic setting. Cross-sections should note the location of faults, major fractures, and carbonate formations that are known to contain or that may contain caverns; and
  - (7) A demonstration that:
    - (a) The confining zone is separated from the base of the lowermost USDW by

at least one sequence of permeable and less permeable strata that will provide an added layer of protection for the USDW in the event of fluid movement in an unlocated bore hole or transmissive fault; or

(b) Within the area of review, the piezometric surface of the fluid in the injection zone is less than the piezometric surface of the lowermost USDW, considering density effects, injection pressures and any significant pumping in the overlying USDW; or

(c) There is no USDW present.

(8) A demonstration for applications for class I hazardous waste injection wells that the well is sited in compliance with paragraph (C) of rule 3745-34-51 of the Administrative Code.

(G) The owner shall submit the information required by rule 3745-34-59 of the Administrative Code for permit applications for class I hazardous waste injection wells.

(H) Financial assurance. The owner shall submit certification and evidence of financial responsibility for operation and closure of the well including surety bond or other adequate assurance, such as a financial statement or other materials acceptable to the director. This demonstration must be consistent with the provisions of rules 3745-34-27, 3745-34-36, and 3745-34-62 of the Administrative Code.

Effective: 04/23/2009

Five Year Review (FYR) Dates: 07/14/2016 and 07/14/2021

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**Class I permit to drill applications.**

In addition to the information required in accordance with rules 3745-34-12 and 3745-34-13 of the Administrative Code, the owner shall include the following in a permit application for a permit to drill a class I injection well:

(A) The final report on the seismic reflection data survey in compliance with rule 3745-34-40 of the Administrative Code.

(B) Well construction. The owner shall submit the following information for a permit to drill application:

(1) A plan for the testing, drilling and construction of the proposed new class I injection well. Whenever required by the director to protect the public welfare or to safeguard life, health, or property, or whenever the contemplated expenditure by the state, any of its political subdivisions, or any municipal corporation for the completed project exceeds five thousand dollars, plans for the design of new class I wells shall be prepared by a professional engineer registered under Chapter 4733. of the Revised Code. In addition, for projects containing a high degree of complexity, non-standard technology, unusual features, or deviations from standards or guidelines used by the agency, the director may require that the owner or operator demonstrate the knowledge and experience of the project designer.

(2) A schematic or other appropriate drawings of the proposed well with proper setting depths, including wellhead and gauges and a written description of the proposed surface and subsurface construction details of the well including all of the following:

(a) Hole size;

(b) Surface casing, intermediate, long string casing, and injection tubing packer information, including all of the following:

(i) Size;

(ii) Weight;

(iii) Grade;

(iv) Depth-GL;

(v) Thickness;



- (vi) Diameter;
  - (vii) Nominal weight;
  - (viii) Length;
  - (ix) Joint specification;
  - (x) Construction material; and
  - (xi) Tubing tensile, burst, and collapse strength.
- (3) A written demonstration that for the design life of the well the casings, including any casing connections, are rated to have sufficient structural strength to withstand:
- (a) The maximum burst and collapse pressures which may be experienced during the construction, operation, and closure of the well; and
  - (b) The maximum tensile strength which may be experienced at any point along the length of the casing during the construction, operation, and closure of the well.
- (4) Cement data, including the proposed type and class, additives, amount, and circulate for the surface casing, long string, and other casings;
- (5) A description of the packer including all of the following:
- (a) Proposed type;
  - (b) Name and model number;
  - (c) Setting depth; and
  - (d) Compatibility with proposed annular fluid and proposed injection fluid.
- (6) A description of the proposed bottom hole completion.
- (7) A plan for the proposed stimulation program.

- (8) Construction procedures including a cementing and casing program, logging procedures, deviation checks, and a drilling, testing, and coring program. These procedures should address the applicable factors and requirements in rules 3745-34-37, 3745-34-54, and 3745-34-55 of the Administrative Code.
- (9) A written analysis demonstrating that the various parts of the casing, tubing, and cement will be compatible with or resistant to corrosion from the formation fluid and injection fluids to which they will respectively be exposed.
- (10) Procedures for core analysis, if performed, including analysis for at least:
  - (a) Permeability;
  - (b) Porosity;
  - (c) Percent saturation;
  - (d) Sample description;
  - (e) Sieve analysis of sand; and
  - (f) Compatibility testing of cores with waste stream for permeability reduction.
- (C) Proposed formation testing program to obtain analysis of the chemical, physical and radiological characteristics of the receiving formation including, but not limited to:
  - (1) Fluid pressure;
  - (2) Temperature;
  - (3) Fracture pressure;
  - (4) Physical and chemical characteristics of the injection matrix;
  - (5) Compatibility of the injected fluids with the formation fluids;
  - (6) Corrosiveness; and

(7) Other applicable information.

(D) Procedures for performing deviation checks in compliance with paragraph (D)(1) of rule 3745-34-37 of the Administrative Code.

(E) Procedures for performing the logging and testing requirements of paragraph (D) of rule 3745-34-37 of the Administrative Code.

(F) Procedures, forms, and methods for collecting all of the following information:

(1) Drilling and completion records including:

(a) Daily reports;

(b) Driller's log or record of strata;

(c) Casing and tubing records;

(d) Pipetallys;

(e) Detailed screen and liner setting;

(f) Details of centralizers, scratchers, and other such equipment; and

(g) Engineering drawings of:

(i) Well completion;

(ii) Packer assembly and setting; and

(iii) Well head parts list.

(2) Testing records including the following:

(a) Well testing:

(i) Static fluid level;

- (ii) Bottom hole temperature and pressure;
  - (iii) Injectivity test result; permeability determination; reservoir limits and storage;
  - (iv) Spinner or tracer surveys; and
  - (v) Casing testing results including those to demonstrate mechanical integrity pursuant to the requirements of rule 3745-34-34 of the Administrative Code.
- (b) Laboratory testing results:
- (i) Cores for permeability;
  - (ii) Cores for compatibility;
  - (iii) Cores for porosity;
  - (iv) Analysis of formation water; and
  - (v) Descriptive core analysis and sieve analysis.

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**Class I permit to operate applications.**

In addition to the information required in accordance with rules 3745-34-12 and 3745-34-13 of the Administrative Code, the owner shall include the following in an application for a permit to operate a class I injection well:

(A) The results of the formation testing program, including a completion report for the injection well that includes all the following information:

(1) Drilling and completion reports including:

- (a) Daily reports;
- (b) Driller's log or record of strata;
- (c) Casting and tubing records, including the pipetallys;
- (d) Cement records;
- (e) Details of centralizers, scratchers, and other such information; and
- (f) Engineering drawings of the following:
  - (i) Well completion;
  - (ii) Packer assembly and setting; and
  - (iii) Well head, including the parts list.

(2) Testing records including the following:

- (a) Well testing:
  - (i) Static fluid level and fluid pressure;
  - (ii) Bottom hole temperature and pressure;
  - (iii) Injectivity test result, permeability determination, reservoir limits, and storage;
  - (iv) Fracture pressure;

- (v) Spinner or tracer surveys; and
  - (vi) Casing testing results including a demonstration of mechanical integrity pursuant to rules 3745-34-34 and 3745-34-58 of the Administrative Code.
- (b) Laboratory testing results:
- (i) Cores for permeability;
  - (ii) Cores for compatibility;
  - (iii) Cores for porosity; and
  - (iv) Descriptive core analysis and sieve analysis.
- (3) The data from the formation testing program including the analysis of the chemical, physical and radiological characteristics of and other information on the receiving formation.
- (B) The final report of the seismic reflection data survey in compliance with rule 3745-34-40 of the Administrative Code.
- (C) A plan for conducting a passive seismic monitoring program if the director determines that the operation of the class I injection well may cause seismic disturbances.
- (D) The proposed injection procedure including all of the following:
- (1) Average and maximum daily rate and volume of the substance(s) to be injected.
  - (2) Average and maximum injection pressure.
- (E) A description of all of the following:
- (1) The chemical composition and physical properties of the substance(s) to be injected. This should include the source and an analysis of the chemical (including corrosiveness), physical (including density and temperature), radiological and biological characteristics of the injection fluid.

- (2) The compatibility of substance(s) to be injected with the fluids in the injection zone and minerals in both the injection zone and confining zone.
- (F) A determination accompanied by supporting documentation describing all areas around the well where formation pressures are predicted by the applicant to be increased due to the operation of the well and an evaluation of whether any resulting potential exists for contamination of any underground source of drinking water or migration of substances injected into the well outside the anticipated injection zone. The determination shall be made through the use of an hydraulic model acceptable to the director.
- (G) A descriptive report interpreting the results of logs and tests performed during the drilling and construction of the injection well shall be submitted. This report shall be prepared by a knowledgeable log analyst. At a minimum, this report shall contain the applicable information required by paragraph (D) of rule 3745-34-37, and rule 3745-34-55 of the Administrative Code. This report shall include the final prints of all logs run on the well and the results of the directional and inclinational survey.
- (H) Contingency plans to cope with all shut-ins or well failures so as to prevent migration of fluids into any underground source of drinking water.
- (I) A plan for ensuring the annual review and testing of the integrity of the well casing and associated well features. This plan shall comply with the requirements of rule 3745-34-34 of the Administrative Code. Renewal permit applications shall include results of all mechanical integrity tests performed on the injection well since the issuance of the previous permit. If the results of the mechanical integrity tests have already been submitted to Ohio EPA they may be included in the permit application by reference.
- (J) A plan for monitoring the lowermost underground source of drinking water near the injection well.
- (K) A plan for plugging and abandonment pursuant to the applicable provisions of paragraph (B)(5) of rule 3745-34-27, rule 3745-34-36, paragraph (C) of rule 3745-34-39, rule 3745-34-60, and rule 3745-34-61 of the Administrative Code. The plugging and abandonment plan shall including all of the following information:
- (1) The type and number of plugs to be used;
  - (2) The placement of each plug including the elevation of the top and bottom;



- (3) The type and grade and quantity of cement to be use;
  - (4) The method for placement of the plugs; and
  - (5) The procedure to be used to meet the applicable requirements of paragraph (B)(5) of rule 3745-34-27, rule 3745-34-36, paragraph (C) of rule 3745-34-39, rule 3745-34-60, and rule 3745-34-61 of the Administrative Code.
- (L) Plans (including maps) for meeting the applicable testing and monitoring requirements of rules 3745-34-38 and 3745-34-57 of the Administrative Code; and
- (M) If hazardous waste is to be injected and is generated at the same facility where the injection well will be placed, provide a certification that:
- (1) The generator of the hazardous waste has a program to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable; and
  - (2) Injection of the waste is that practicable method of disposal currently available to the generator which minimizes the present and future threat to human health and the environment.
- (N) A report submitting the applicable information required by and demonstrating compliance with the applicable requirements of rules 3745-34-37, 3745-34-54, and 3745-34-55 of the Administrative Code.
- (O) Procedures and forms for collecting and submitting the information required by rule 3745-34-58 of the Administrative Code.

Effective: 04/23/09

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**Class V permit requirements.**

(A) In addition to the information required in accordance with rule 3745-34-12 of the Administrative Code, the owner shall include the following in a permit application for a permit to drill a class V injection well:

(1) A map showing the injection well(s) for which a permit is sought and the applicable area of review. The area of review shall be one-quarter mile beyond the injection well(s). Within the area of review, the map must show the number or name, and location of all of the following:

- (a) All producing and abandoned oil and natural gas wells for which public records exist;
- (b) Injection wells including large capacity septic systems and storm water drainage wells;
- (c) All active and abandoned water supply wells for which public records exist;
- (d) Surface bodies of water;
- (e) Springs;
- (f) Mines (surface and subsurface);
- (g) Quarries;
- (h) Other pertinent surface features including residences and roads;
- (i) Faults, if known or suspected; and
- (j) Storm and sanitary sewers.

(2) Maps and cross sections:

- (a) Indicating the general vertical and lateral limits of all underground sources of drinking water within the area of review, their position relative to the injection formation and the direction of water movement where known, in each underground source of drinking water that may be affected by the proposed injection.
- (b) Detailing the geologic structure of the local area.
- (c) Illustrating the regional geologic setting.

- (3) Geologic description of the injection zone including: name of formation; depth; thickness; and lithology.
  - (4) Proposed injection procedure.
  - (5) Schematic or other appropriate drawings of the proposed surface and subsurface construction details of the well.
  - (6) Any information deemed necessary by the director to determine that the requirements of rule 3745-34-07 of the Administrative Code are satisfied.
- (B) In addition to the information required in accordance with rule 3745-34-12 of the Administrative Code and paragraphs (A)(1) to (A)(3) of this rule, an owner shall include in a permit application for a permit to operate a class V injection well:
- (1) The date the well construction was completed;
  - (2) A construction narrative and as built engineering plans for the well;
  - (3) An anticipated maintenance and inspection schedule for the well;
  - (4) Evidence of financial responsibility for operation, maintenance and closure of the well including surety bond, or other adequate assurance, such as financial statement or other materials acceptable to the director;
  - (5) If requested by the director, the chemical characteristics of formation fluid, including complete chemical analysis for all of the following parameters:
    - (a) Calcium;
    - (b) Magnesium;
    - (c) Sodium;
    - (d) Carbonate;
    - (e) Bicarbonate;
    - (f) Sulfate;
    - (g) Chloride;
    - (h) Fluoride;

- (i) Nitrate;
  - (j) Conductivity;
  - (k) Temperature;
  - (l) Total dissolved solids;
  - (m) Potassium;
  - (n) Manganese;
  - (o) Barium;
  - (p) Boron;
  - (q) Strontium;
  - (r) Cadmium;
  - (s) Iron; and
  - (t) pH;
- (6) A description of the fluid to be injected including, if determined by the director to be necessary to protect underground sources of drinking water, the complete chemical analysis for all chemical parameters needed to determine compliance with rule 3745-34-07 of the Administrative Code;
- (7) For an existing well being converted to a class V well or a permit renewal, provide a chronology of all major workovers and well malfunctions, a brief description of reasons for the well failure, and the corrective actions taken; and
- (8) Any additional information deemed necessary by the director to determine that the requirements of rule 3745-34-07 of the Administrative Code are satisfied.

Replaces: Part of 3745-34-16

Effective: 04/23/2009

R.C. 119.032 review dates: 04/23/2014 and 04/24/2019

Promulgated Under: 119.03

Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: 7/25/84, 9/15/92, 1/24/00, 10/17/03

**Signatories to permit applications and reports.**

(A) Applications. All permit applications shall be signed as follows:

- (1) For a corporation; by a principal executive officer of at least the level of vice president;
- (2) For a partnership or sole proprietorship; by a general partner or the proprietor, respectively; or
- (3) For a municipality, state, federal, or other public agency; by either a principal executive or ranking elected official.

(B) Reports. All reports required by permits, other information requested by the director, and all permit applications submitted under rule 3745-34-12 of the Administrative Code shall be signed by a person described in paragraph (A) of this rule, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

- (1) The authorization is made in writing by a person described in paragraph (A) of this rule;
- (2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility (a duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- (3) The written authorization is submitted to the director.

(C) Changes to authorization. If an authorization under paragraph (B) of this rule is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (B) of this rule must be submitted to the director prior to or together with any reports, information, or applications to be signed by an authorized representative.

(D) Certification. Any person signing a document under paragraph (A) or (B) of this rule shall make the following certification:

"I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate,

and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Effective: 04/23/2009

R.C. 119.032 review dates: 04/23/2014 and 04/24/2019

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Rule Amplifies: 6111.043

Prior Effective Dates: 12/15/82, 7/25/84



**Class V injection well area permits.**

- (A) The director may issue a class V injection well permit on an area basis, rather than for each well individually, provided that the Permit is for class V injection wells:
  - (1) Described and identified by location in permit application(s) if they are existing wells, except that the director may accept a single description of wells with substantially the same characteristics; and
  - (2) Within the same well field, facility site, reservoir, project, or similar unit within the state of Ohio; and
  - (3) Operated by a single owner or operator; and
  - (4) Used to inject other than hazardous waste.
- (B) Area permits shall specify:
  - (1) The area within which underground injections are authorized, and
  - (2) The requirements for construction, monitoring, reporting, operation, and abandonment, for all wells authorized by the permit.
- (C) The area permit may authorize the permittee to construct, and operate, convert, or plug and abandon, wells in excess of the number specified in the current class V injection well area permit, provided:
  - (1) The permittee notifies the director at such time as the permit requires; and
  - (2) The additional well satisfies the criteria in paragraph (A) of this rule and meets the requirements specified in the permit under paragraph (B) of this rule; and
  - (3) The cumulative effects of drilling and operation of additional injection wells are considered by the director during evaluation of the area permit application and are acceptable to the director.
- (D) The director may modify, or revoke and reissue the permit in accordance with rule 3745-34-23 of the Administrative Code, terminate the permit under rule 3745-34-24 of the Administrative Code, or take enforcement action upon a finding that any well authorized by the permit is not in compliance with the terms of the permit.

Effective date: January 20, 1995

R.C. 119.032 review dates: 12/08/2014 and 04/24/2019

Promulgated Under: 119.03

Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: 07/25/84

**Emergency permits.**

(A) Coverage. Notwithstanding any other provision of this chapter, the director may temporarily permit a specific underground injection which has not otherwise been authorized by rule or permit if:

- (1) An imminent and substantial endangerment to the health of persons will result unless a temporary emergency permit is granted; and
- (2) Timely application for a permit could not practicably have been made; and
- (3) The injection will not result in the movement of fluids into underground sources of drinking water.

(B) Requirements for issuance.

- (1) Any temporary permit under paragraph (A) of this rule shall be for no longer term than required to prevent the hazard.
- (2) Notice of any temporary permit under this paragraph shall be published in accordance with rule 3745-47-07 of the Administrative Code within ten days of the issuance of the permit.
- (3) The temporary permit under this rule may be either oral or written. If oral, it must be followed within five calendar days by a written temporary emergency permit.
- (4) The director shall condition the temporary permit in any manner he or she determines is necessary to ensure that the injection will not result in the movement of fluids into an underground source of drinking water.

Effective: 07/25/1984

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Rule Amplifies:	6111.043
Prior Effective Dates:	7/25/84

3745-34-21

**Duration of permits.**

- (A) Permits to operate for class I and class V wells shall be effective for a fixed term not to exceed five years, except that in the case of the renewal of an injection well operating permit that is issued for a class I injection well that was in operation on May 28, 1992 shall be not less than four nor more than six years as determined by the director.
- (B) The term of a permit to operate shall not be extended by modification beyond the maximum duration specified in this rule.
- (C) The director may issue any permit for a duration that is less than the full allowable term under this rule.
- (D)
  - (1) Permits to drill for class I and class V wells shall terminate within eighteen months of the effective date of the permit to drill if the owner or operator has not undertaken a continuing program of installation or modification or has not entered into a binding contractual obligation to undertake and complete within a reasonable time a continuing program of installation or modification.
  - (2) The director may modify a permit to drill to extend these dates of expiration by up to twelve months if the applicant submits, within a reasonable time before the termination date, an application for modification containing information that, in the judgment of the director, adequately justifies an extension of time. No appeal taken from denial of extension of an expiration date shall prevent termination of a permit during the period between denial of extension and final disposition of the appeal.

Effective date: March 11, 2002

R.C. 119.032 review dates: 12/08/2014 and 04/24/2019

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Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: 07/25/84

3745-34-23      **Modification or revocation and reissuance of permits.**

When the director receives any information (for example, inspects the facility, receives information pertinent to the permit submitted by the permittee as required in the permit [see rule 3745-34-26 of the Administrative Code], receives a request for modification or revocation and reissuance or conducts a review of the permit file), the director may determine whether or not one or more of the causes listed in paragraphs (A) and (B) of this rule for modification, revocation and reissuance, or both exist. If cause exists, the director may modify or revoke and reissue the permit accordingly, subject to the limitations of paragraph (C) of this rule, and may request an updated application if necessary. When a permit is modified, only the conditions subject to modification are reopened. If a permit is revoked and reissued, the entire permit is reopened and subject to revision, and the permit is then reissued for a new term. If cause does not exist under this rule or rule 3745-34-25 of the Administrative Code, the director shall not modify or revoke and reissue the permit. If a permit modification satisfies the criteria in rule 3745-34-25 of the Administrative Code for minor modifications, the permit may be modified without a draft permit or public review. Otherwise, a draft permit must be prepared and other procedures in Chapter 3745-49 of the Administrative Code must be followed.

- (A) Causes for modification. The following are causes for modification. For class I hazardous waste injection wells the following may be cause for revocation and reissuance or modification; and for all other wells the following may be cause for revocation or modification when the permittee requests or agrees.
  - (1) Alterations. There are material and substantial alterations or additions to the permitted facility or activity which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit.
  - (2) Information. The director has received information pertinent to the permit. Permits may be modified during their terms for this cause only if the information was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and would have justified the application of different permit conditions at the time of issuance. For underground injection control area permits (rule 3745-34-18 of the Administrative Code), this cause shall include any information indicating that cumulative effects on the environment are unacceptable.
  - (3) New rules. The standards or regulations on which the permit was based have been changed by promulgation of amended rules. Permits may be modified during their terms for this cause only as follows.
    - (a) For promulgation of amended standards or regulations, when all of the following criteria are met:
      - (i) The permit condition requested to be modified was based on a rule within this chapter.
      - (ii) The director has revised, withdrawn, or modified that portion of the regulation on which the permit condition was based.
      - (iii) A permittee requests modification within ninety days after the effective

date of the rule or director's action on which the request is based.

- (4) For judicial decisions when a state court of competent jurisdiction has remanded and stayed Ohio EPA promulgated regulations if the remand and stay concern that portion of the regulations on which the permit condition was based and a request is filed to Ohio EPA by the permittee within ninety days of judicial remand.
  - (5) Compliance schedules. The director determines good cause exists for modification of a compliance schedule, such as an act of God, strike, flood, or materials shortage or other events over which the permittee has little or no control and for which there is no reasonably available remedy. See also paragraph (C) of rule 3745-34-25 of the Administrative Code (minor modifications).
- (B) Causes for modification or revocation and reissuance. The following are causes to modify, or, alternatively, revoke and reissue a permit:
- (1) Cause exists for termination under rule 3745-34-24 of the Administrative Code and the director determines that modification or revocation and reissuance is appropriate.
  - (2) The director has received notification (as required in the permit-see paragraph (D) of rule 3745-34-25 of the Administrative Code) of a proposed transfer of the permit. A permit also may be modified to reflect a transfer after the effective date of an automatic transfer (paragraph (B) of rule 3745-34-22 of the Administrative Code) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new permittee.
  - (3) A determination that the waste being injected is a hazardous waste as defined in rule 3745-34-01 of the Administrative Code either because the definition has been revised, or because a previous determination has been changed.
- (C) Facility siting. Suitability of the facility location will not be considered at the time of permit modification or revocation and reissuance unless new information or standards indicate that a threat to human health or the environment exists which was unknown at the time of permit issuance.

Effective: 11/11/2016

Five Year Review (FYR) Dates: 08/24/2016 and 07/14/2021

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Prior Effective Dates: 12/15/82, 07/25/84, 01/24/00



**Conditions applicable to all permits.**

The following conditions apply to all UIC permits. All conditions applicable to all permits shall be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to these rules must be given in the permit.

- (A) Duty to comply. The permittee must comply with all conditions of the permit. Any permit noncompliance constitutes a violation of sections 6111.043 and 6111.044 of the Revised Code and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application; except that the permittee need not comply with the provisions of the permit to the extent and for the duration such noncompliance is authorized in an emergency permit under rule 3745-34-19 of the Administrative Code.
- (B) Duty to reapply. If the permittee wishes to continue an activity regulated by the permit after the expiration date of the permit, the permittee must apply for and obtain a new permit.
- (C) Need to halt or reduce activity not a defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.
- (D) Duty to mitigate. The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with the permit.
- (E) Proper operation and maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of the permit. "Proper operation and maintenance" includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.
- (F) Permit actions. The permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.
- (G) Property right. The permit does not convey any property rights of any sort, or any exclusive privilege.

- (H) Duty to provide information. The permittee shall furnish to the director, within a time specified, any information which the director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit, or to determine compliance with the permit. The permittee shall also furnish to the director, upon request, copies of records required to be kept by the permittee.
- (I) Inspection and entry. The permittee shall allow the director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:
  - (1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;
  - (2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;
  - (3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under the permit; and
  - (4) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by Chapter 6111. of the Revised Code, any substances or parameters at any location.
- (J) Monitoring and records.
  - (1) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
  - (2) The permittee shall retain records of all monitoring information, including the following:
    - (a) Calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for the duration of the permitted life of the well. This period may be extended by request of the director at any time; and
    - (b) The nature and composition of all injected fluids until three years after the completion of any plugging and abandonment procedures specified under paragraph (B)(5) of rule 3745-34-27 of the Administrative Code. The director may require the

owner or operator to deliver the records to the director at the conclusion of the retention period.

- (3) Records of monitoring information shall include:
  - (a) The date, exact place, and time of sampling or measurements;
  - (b) The individual(s) who performed the sampling or measurements;
  - (c) The date(s) analyses were performed;
  - (d) The individual(s) who performed the analyses;
  - (e) The analytical techniques or methods used; and
  - (f) The results of such analyses.
- (K) Signatory requirement. All applications, reports, or information submitted to the director shall be signed and certified (see rule 3745-34-17 of the Administrative Code).
- (L) Reporting requirements.
  - (1) Planned changes. The permittee shall give written notice to the director as soon as possible of any planned physical alterations or additions to the permitted facility.
  - (2) Anticipated noncompliance. The permittee shall give advance written notice to the director as soon as possible of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
  - (3) Transfers. The permit is not transferable to any person except after written notice to the director.

The director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under sections 6111.043 and 6111.044 of the Revised Code. (See rule 3745-34-22 of the Administrative Code; in some cases, modification or revocation and reissuance is mandatory.)
  - (4) Monitoring reports. Monitoring results shall be reported in writing at the intervals specified elsewhere in the permit.

- (5) Compliance schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted in writing no later than thirty days following each schedule date.
- (6) Twenty-four hour reporting. The permittee shall report any noncompliance which may endanger health or the environment, including:
  - (a) Any monitoring or other information which indicates that any contaminant may cause an endangerment to a USDW; or
  - (b) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between USDWs.

Any information shall be provided orally within twenty-four hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance including exact dates and times, and if the noncompliance including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
- (7) Other noncompliance. The permittee shall report in writing all instances of noncompliance not reported under paragraphs (L)(4), (L)(5), and (L)(6) of this rule, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (L)(6) of this rule.
- (8) Other information. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the director, it shall promptly submit such facts or information in writing.
- (M) Requirements prior to commencing injection. Except for all new wells authorized by a class V injection well area permit under rule 3745-34-18 of the Administrative Code, a new injection well may not commence injection until construction is complete; and
  - (1) The permittee has applied for and obtained a permit to operate in accordance with the requirements of this chapter, and

(2)

- (a) The director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit to drill and the permit to operate; or
  - (b) The permittee has not received notice from the director of his or her intent to inspect or otherwise review the new injection well within thirty days of the date of notice of completion of construction, in which case prior inspection or review is waived and the permittee may commence injection. The director shall include in his notice a reasonable time period in which he shall inspect the well.
- (N) The permittee shall notify the director at such times as the permit requires before conversion or abandonment of the well or in the case of area permits before closure of the project.

Effective date: January 20, 1995

R.C. 119.032 review dates: 12/08/2014 and 04/24/2019

Promulgated Under: 119.03

Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: 12/19/82, 07/25/84

3745-34-27 **Establishing Drilling Permit and Operating Permit Conditions.**

(A) Drilling permits shall include conditions meeting the following requirements:

- (1) Construction requirements as set forth in this chapter. Existing wells shall achieve compliance with such requirements according to a compliance schedule established as a permit condition. The owner or operator of a proposed new injection well shall submit plans for testing, drilling, and construction as part of the permit application. No construction may commence until a permit has been issued containing construction requirements (see rule 3745-34-06 of the Administrative Code). New wells shall be in compliance with paragraph (A) of this rule prior to commencing injection operations. Changes in construction plans during construction may be approved by the director as minor modifications (rule 3745-34-25 of the Administrative Code). No such changes may be physically incorporated into construction of the well prior to approval of the modification by the director.
- (2) Monitoring and reporting requirements as set forth in this chapter shall be complied with by the permittee.
- (3) Additional conditions. The director shall impose on a case-by-case basis such additional conditions as are necessary to prevent the migration of fluids into USDW.

(B) Injection permits shall include conditions meeting the following requirements:

- (1) Corrective action as set forth in rules 3745-34-30 and 3745-34-33 of the Administrative Code.
- (2) Operation requirements as set forth in this chapter. The permit shall establish any maximum injection volumes and/or pressures necessary to assure that fractures are not initiated in the injection zone or the confining zone, that injected fluids do not migrate into any underground source of drinking water, that formation fluids are not displaced into any underground source of drinking water, and to assure compliance with the operating requirements of this chapter.
- (3) Requirements for wells managing hazardous waste, as set forth in rule 3745-34-09 of the Administrative Code.
- (4) Monitoring and reporting requirements as set forth in this chapter. The permittee shall be required to identify types of tests and methods used to generate the monitoring data.
- (5) Plugging and abandonment. Any class I permit shall include, and any class V permit may include, conditions to ensure that plugging and

abandonment of the well will not allow the movement of fluids either into an underground source of drinking water or from one underground source of drinking water to another. Applicants for a UIC permit shall submit a plan for plugging and abandonment. For class I hazardous injection wells, such plan shall be the same as that required under rule 3745-34-36 of the Administrative Code. Where the plan meets the requirements of this paragraph, the director shall incorporate it into the permit as a condition. Where the director's review of an application indicates that the permittee's plan is inadequate, the director shall require the applicant to revise the plan, prescribe conditions meeting the requirements of this paragraph, or deny the application. For purposes of this paragraph, temporary intermittent cessation of injection operations is not abandonment.

- (6) After a cessation of operations of two years, the owner or operator shall plug and abandon the well in accordance with the plugging and abandonment plan. The owner or operator may request approval from the director to not plug and abandon the well. Such a request shall include a description of actions and procedures the owner or operator will take to ensure that the well will not endanger USDWs during the period of temporary abandonment. These actions and procedures shall include compliance with all technical requirements applicable to active injection wells.
  - (7) Financial responsibility. The permittee is required to maintain financial responsibility and resources to close, plug, and abandon the underground injection operation. The permittee must show evidence of financial responsibility to the director by the submission of surety bond, or other materials acceptable to the director. For class I hazardous injection wells, financial responsibility must be demonstrated as required under paragraph (d) of rule 3745- 34-36 of the Administrative Code.
  - (8) Mechanical integrity. A permit for any class I well or injection project which lacks mechanical integrity shall include, and for any class V well may include, a condition prohibiting injection operations until the permittee shows to the satisfaction of the director under rule 3745-34-34 of the Administrative Code that the well has mechanical integrity.
  - (9) Additional conditions. The director shall impose on a case-by-case basis such additional conditions as are necessary to prevent the migration of fluids into underground sources of drinking water.
- (C) In addition to conditions required in rule 3745-34-26 of the Administrative Code, the director shall establish conditions, as required on a case-by-case

basis under rule 3745-34-21 of the Administrative Code (duration of permits), paragraph (a) of rule 3745-34-28 of the Administrative Code (schedules of compliance), rule 3745-34-29 of the Administrative Code (monitoring), paragraph (b) of rule 3745-34-28 of the Administrative Code (alternate schedules of compliance), and rule 3745-34-02 of the Administrative Code (considerations under federal law).

- (1) In addition to conditions required in all permits, the director shall establish conditions in permits as required on a case-by-case basis, to provide for and assure compliance with all applicable requirements of sections 6111.043 and 6111.044 of the Revised Code and this chapter.
  - (2) An "applicable requirement" is any requirement which takes effect prior to the modification or revocation and reissuance of a permit, to the extent allowed in rule 3745-34-23 of the Administrative Code.
  - (3) New or reissued permits, and to the extent allowed under rule 3745-34-23 of the Administrative Code, modified or revoked and reissued permits, shall incorporate each of the applicable requirements referenced in rule 3745-34-27 of the Administrative Code.
  - (4) Permits for owners or operators of hazardous waste injection wells shall include conditions meeting the requirements of rule 3745-34-09 and rules 3745-34-50 to 3745-34-62 of the Administrative Code.
- (D) Incorporation. All permit conditions shall be incorporated either expressly or by reference. If incorporated by reference, a specific citation to the applicable regulations or requirements must be given in the permit.

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Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: 12/15/82, 07/25/84, 12/16/91



3745-34-32 **Area of review.**

The area of review of each injection well or each field or project shall be determined according to either paragraph (A) or (B) of this rule. The director may solicit input from the owners or operators of injection wells within the state as to which method is most appropriate for each geographic area or field.

(A) Zone of endangering influence.

- (1) In the case of an application for a well permit under rule 3745-34-12 of the Administrative Code, the zone of endangering influence is the area for which the radius is the lateral distance where the pressures in the injection zone may cause the migration of the injection and/or formation fluid into an underground source of drinking water; or
- (2) Computation of the zone of endangering influence may be based upon the parameters listed below and should be calculated for an injection time period equal to the expected life of the injection well or pattern. The following modified Theis equation illustrates one form which the mathematical model may take.

$$r = [(2.25KHt) \setminus (S10^x)]^{1/2}$$

where

$$x = (4\pi KH [h_w - h_{bo} (S_p G_b) ] ) \setminus 2.3Q$$

$r$  = Radius of endangering influence from injection well (length)

$K$  = Hydraulic conductivity of the injection zone (length/time)

$H$  = Thickness of the injection zone (length)

$t$  = Time of injection (time)

$S$  = Storage coefficient (dimensionless)

$Q$  = Injection rate (volume/time)

$h_{bo}$  = Observed original hydrostatic head of injection zone (length)  
measured from the base of the lowermost underground  
source of drinking water

$h_w$  = Hydrostatic head of underground source of drinking water  
(length) measured from the base of the lowest underground  
source of drinking water

$S_p G_b$  = Specific gravity of fluid in the injection zone  
(dimensionless)

$\pi$  = 3.142 (dimensionless)

The above equation is based on the following assumptions:

- (a) The injection zone is homogenous and isotropic;
- (b) The injection zone has infinite area extent;
- (c) The injection well penetrates the entire thickness of the injection zone;
- (d) The well diameter is infinitesimal compared to “r” when injection time is longer than a few minutes; and
- (e) The emplacement of fluid into the injection zone creates instantaneous increase in pressure.

(B) Fixed radius.

- (1) In the case of an application for a well permit(s) under rule 3745-34-12 of the Administrative Code, a fixed radius around the well of not less than one-fourth mile may be used.
- (2) In determining the fixed radius, the following factors shall be taken into consideration: chemistry of injected and formation fluids; hydrogeology; population and ground water used and dependence; and historical practices in the area.

(C) If the area of review is determined by a mathematical model pursuant to paragraph (A) of this rule, the permissible radius is the result of such calculation even if it is less than one-fourth mile.

Effective: 04/23/2009

Five Year Review (FYR) Dates: 07/14/2016 and 07/14/2021

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Statutory Authority:	6111.043
Rule Amplifies:	6111.043
Prior Effective Dates:	7/25/84

In determining the adequacy of corrective action proposed by the applicant under rule 3745-34-30 of the Administrative Code and in determining the additional steps needed to prevent fluid movement into underground sources of drinking water, the following criteria and factors shall be considered by the director:

- (A) Nature and volume of injected fluid;
- (B) Nature of native fluids or by-products of injection;
- (C) Potentially affected population;
- (D) Geology;
- (E) Hydrology;
- (F) History of the injection operation;
- (G) Completion and plugging records;
- (H) Abandonment procedures in effect at the time the well was abandoned;
- (I) Hydraulic connections with underground sources of drinking water; and
- (J) Surface waste handling operations.

Effective: 07/25/1984

Five Year Review (FYR) Dates: 07/14/2016 and 07/14/2021

Promulgated Under:	119.03
Statutory Authority:	6111.043
Rule Amplifies:	6111.043
Prior Effective Dates:	12/15/82, 7/25/84

3745-34-34      **Mechanical integrity.**

- (A) An injection well has mechanical integrity if the following are met:
  - (1) There are no significant leaks in the casing, tubing or packer.
  - (2) There is no significant fluid movement into an underground source of drinking water (USDW) through vertical channels adjacent to the injection well bore.
- (B) One of the following methods shall be used to evaluate the absence of leaks under paragraph (A)(1) of this rule:
  - (1) Monitoring of the tubing-casing annulus pressure with sufficient frequency to be representative, as determined by the director, while maintaining an annulus pressure different from atmospheric pressure measured at the surface.
  - (2) Pressure test with liquid or gas.
- (C) The results of a temperature or noise log shall be used to determine the absence of significant fluid movement under paragraph (A)(2) of this rule.
- (D) The director may allow the use of a test to demonstrate mechanical integrity other than those listed in paragraphs (B) and (C) of this rule with the written approval of the administrator of the United States environmental protection agency (USEPA). To obtain approval, the director shall submit a written request to the administrator of USEPA, which shall set forth the proposed test and all technical data supporting its use. Any alternate method approved by the director shall be published pursuant to the requirements of Chapter 3745-49 of the Administrative Code.
- (E) In conducting and evaluating the tests enumerated in this rule or others to be allowed by the director, the owner or operator and the director shall apply methods and standards generally accepted in the industry. When the owner or operator reports the results of mechanical integrity tests to the director, a description of any test and any method used shall be included. In making an evaluation, the director shall review monitoring and other test data submitted since the previous evaluation.
- (F) The director or the director's authorized representative shall be present during the test for demonstration of mechanical integrity, unless the director or the director's authorized representative waives this requirement before the test occurs.
- (G) The director may require additional or alternative tests if the results presented by the owner or operator under paragraph (E) of this rule are not satisfactory to the director to demonstrate that there is no movement of fluid into or between USDWs resulting from the injection activity.
- (H) No injection without the director's approval shall occur into a class I well that cannot maintain technical integrity as defined by paragraph (A) of this rule unless the injection of fluids is intended to prevent the flow of waste up the well to the surface. In the event that a loss of mechanical integrity of a class I well is discovered, the owner or operator shall follow the requirements of paragraph (H) of rule 3745-34-56 of the Administrative Code.

Effective: 11/11/2016

Five Year Review (FYR) Dates: 08/24/2016 and 07/14/2021

Promulgated Under: 119.03

Statutory Authority: 6111.043

Rule Amplifies: 6111.043, 6111.044, 6111.046, 6111.047, 6111.049

Prior Effective Dates: 12/15/82, 07/25/84, 01/24/00

**Criteria for establishing permitting priorities.**

In determining priorities for setting times for owners to submit applications for authorization to operate under the procedures of paragraphs (A) and (C) of rule 3745-34-12, and paragraphs (B) and (C) of rule 3745-34-13 of the Administrative Code, the director shall base these priorities upon consideration of the following factors:

- (A) Injection wells known or suspected to be contaminating underground sources of drinking water;
- (B) Injection wells known to be injecting fluids containing hazardous contaminants;
- (C) Likelihood of contamination of underground sources of drinking water;
- (D) Potentially affected population;
- (E) Injection wells violating existing requirements of this chapter and Chapters 6111. and 3734. of the Revised Code;
- (F) Coordination with the issuance of permits required by other permit programs;
- (G) Age and depth of the injection well; and
- (H) Expiration dates of existing permits, if any.



Effective: 04/23/09

Five Year Review (FYR) Dates: 07/14/2016 and 07/14/2021

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Statutory Authority:	6111.043
Rule Amplifies:	6111.043
Prior Effective Dates:	7/25/84

**Construction requirements for class I wells.**

- (A) All class I wells shall be sited in such a fashion that they inject into a formation which is beneath the lowermost formation containing, within one-quarter mile of the well bore, an underground source of drinking water.
- (B) All class I wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well. In determining and specifying casing and cementing requirements, the following factors shall be considered:
  - (1) Depth to the injection zone;
  - (2) Injection pressure, external pressure, internal pressure, and axial loading;
  - (3) Hole size;
  - (4) Size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification, and construction material);
  - (5) Corrosiveness of injected fluid, formation fluids, and temperatures;
  - (6) Lithology of injection and confining intervals; and
  - (7) Type or grade of cement.
- (C) All class I injection wells, except those municipal wells injecting non-corrosive wastes, shall inject fluids through tubing with a packer set immediately above the injection zone, or tubing with an approved fluid seal as an alternative. The tubing, packer, and fluid seal shall be designed for the expected service.
  - (1) The use of other alternatives to a packer may be allowed with the written approval of the director. To obtain approval, the operator shall submit a written request to the director, which shall set forth the proposed alternative and all technical data supporting its use. The director shall approve the request if the alternative method will reliably provide a comparable level of protection to underground sources of drinking water. The director may approve an alternative method solely for an individual well or for general use.
  - (2) In determining and specifying requirements for tubing, packer, or alternatives, the following factors shall be considered:

- (a) Depth of setting;
  - (b) Characteristics of injection fluid (chemical content, corrosiveness, and density);
  - (c) Injection pressure;
  - (d) Annular pressure;
  - (e) Rate, temperature and volume of injected fluid; and
  - (f) Size of casing.
- (3) All areas of a well that may come into contact with corrosive wastes shall be constructed of corrosion-resistant materials.
- (D) Appropriate logs and other tests shall be conducted during the drilling and construction of new class I wells. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the director. At a minimum, such logs and tests shall include:
- (1) Deviation checks on all holes constructed by first drilling a pilot hole, and then enlarging the pilot hole by reaming or another method. Such checks shall be at sufficiently frequent intervals to assure that vertical avenues for fluid migration in the form of diverging holes are not created during drilling.
  - (2) Such other logs and tests as may be needed after taking into account the availability of similar data in the area of the drilling site, the construction plan, and the need for additional information, that may arise from time to time as the construction of the well progresses. In determining which logs and tests shall be required, the following logs shall be considered for use in the following situations:
    - (a) For surface casing intended to protect underground sources of drinking water;
      - (i) Resistivity, spontaneous potential, and caliper logs before the casing is installed; and
      - (ii) A cement bond, temperature, or density log after the casing is set

and cemented.

(b) For intermediate and long strings of casing intended to facilitate injection:

(i) Resistivity, spontaneous potential, porosity, and gamma ray logs before the casing is installed;

(ii) Fracture finder logs; and

(iii) A cement bond, temperature, or density log after the casing is set and cemented.

(E) At a minimum, the following information concerning the injection formation shall be determined or calculated for new class I wells:

(1) Fluid pressure;

(2) Temperature;

(3) Fracture pressure;

(4) Other physical and chemical characteristics of the injection matrix;

(5) Physical and chemical characteristics of the formation fluids; and

(6) Compatibility of injected fluids with formation fluids.

Effective: 07/25/1984

Five Year Review (FYR) Dates: 07/14/2016 and 07/14/2021

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Rule Amplifies:	6111.043
Prior Effective Dates:	12/15/82, 7/25/84

3745-34-38 **Operating, Monitoring, and Reporting Requirements for Class I Wells.**

- (A) Operating requirements. Operating requirements shall, at a minimum, include:
- (1) Except during stimulation, injection pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case shall injection pressure initiate fractures in the confining zone or cause the movement of injection or formation fluids into an underground source of drinking water.
  - (2) Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.
  - (3) Unless an alternative to a packer has been approved under paragraph (c) of rule 3745-34-37 of the Administrative Code, the annulus between the tubing and the long string of casings shall be filled with a fluid approved by the director, and a pressure, also approved by the director, shall be maintained on the annulus.
- (B) Monitoring requirements. Monitoring requirements shall, at a minimum, include:
- (1) The analysis of the injected fluids with sufficient frequency to yield representative data of their characteristics; and
  - (2) Installation and use of continuous recording devices to monitor injection pressure, flow rate and volume, and the pressure on the annulus between the tubing and the long string of casing; and
  - (3) A demonstration of mechanical integrity pursuant to rule 3745-34-34 of the Administrative Code every three years during the life of the well or more frequently, if public health, safety, or environmental circumstances so warrant; and
  - (4) Pressure testing of the entire casing length every three years during the life of the well or more frequently, if public health, safety, or environmental circumstances so warrant, instead of using as the standard a pressure of fifty per cent greater than the average pressure; and
  - (5) The type, number and location of wells within the area of review to be used to monitor any migration of fluids into and pressure in the underground sources of drinking water, the parameters to be

measured and the frequency of monitoring.

- (C) The director may require the owner or operator to submit, for approval, a monitoring program plan which meets the requirements set forth in rule 3745-34-57 of the Administrative Code.
- (D) Reporting requirements. Reporting requirements shall, at a minimum, include:
  - (1) Monthly reports to the director on:
    - (a) The physical, chemical and other relevant characteristics of injection fluids; and
    - (b) Monthly average, maximum and minimum values for injection pressure, flow rate in gpm and volume, and annular pressure. For each minimum and maximum injection rate reported, list in the report the injection pressure and annulus pressure occurring during the time the well was operating at this minimum or maximum rate. Also include a listing of the date, duration, and cause of any non-operating period for each well during the month; and
    - (c) The results of monitoring prescribed under paragraph (b)(5) of this rule.
  - (2) Reporting the results, with the first monthly report after the completion, of:
    - (a) Periodic tests of mechanical integrity; and
    - (b) Any other test of the injection well conducted by the permittee if required by the director; and
    - (c) Any well work over.
  - (3) Any procedures conducted at the injection well other than routine operational procedures.

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Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: 12/15/82, 07/25/84

**Information to be considered by the director in authorizing class I wells.**

This rule sets forth the information which must be considered by the director in authorizing class I wells. For an existing or converted new class I well, the director may rely on the existing permit file for those items of information listed below which are current and accurate in the file. For a newly drilled class I well, the director shall require the submission of all the information listed below. For both existing and new class I wells, certain maps, cross sections, tabulations of wells within the area of review and other data may be included in the application by reference provided they are current, readily available to the director (for example in the permitting agency's files) and sufficiently identified to be retrieved.

(A) Prior to the issuance of a permit for an existing class I well to operate or the construction or conversion of a new class I well, the director shall consider the following:

- (1) Information required in rules 3745-34-12, 3745-34-13, and 3745-34-14 of the Administrative Code;
- (2) A map showing the injection well(s) for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number, or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells and other pertinent surface features including residences and roads. The map should also show faults, if known or suspected. Only information of public record is required to be included on this map;
- (3) A tabulation of data on all wells within the area of review which penetrate into the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the director may require;
- (4) Maps and cross sections indicating the general vertical and lateral limits of all underground sources of drinking water within the area of review, their position relative to the injection formation and the direction of water movement, where known, in each underground source of drinking water which may be affected by the proposed injection;
- (5) Maps and cross sections detailing the geologic structure of the local area;
- (6) Generalized maps and cross sections illustrating the regional geologic setting;



(7) Proposed operating data:

- (a) Average and maximum daily rate and volume of the fluid to be injected;
- (b) Average and maximum injection pressure; and
- (c) Source and an analysis of the chemical, physical, radiological and biological characteristics of injection fluids.

(8) Proposed formation testing program to obtain an analysis of the chemical, physical and radiological characteristics of and other information on the receiving formation;

(9) Proposed stimulation program;

(10) Proposed injection procedure;

(11) Schematic or other appropriate drawings of the surface and subsurface construction details of the well;

(12) Contingency plans to cope with all shut-ins or well failures so as to prevent migration of fluids into any underground source or drinking water;

(13) Plans (including maps) for meeting the monitoring requirements in paragraph (B) of rule 3745-34-38 of the Administrative Code;

(14) For wells within the area of review which penetrate the injection zone but are not properly completed or plugged, the corrective action proposed to be taken under rule 3745-34-30 of the Administrative Code;

(15) Construction procedures including a cementing and casing program, logging procedures, deviation checks, and a drilling, testing, and coring program;

(16) A certificate that the applicant has assured, through a performance bond or other appropriate means, the resources necessary to close, plug or abandon the well as required by paragraph (B)(6) of rule 3745-34-27 of the Administrative Code;

(17) Location, including, but not limited to, seismic areas, wetlands, flood hazard areas, carbonate formations that result in caverns, and underground mines,

both active and abandoned; and

(18) The means to dispose of any sludges, solid wastes, or semi-solids or liquids generated in the treatment of any wastes received.

(B) Prior to granting approval for the operation of a class I well, the director shall consider the following information:

(1) All available logging and testing program data on the well;

(2) A demonstration of mechanical integrity pursuant to rule 3745-34-34 of the Administrative Code;

(3) The anticipated maximum pressure and flow rate at which the permittee will operate;

(4) The results of the formation testing program;

(5) The actual injection procedure;

(6) The compatibility of injected waste with fluids in the injection zone and minerals in both the injection zone and the confining zone; and

(7) The status of corrective action on defective wells in the area of review.

(C) Prior to granting approval for the plugging and abandonment of a class I well, the director shall consider the following information:

(1) The type and number of plugs to be used;

(2) The placement of each plug including the elevation of the top and bottom;

(3) The type and grade and quantity of cement to be used;

(4) The method for placement of the plugs; and

(5) The procedure to be used to meet the requirements of rule 3745-34-36 of the Administrative Code.

Effective: 04/23/2009

Five Year Review (FYR) Dates: 07/14/2016 and 07/14/2021

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Statutory Authority:	6111.043
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Prior Effective Dates:	12/15/82, 7/25/84

3745-34-40      **Seismic reflection survey requirements for class I wells.**

- (A) A seismic reflection data survey shall be conducted at each injection site where a class I injection well is located or is proposed to be located in order to determine the presence or absence of such geologic faults or fractures as may be identified by seismic reflection survey data within or near the area around the well where the formation pressures may be increased due to the operation of the well.
- (B) A new seismic reflection data survey is not required, if a seismic reflection data survey was conducted at an injection site in accordance with a work plan approved by the director or a seismic reflection data survey was conducted at an injection site and the results were approved in writing by the director.
- (C) The owner of a class I injection well shall re-evaluate the seismic reflection data collected per paragraph (A) or (B) of this rule, if there is a change in the area of review of an injection well or if the owner or operator is proposing a new well to be located at the injection site. The director may require the owner or operator to submit additional seismic reflection data as may be necessary or appropriate, if the director determines that the existing data are inadequate to determine the presence or absence of geologic faults or fractures as may be identified by seismic reflection survey data within the altered area of review or within the area of pressure buildup of the new well.
- (D) Prior to conducting a seismic reflection data survey, the owner or operator shall submit for approval by the director, a work plan detailing the activities and methods to be used to fulfill the requirements of paragraph (A) of this rule. The activities and methods described in the plan shall include those used in data acquisition, processing, interpreting and reporting the seismic reflection data. This work plan shall, at a minimum, include the following:
  - (1) Provisions for data acquisition, processing, and plotting no less than three seconds of data.
  - (2) Proposed line locations and appropriate acquisition and processing parameters for the data. The survey shall include adequate horizontal data coverage which will image and properly identify any known or unknown geologic features that may affect the site, both during operation and post-closure periods of the wells.
  - (3) Provisions for keeping detailed and dated field notes and records of all geophysical investigations.
  - (4) Provisions for headers on final line plots to indicate the shotpoint ranges of the various energy sources, if multiple energy sources are utilized within a survey. Any changes in shooting or processing parameters utilized should be specified within the headers as well.
  - (5) Provisions for having lines plotted at an appropriate vertical scale.
  - (6) Other additional information determined necessary by the director.

- (E) The owner or operator shall conduct the seismic reflection survey per the plan approved by the director under paragraph (D) of this rule, unless during the conducting of the seismic reflection survey unanticipated conditions cause a reasonable deviation from the approved plan. Any deviation from the plan shall be reported to Ohio EPA within one business day of the deviation taking place. Any deviations from the approved plan shall continue to allow the resulting seismic reflection survey to meet the requirements of paragraph (A) of this rule. All deviations from the approved plan shall be listed within the report required by paragraph (F) of this rule with an explanation as to why the deviation was necessary and how the deviation continued to allow the seismic reflection survey to continue to meet the requirements of paragraph (A) of this rule.
- (F) The owner shall submit to the director four copies of the final report and digital data with all appropriate header information detailing the results of the seismic reflection data survey required by paragraph (A) of this rule. This report shall be submitted with the permit to drill application required by rules 3745-34-12 and 3745-34-13 of the Administrative Code. The report shall be certified in accordance with rule 3745-34-17 of the Administrative Code. The report shall describe, where present, the faults and fractures within or near the area around the well where the formation pressures may be increased due to the operation of the well. Where there are no faults and fractures present within or near the area around the well where the formation pressures may be increased due to the operation of the well, the report shall state this. The report shall, at a minimum, include the following:
- (1) A copy of the seismic reflection field digital data. The field digital data shall be submitted in a format approved by the director within the work plan required.
  - (2) A surveyed base map illustrating the following:
    - (a) Surveyed line locations with shot points annotated.
    - (b) All wells in the area that penetrate the confining zone, with permit numbers, total depth and standard symbols utilized to denote these wells. The producing zone(s) of these wells should be listed within the final report.
    - (c) The facility property boundaries.
    - (d) County and township boundaries and names (or numbers).
    - (e) Highways, pipelines, railways and transmission lines.
  - (3) Provisions for including processed digital data of seismic profiles in the final report.
    - (a) Brute stack.
    - (b) Structure stack.
    - (c) Migration stack.
  - (4) The compilation and presentation of processing step notes with the data. These notes should be detailed so the entire processing sequence may be duplicated by an outside party. Intermediate data, specific procedures and the technical basis for selected

procedures applied in all static corrections should be provided in digital form.

- (5) A copy of interpreted profile sections as requested by the director with all significant geologic horizons annotated. The stratigraphic nomenclature shall be that currently in use by the Ohio department of natural resources, division of geologic survey. Wellbores shall be projected along regional geologic strike and annotated on nearby sections. The distance and azimuth of the projection shall be noted on any seismic lines for each well location. One copy of the uninterpreted seismic sections shall be included within the report.
- (6) Other additional information determined necessary by the director.
- (G) The director may require a passive seismic monitoring program be maintained at or near the injection site if the director determines that the operation of a class I injection well may cause seismic disturbances. The director may require that a microseismicity monitoring program be maintained at an injection site when determined to be necessary or appropriate.

Effective: 11/11/2016

Five Year Review (FYR) Dates: 08/24/2016 and 07/14/2021

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Statutory Authority: 6111.043  
Rule Amplifies: 6111.043  
Prior Effective Dates: 03/11/02, 04/23/09

**Minimum criteria for siting class I hazardous waste injection wells.**

- (A) All class I hazardous waste injection wells shall be sited such that they inject into a formation that is beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.
- (B) Upon a finding by the director, the siting of class I hazardous waste injection wells shall be limited to areas that are geologically suitable. The director shall determine geologic suitability based upon information submitted by the applicant including:
  - (1) An analysis of the structural and stratigraphic geology, the hydrogeology, and the seismicity of the region; and
  - (2) An analysis of the local geology and hydrogeology of the well site, including, at a minimum, detailed information regarding stratigraphy, structure and rock properties, aquifer hydrodynamics and mineral resources; and
  - (3) A determination that the geology of the area can be described confidently and that limits of waste fate and transport can be accurately predicted through the use of models.
- (C) Class I hazardous waste injection wells shall be sited such that:
  - (1) The injection zone has sufficient permeability, porosity, thickness and areal extent to prevent migration of fluids into USDWs.
  - (2) The confining zone:
    - (a) Is laterally continuous and free of transecting, transmissive faults or fractures over an area sufficient to prevent the movement of fluids into USDW; and
    - (b) Contains at least one formation of sufficient thickness and with lithologic and stress characteristics capable of preventing vertical propagation of fractures.
- (D) The owner or operator shall submit information to the director adequate to demonstrate that:
  - (1) The confining zone is separated from the base of the lowermost USDW by at least one sequence of permeable and less permeable strata that will provide an



added layer of protection for the USDW in the event of fluid movement in an unlocated bore hole or transmissive fault; or

(2) Within the area of review, the piezometric surface of the fluid in the injection zone is less than the piezometric surface of the lowermost USDW, considering density effects, injection pressures and any significant pumping in the overlying USDW; or

(3) There is no USDW present.

Effective: 01/24/2000

Five Year Review (FYR) Dates: 07/14/2016 and 07/14/2021

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Prior Effective Dates:	12/16/91, 1/24/00

**Construction requirements.**

(A) All existing and new class I hazardous waste injection wells shall be constructed and completed by owners and operators to:

- (1) Prevent the movement of fluids into or between USDWs or into any unauthorized zones;
- (2) Permit the use of appropriate testing devices and work over tools; and
- (3) Permit continuous monitoring of injection tubing and long string casing as required pursuant to rule 3745-34-56 of the Administrative Code.

(B) All well materials used in the construction of new class I hazardous waste injection wells must be compatible with fluids with which the materials may be expected to come into contact. A well shall be deemed by the director to have compatibility as long as the materials used in the construction of the well meet or exceed the requirements of this rule.

(C) Casing and cementing of new wells.

- (1) Casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well, including the post-closure care period. The casing and cementing program shall be designed to prevent the movement of fluids into or between USDWs, and to prevent potential leaks of fluids from the well. In establishing casing and cementing requirements of the permit, the director shall consider the following information as required by rule 3745-34-59 of the Administrative Code.

- (a) Depth to the injection zone;
- (b) Injection pressure, external pressure, internal pressure and axial loading;
- (c) Hole size;
- (d) Size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification and construction material);
- (e) Corrosiveness of injected fluid, formation fluids and temperature;
- (f) Lithology of injection and confining zones;

- (g) Type or grade of cement; and
  - (h) Quantity and chemical composition of the injected fluid.
- (2) One surface casing string shall, at a minimum, extend into the confining bed below the lowest formation that contains a USDW and be cemented by circulating cement from the base of the casing to the surface, using a minimum of one hundred twenty per cent of the calculated annular volume. The director may require more than one hundred twenty per cent when the geology or other circumstances warrant to protect underground sources of drinking water.
- (3) At least one long string casing, using a sufficient number of centralizers, shall extend to the injection zone and shall be cemented by circulating cement to the surface in one or more stages:
- (a) Of sufficient quantity and quality to withstand the maximum operating pressure; and
  - (b) In a quantity no less than one hundred twenty per cent of the calculated volume necessary to fill the annular space. The director may require more than one hundred twenty per cent when the geology or other circumstances warrant to protect underground sources of drinking water.
- (4) Circulation of cement may be accomplished by staging. The director may approve an alternative method of cementing in cases where the cement cannot be recirculated to the surface, provided the owner or operator can demonstrate by using logs that the cement is continuous and does not allow fluid movement behind the well bore and it is still protective of underground sources of drinking water.
- (5) Casings, including any casing connections, must be rated to have sufficient structural strength to withstand, for the design life of the well;
- (a) The maximum burst and collapse pressures that may be experienced during the construction, operation, and closure of the well; and
  - (b) The maximum tensile stress that may be experienced at any point along the length of the casing during the construction, operation, and closure of the well.

- (6) At a minimum, cement and cement additives must be of sufficient quality and quantity to maintain integrity over the design life of the well.

(D) Tubing and packer.

- (1) All class I hazardous waste injection wells shall inject fluids through tubing with a packer set at a point approved by the director.
- (2) In determining and specifying requirements for tubing and packer, the director shall consider the following factors, among others:
  - (a) Depth of setting;
  - (b) Characteristics of injection fluid (chemical content, corrosiveness, temperature and density);
  - (c) Injection pressure;
  - (d) Annular pressure;
  - (e) Rate (intermittent or continuous), temperature and volume of injected fluid;
  - (f) Size of casing; and
  - (g) Tubing tensile, burst, and collapse strengths.
- (3) The director may approve the use of fluid seal if the director finds that the following conditions are met:
  - (a) The operator demonstrates that the seal will provide a level of protection comparable to a packer;
  - (b) The operator demonstrates that the staff is, and will remain, adequately trained to operate and maintain the well and to identify and interpret variations in parameters of concern;
  - (c) The permit contains specific limitations on variations in annular pressure and loss of annular fluid;

- (d) The design and construction of the well allows continuous monitoring of the annular pressure and mass balance of annular fluid; and
- (e) A secondary system is used to monitor the interface between the annulus fluid and the injection fluid and the permit contains requirements for testing the system every three months and recording the results.

Effective: 04/23/2009

Five Year Review (FYR) Dates: 07/14/2016 and 07/14/2021

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Prior Effective Dates:	12/16/91

3745-34-56 **Operating requirements.**

- (A) Except during stimulation, the owner or operator of a class I injection well shall assure the director in writing, that injection pressure at the wellhead does not exceed a maximum which shall be calculated so as to ensure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. The owner or operator shall operate a class I injection well such that the injection pressure does not initiate fractures or propagate existing fractures in the confining zone, or cause the movement of injection or formation fluids into a USDW.
- (B) Injection between the outermost casing protecting USDWs and the well bore is prohibited.
- (C) The owner or operator of a class I hazardous waste injection well shall maintain an annulus pressure that exceeds the operating injection pressure, unless the director determines that such a requirement might harm the integrity of the well. The fluid in the annulus shall be noncorrosive, or shall contain a corrosion inhibitor.
- (D) The owner or operator of a class I hazardous waste injection well shall maintain mechanical integrity of the injection well at all times.
- (E) Permit requirements for owners or operators of hazardous waste wells which inject wastes which have the potential to react with the injection formation to generate gases shall include:
  - (1) Conditions limiting the temperature, pH or acidity of the injected waste; and
  - (2) Procedures necessary to assure that pressure imbalances which might cause a backflow or blowout do not occur.
- (F) The owner or operator of a class I hazardous waste injection well shall install and use continuous recording devices to monitor the injection pressure; the flow rate, volume, and temperature of injected fluids and the pressure on the annulus between the tubing and the long string casing, and shall install and use:
  - (1) Automatic alarm and automatic shut-off systems, designed to sound and shut-in the well when pressures and flow rates or other parameters approved by the director exceed a range and/or gradient specified in the permit; or
  - (2) Automatic alarms, designed to sound when the pressures and flow rates or other parameters approved by the director exceed a rate



and/or gradient specified in operator will be on-site at all times when the well is operating.

- (G) If an automatic alarm or shutdown is triggered, the owner or operator shall investigate immediately and identify as expeditiously as possible the cause of the alarm or shutoff. If, upon such investigation, the well appears to be lacking mechanical integrity, or if monitoring required under paragraph (F) of this rule otherwise indicates that the well may be lacking mechanical integrity, the owner or operator shall:
  - (1) Immediately cease injection of waste fluids unless authorized by the director to continue or resume injection; and
  - (2) Take all necessary steps to determine the presence or absence of a leak; and
  - (3) Notify the director within twenty-four hours after the alarm or shutdown.
- (H) In the event that a loss of mechanical integrity is discovered pursuant of this rule or during periodic mechanical integrity testing, the owner or operator shall:
  - (1) Immediately cease injection of waste fluids; and
  - (2) Take all steps reasonably necessary to determine whether there may have been a release of hazardous wastes or hazardous waste constituents into any unauthorized zone; and
  - (3) Notify the director within twenty-four hours after loss of mechanical integrity is discovered; and
  - (4) Notify the director when injection can be expected to resume; and
  - (5) Restore and submit a demonstration of mechanical integrity for approval by the director prior to resuming injection of waste fluids.
- (I) Whenever the owner or operator of a class I hazardous waste injection well obtains evidence that there may have been a release of injected wastes into an unauthorized zone:
  - (1) The owner or operator shall immediately cease injection of waste fluids, and:
    - (a) Notify the director within twenty-four hours of obtaining such evidence; and the permit, in cases where the owner or operator

certifies that a trained

- (b) Take all necessary steps to identify and characterize the extent of any releases; and
  - (c) Comply with any remediation plan specified by the director; and
  - (d) Where such release is into a USDW currently serving as a water supply, immediately notify the public water system(s) using that USDW and place a notice in a newspaper of general circulation.
- (2) The director may allow the operator to resume injection prior to completing cleanup action if the owner or operator demonstrates that the injection operation will not endanger USDWs.
- (J) The owner or operator of a class I hazardous waste injection well shall submit a plan for approval to the director prior to conducting any well work over which requires removal of the injection tubing.

Effective: December 16, 1991

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Prior Effective Dates: None

3745-34-57 **Testing and monitoring requirements.**

Testing and monitoring requirements for all class I injection wells shall include monitoring of the injected wastes:

- (A) The owner or operator of a class I injection well shall submit a written waste analysis plan to the director for approval that describes the procedures to be carried out to obtain a detailed chemical and physical analysis of a representative sample of the injected waste, including the quality assurance procedures used. The plan shall include:
  - (1) The parameters for which the waste will be analyzed and the rationale for the selection of these parameters; and
  - (2) The test methods that will be used to test for these parameters; and
  - (3) The sampling method that will be used to obtain a representative sample of the waste to be analyzed.
- (B) The owner or operator of a class I injection well shall repeat the analysis of the injected wastes as described in the waste analysis plan at frequencies specified in the waste analysis plan and when process or operating changes occur that may significantly alter the characteristics of the waste stream.
- (C) The owner or operator of a class I injection well shall conduct continuous or periodic monitoring of selected parameters as may be required by the director.
- (D) The owner or operator of a class I injection well shall assure that the waste analysis plan remains accurate and the analyses remain representative.
- (E) The owner or operator of a class I injection well shall as part of the waste analysis plan submit information demonstrating to the satisfaction of director that the waste stream and its anticipated reaction products will not alter the permeability, thickness or other relevant characteristics of the confining or injection zones such that they would no longer meet the requirements specified in rule 3745-34-51 of the Administrative Code.
- (F) The owner or operator of a class I injection well shall as part of the waste analysis plan demonstrate that the waste stream will be compatible with the well materials with which the waste is expected to come into contact, and submit to the director a description of the methodology used to make that determination. Compatibility for purposes of this requirement is established if contact with injected fluids will not cause the well materials to fail to satisfy any design requirement imposed by rule 3745-34-54 of the Administrative Code.

- (G) The owner or operator of a class I hazardous waste injection well that injects corrosive waste, or any other waste determined by the director to be potentially interactive with the materials of well construction, shall continuously monitor for corrosion of the construction materials used in the well by:
- (1) Placing coupons of the well construction materials in contact with the waste stream; or
  - (2) Routing the waste stream through a loop constructed with the material used in the well; or
  - (3) Using an alternative method approved by the director.
- (H) The owner or operator of a class I hazardous waste injection well that injects corrosive waste, or any other waste determined by the director to be potentially interactive with the materials of well construction, shall implement a corrosion monitoring program including:
- (1) Using materials identical to those used in the construction of the well, and such materials must be continuously exposed to the operating pressures and temperatures (measured at the wellhead) and flow rates of the injection operation; and
  - (2) Monitoring the materials of construction for loss of mass, thickness, cracking, pitting and other signs of corrosion on a quarterly basis to ensure that the well components meet the minimum standards for material strength and performance set forth in rule 3745-34-54 of the Administrative Code.
- (I) Mechanical integrity testing
- The owner or operator of a class I hazardous waste injection well shall conduct the mechanical integrity testing required by rule 3745-34-34 of the Administrative Code and approved by the administrator of U.S. EPA as follows:
- (1) The long string casing, injection tube, and annular seal shall be tested by means of a pressure test approved by the director, utilizing a liquid or gas, annually and whenever there has been a well work over; and
  - (2) On an annual basis the bottom-hole cement shall be tested by means of a radioactive tracer survey approved by the director; and
  - (3) A temperature, noise, or other log approved by the director shall be run

at least once every three years to test for movement of fluid along the bore hole. The director may require such tests whenever the well is worked over; and

- (4) Casing inspection logs shall be run whenever the owner or operator conducts a workover in which the injection string is pulled, unless the director waives this requirement due to well construction or other factors which limit the test's reliability, or based upon the satisfactory results of a casing inspection log run within the previous five years. The director may require that a casing inspection log be run every five years, if he has reason to believe that the integrity of the long string casing of the well may be adversely affected by naturally occurring or man-made events; and
- (5) Any other test approved by the administrator of U.S. EPA and the director in accordance with the procedures in rule 3745-34-34 of the Administrative Code may also be used.

(J) Monitoring program

- (1) Based on a site specific assessment of the potential for fluid movement from the well or injection zone, and on the potential value of monitoring wells to detect such movement, the director shall require the owner or operator to submit for approval, a monitoring program plan. The director shall require monitoring of the pressure buildup in the injection zone annually, including at a minimum, a shut down of the well for a time sufficient to conduct a valid observation of the pressure fall-off curve.
- (2) When prescribing a monitoring system the director may also require:
  - (a) Continuous monitoring for pressure changes in the first aquifer overlying the confining zones. When such a well or wells is/are installed, the owner or operator shall, on a quarterly basis, sample the aquifer and analyze for constituents specified in the approved monitoring program plan; and
  - (b) The use of indirect geophysical techniques to determine the position of the waste front, the water quality in a formation(s) designated in the approved monitoring program plan, or to provide other site specific data; and
  - (c) Periodic monitoring of the pressure and ground water quality in the first permeable zone (that is, a zone from which a representative sample may be obtained within seventy-two

hours) overlying the injection zone; and

- (d) Periodic monitoring of the ground water quality in the lowermost USDW; and
  - (e) Any additional monitoring necessary to determine whether fluids are moving into or between USDWs.
- (K) The director may require the owner or operator of a class I injection well to submit a seismicity monitoring plan for approval when he has reason to believe that injection activity may have the capacity to cause seismic disturbances.

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Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: 12/16/91

- (A) For a new class I hazardous waste injection well, the owner shall submit all information listed in paragraph (B) of this rule as part of the permit application except for those items of information which are current, accurate, and available in the existing permit record. For both existing and new class I hazardous waste injection wells, certain maps, cross-sections, tabulations of wells within the area of review and other data may be included in the application by reference provided they are current and readily available to the director and sufficiently identifiable to be retrieved.
- (B) Prior to the issuance of a permit for an existing class I hazardous waste injection well to operate or the construction or conversion of a new class I hazardous waste injection well, the director shall review the following to assure that the requirements of this chapter are met:
- (1) Information required by rules 3745-34-12, 3745-34-13, and 3745-34-14 of the Administrative Code;
  - (2) A map showing the injection well for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells and other pertinent surface features, including residences and roads. The map should also show faults, if known or suspected;
  - (3) A tabulation of all wells within the area of review which penetrate the proposed injection zone or confining zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion and any additional information the director may require;
  - (4) The protocol followed to identify, locate and ascertain the condition of abandoned wells within the area of review which penetrate the injection or the confining zones;
  - (5) Maps and cross-sections indicating the general vertical and lateral limits of all underground sources of drinking water within the area of review, their position relative to the injection formation and the direction of water movement, where known, in each underground source of drinking water which may be affected by the proposed injection;
  - (6) Maps and cross-sections detailing the geologic structure of the local area;

- (7) Maps and cross-sections illustrating the regional geologic setting;
- (8) Proposed operating data:
  - (a) Average and maximum daily rate and volume of the fluid to be injected;  
and
  - (b) Average and maximum injection pressure and calculation of proposed  
maximum injection pressure.
- (9) Proposed formation testing program to obtain an analysis of the chemical,  
physical and radiological characteristics of and other information on the  
injection formation and the confining zone;
- (10) Proposed stimulation program;
- (11) Proposed injection procedure;
- (12) Schematic or other appropriate drawings of the surface and subsurface  
construction details of the well;
- (13) Contingency plans to cope with all shut-ins or well failures so as to prevent  
migration of fluids into any USDW;
- (14) Plans (including maps) for meeting monitoring requirements of rule  
3745-34-57 of the Administrative Code;
- (15) For wells within the area of review which penetrate the injection zone or the  
confining zone but are not properly completed or plugged, the plan and  
comprehensive schedule for corrective action to be taken under rule  
3745-34-53 of the Administrative Code;
- (16) Construction procedures including a cementing and casing program, well  
materials specifications and their life expectancy, logging procedures,  
deviation checks, and a drilling, testing and coring program; and
- (17) A certificate that the applicant has assured, through a performance bond or  
other appropriate means, the resources necessary to close, plug or abandon  
the well and for post closure care.



(C) Prior to the director's granting approval for the operation of a Class I hazardous waste injection well, the owner shall submit to the director for review the following information, which shall be included in the completion report:

- (1) All available logging and testing program data on the well;
- (2) A demonstration of mechanical integrity pursuant to rule 3745-34-58 of the Administrative Code;
- (3) The anticipated maximum pressure and flow rate at which the permittee will operate;
- (4) The results of the injection zone and confining zone testing program as required in rule 3745-34-60 of the Administrative Code;
- (5) The actual injection procedure;
- (6) The compatibility of injected waste with fluids in the injection zone and minerals in both the injection zone and confining zone and with materials used to construct the well;
- (7) The calculated area of review based on data obtained during logging and testing of the well and the formation, and where necessary revisions to the information submitted under rule 3745-34-60 of the Administrative Code; and
- (8) The status of corrective action on wells identified in rule 3745-34-60 of the Administrative Code.

(D) Prior to granting approval for the plugging and abandonment or closure of a Class I hazardous waste injection well, the director shall review the information required by rules 3745-34-61 and 3745-34-62 of the Administrative Code.

(E) Any permit issued for a Class I hazardous waste injection well for disposal on the premises where the waste is generated shall contain a certification by the owner or operator that:

- (1) The generator of the hazardous waste has a program to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable; and

- (2) Injection of the waste is that practicable method of disposal currently available to the generator which minimizes the present and future threat to human health and the environment.

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Five Year Review (FYR) Dates: 07/14/2016 and 07/14/2021

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Prior Effective Dates:	12/16/91

**Post closure.**

- (A) The owner or operator of a Class I hazardous waste injection well shall prepare, maintain, and comply with a plan approved by the director for post-closure care that meets the requirements of this rule and is in compliance with rule 3745-34-09 of the Administrative Code. The owner or operator shall implement the approved post closure plan upon termination of a permit or the cessation of injection activities. The requirement to maintain and implement the approved post-closure plan is enforceable irrespective of the permit.
- (B) The owner or operator of a Class I hazardous waste injection well shall submit the post closure plan as part of the permit application and, upon approval by the director, such plan shall be a condition of any permit issued.
- (C) The owner or operator of a Class I hazardous waste injection well shall submit any proposed significant revision to the post closure plan as appropriate over the life of the well, but no later than the date of the closure report required under rule 3745-34-59 of the Administrative Code.
- (D) The post closure plan shall assure financial responsibility as required by rule 3745-34-62 of the Administrative Code.
- (E) The post closure plan shall include the following information:
  - (1) The pressure in the injection zone before injection began; and
  - (2) The anticipated pressure in the injection zone at the time of closure; and
  - (3) The predicted time until pressure in the injection zone decays to the point that the well's cone of influence no longer intersects the base of the lowermost USDW; and
  - (4) Predicted position of the waste front at closure; and
  - (5) The status of any cleanups required under rule 3745-34-53 of the Administrative Code; and
  - (6) The estimated cost of proposed post-closure care.
- (F) The owner or operator of a Class I hazardous waste injection well shall:
  - (1) Continue and complete any cleanup action required under rule 3745-34-53 of the Administrative Code if applicable; and
  - (2) Continue to conduct any ground water monitoring required under the permit until pressure in the injection zone decays to the point that the

well's cone of influence no longer intersects the base of the lowermost usdw; and

- (3) Submit a survey plat to the local zoning authority designated by the director and to the director, indicating the location of the well relative to permanently surveyed benchmarks; and
  - (4) Provide appropriate notification and information to such state and local authorities as have cognizance over drilling activities to enable such state and local authorities to impose appropriate conditions of subsequent drilling activities that may penetrate the well's confining or injection zone; and
  - (5) Retain, for a period of three years following well closure, records reflecting the nature, composition and volume of all injected fluids, which will be delivered to the director at the conclusion of the retention period, and the records shall thereafter be retained at a location designated by the director for that purpose.
- (G) The director may extend the period of post-closure monitoring upon a finding that the well may endanger a USDW.
- (H) Each owner of a Class I hazardous waste injection well, and the owner of the surface or subsurface property on or in which a Class I hazardous waste injection well is located, must record a notation on the deed to the facility property or on some other instrument which is normally examined during title search that will, in perpetuity, provide any potential purchaser of the property with the following information:
- (1) The fact that land has been used to manage hazardous waste; and
  - (2) The name of the state agency or local authority with which the plat was filed, as well as the address of the regional environmental protection agency office to which it was submitted; and
  - (3) The type and volume of waste injected, the injection interval or intervals into which it was injected, and the period over which injection occurred.

Effective: December 16, 1991

R.C. 119.032 review dates: 12/08/2014 and 04/24/2019

Promulgated Under: 119.03  
Statutory Authority: 6111.043  
Rule Amplifies: 6111.043  
Prior Effective Dates: None

3745-34-62 **Financial responsibility for closure and post closure care.**

The owner or operator shall comply with the financial responsibility requirements of rules 3745-55-42 to 3745-55-51 or 3745-66-42 to 3745-66-48 of the Administrative Code.

Effective: December 16, 1991

R.C. 119.032 review dates: 12/08/2014 and 04/24/2019

Promulgated Under: 119.03

Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: None

- (A) The owner of a class I injection well for which the director has issued a permit or renewal of a permit for the disposal of any hazardous waste identified in or listed under section 3734.12 of the Revised Code or the rules adopted thereunder, and that waste is generated on the premises where the injection well is located shall pay an annual permit fee of thirty thousand dollars. Said fee shall be payable by certified check drawn to the "Director of Environmental Protection - Underground Injection Control Fund," within thirty days of the issuance of a permit or renewal of a permit, and annually thereafter during the term of the permit or renewal of the permit. Annual payment shall be tendered within thirty days prior to the anniversary date of the issuance of the permit or renewal of the permit. Failure to timely remit the annual permit fee shall be a violation of the permit or renewal of the permit, this rule, and section 6111.046 of the Revised Code.
- (B) The owner of a class I injection well for which the director has issued a permit or renewal of a permit for the injection of any waste other than that identified in paragraph (A) of this rule, shall pay an annual permit fee of twelve thousand five hundred dollars. Said fee shall be payable by certified check drawn to the "Director of Environmental Protection - Underground Injection Control Fund," within thirty days of the issuance of a permit or renewal of a permit, and annually thereafter during the term of the permit or renewal of the permit. Annual payment shall be tendered within thirty days prior to the anniversary date of the issuance of the permit or renewal of the permit. Failure to timely remit the annual permit fee shall be a violation of the permit or renewal of the permit, this rule and section 6111.046 of the Revised Code.
- (C) The owner of each class I injection facility shall act as trustee for the state of Ohio and collect a fee of one dollar per ton of industrial waste or other waste, to a maximum of twenty-five thousand dollars per year, irrespective of the number of wells at that facility. The owner or operator shall maintain appropriate records of the amount of waste injected at the facility. The owner or operator shall remit said fees payable by certified check drawn to the "Director of Environmental Protection - Underground Injection Control Fund" within thirty days prior to the anniversary date of the permit or renewal of the permit. For facilities where multiple permits are held, for purposes of this fee, the anniversary date shall be the date of issuance of the permit or the renewal of the permit closest to January first of the year of issuance. A penalty of ten per cent of the amount of the fee shall be assessed for each month of late payment. Failure to remit the appropriate fee shall be a violation of the permit or renewal of the permit, this rule and section 6111.047 of the Revised Code.

- (1) This fee does not apply to the owner of any well injecting hazardous waste as identified or listed under section 3734.12 of the Revised Code or the rules adopted thereunder.
- (2) This fee does not apply to the owner of an existing well that disposes of naturally occurring formation fluids extracted during salt mining processes by injection into a zone consisting of the Oriskany sandstone at depths of not more than one thousand five hundred feet.
- (D) Pursuant to section 6111.046 of the Revised Code, on or about July first of each year, the director shall request, in writing, that the office of budget and management transfer fifteen per cent of the money in the "Underground Injection Control Fund" to the "Injection Well Review Fund" created in section 1501.022 of the Revised Code.

Replaces: Part of 3745-34-16

Effective: 04/23/2009

R.C. 119.032 review dates: 04/23/2014 and 04/24/2019

Promulgated Under: 119.03

Statutory Authority: 6111.043

Rule Amplifies: 6111.043

Prior Effective Dates: 7/25/1984, 09/15/1992, 01/24/00, 10/17/03



**3745-81-01 Primary drinking water standards definitions.**

As used in this chapter:

**(A)**

- (1) "Action level" is the concentration of lead or copper in water specified in paragraph (C) of rule 3745-81-80 of the Administrative Code.
- (2) "Actual CT" means the CT value or the sum of CT values that is representative of the disinfection as determined in accordance with rule 3745-81-72 of the Administrative Code.
- (3) "Approved effective volume factor" means the ratio of the disinfectant contact time (T) to the theoretical contact time. The theoretical contact time is the lowest daily clearwell operating volume during the peak hourly flow divided by the peak hourly flow.
- (4) "Average household size" for the purposes of determining if a system is a "public water system" as defined in this rule, means 2.44 individuals per service connection in accordance with the 2010 federal census for the state of Ohio.

**(B)**

- (1) "Bag filters" means pressure-driven separation devices that remove particulate matter larger than one micrometer using an engineered porous filtration media. They are typically constructed of a non-rigid, fabric filtration media housed in a pressure vessel in which the direction of flow is from the inside of the bag to outside.
- (2) "Bank filtration" means a water treatment process that uses a well to recover surface water that has naturally infiltrated into ground water through a river bed or bank. Infiltration is typically enhanced by the hydraulic gradient imposed by a nearby pumping water supply or other well.
- (3) "Best available technology" or "BAT" means the best technology, treatment techniques, or other means which the director may approve, after examination for efficacy under field conditions and taking cost into consideration, for a public water system to use for achieving compliance with a maximum contaminant level. For synthetic organic chemicals, any BAT must be at least as effective as granular activated carbon.

**(C)**

- (1) "Cartridge filters" means pressure-driven separation devices that remove particulate matter larger than one micrometer using an engineered porous filtration media. They are typically constructed as rigid or semi-rigid, self supporting filter elements housed in pressure vessels in which flow is from the outside of the cartridge to the inside.
- (2) "Chemical Abstracts Service registry number" or "CAS number" means the hyphenated number assigned by the "American Chemical Society's Chemical Abstracts Service" to uniquely designate a chemical substance, regardless of the various names used for this substance.
- (3) "Clean compliance history" means, for the purposes of rules 3745-81-50 to 3745-81-55 of the Administrative Code, a record of no violations or exceedances of any of the following:
  - (a) Maximum contaminant levels under rule 3745-81-14 or 3745-81-54 of the Administrative Code.

- (b) Monitoring requirements under rule 3745-81-21, 3745-81-51 or paragraph (B) of rule 3745-81-52 of the Administrative Code.
  - (c) Treatment technique triggers under rule 3745-81-53 of the Administrative Code.
  - (d) Treatment technique requirements under rule 3745-81-53 of the Administrative Code.
- (4) "Coagulation" means a process using coagulant chemicals and mixing by which colloidal and suspended materials are destabilized and agglomerated into flocs.
  - (5) "Coliform bacteria" means any of the enterobacteriaceae group, including all aerobic and facultative anaerobic gram-negative, nonspore-forming bacilli which utilize lactose with or without the formation of gas.
  - (6) "Combined distribution system" means an interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water. Combined distribution systems do not include consecutive systems which receive water from a wholesale system only on an emergency basis or receive only a small percentage and small volume of water from a wholesale system. Combined distribution systems do not include wholesale systems which deliver water to a consecutive system only on an emergency basis or deliver only a small percentage and small volume of water to a consecutive system.
  - (7) "Combined population" means the total number of individuals served by the public water system as a prime supplier plus those individuals served through a consecutive water system.
  - (8) "Compliance cycle" means the nine-year cycle for monitoring during which public water systems shall monitor. Each compliance cycle consists of three three-year compliance periods.
  - (9) "Compliance period" means one of the three periods of three consecutive calendar years within a compliance cycle. Each compliance cycle has three three-year compliance periods.
  - (10) "Comprehensive performance evaluation" or "CPE" means a thorough review and analysis of a treatment plant's performance-based capabilities and associated administrative, operation and maintenance practices. A CPE is conducted to identify factors that may be adversely impacting a plant's performance. The comprehensive performance evaluation consists of at least the following components: assessments of plant performance; evaluation of major unit processes; identification and prioritization of performance limiting factors; assessment of the applicability of comprehensive technical assistance; and preparation of a CPE report.
  - (11) "Confluent growth" means a continuous bacterial growth, covering the entire filtration area of a membrane filter, or a portion thereof, in which bacterial colonies are not discrete.
  - (12) "Consecutive water system" means a public water system that receives water from one or more public water systems, excluding emergency interconnections or interconnections where only a small percentage and small volume of water are received. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.
  - (13) "Consumer notice," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means notification of individual tap results from lead tap water monitoring in accordance with rule 3745-81-85 of the Administrative Code.
  - (14) "Contact time" or "CT" means the mathematical product of a "residual disinfectant concentration" (C),

which is determined before or at the first customer, and the corresponding "disinfectant contact time" (T).

- (15) "Contaminant" means any physical, chemical, biological or radiological substance or matter in water.
- (16) "Conventional filtration treatment" means a series of processes including coagulation, flocculation, sedimentation and filtration resulting in substantial removal of particles.
- (17) "Corrosion inhibitor" means a substance capable of reducing the corrosivity of water toward metal plumbing materials, especially lead and copper, by forming a protective film on the interior surface of those materials.

(D)

- (1) "Direct filtration" means a series of processes, including coagulation and filtration but excluding sedimentation, resulting in substantial removal of particles from water.
- (2) "Director of environmental protection" or "director" means the director of the Ohio environmental protection agency and includes an authorized representative of the director.
- (3) "Disinfectant" means any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.
- (4) "Disinfectant contact time" ("T" in CT calculations) means the time in minutes that it takes for water to move from the point of disinfectant application or the previous point of disinfectant residual measurement to a point before or at the point where residual disinfectant concentration (C) is measured.
- (5) "Disinfection" means a process which inactivates pathogenic organisms in water by the addition of chemical oxidants or equivalent agents.
- (6) "Disinfection profile" means a summary of Giardia lamblia inactivation through the treatment plant.
- (7) "District office" means the office of the Ohio environmental protection agency located in the district within which the subject water system is located.
- (8) "Dose equivalent" means the product of the absorbed dose from ionizing radiation and such other factors as account for differences in biological effectiveness due to the type of radiation and its distribution in the body as specified by the "International Commission of Radiological Units and Measurements (ICRU)."
- (9) "Dual sample set" means a set of two samples collected at the same time and same location, with one sample analyzed for TTHM and the other sample analyzed for HAA5. Dual sample sets are collected in accordance with rule 3745-81-24 of the Administrative Code.

(E)

- (1) "Effective corrosion inhibitor residual," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means a concentration sufficient to form a passivating film on the interior walls of a pipe.
- (2) "Enhanced coagulation" means the addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

- (3) "Enhanced softening" means the improved removal of disinfection byproduct precursors by precipitative softening.

(F)

- (1) "Filter profile" means a graphical representation of individual filter performance based on continuous turbidity measurements or total particle counts versus time for an entire filter run, from startup to backwash inclusively, that includes an assessment of filter performance while another filter is being backwashed.
- (2) "Filtration" means a process for removing particles from water by passage through porous media.
- (3) "Finished water" means water that is introduced into the distribution system of a public water system and is intended for distribution and consumption without further treatment, except as necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals).
- (4) "First-draw sample" means a one-liter sample of tap water, collected in accordance with rule 3745-81-86 of the Administrative Code, that has been standing in plumbing pipes at least six hours and is collected without flushing the tap.
- (5) "Flocculation" means a process which enhances agglomeration of particles into larger, more easily settleable particles through gentle stirring.
- (6) "Flowing stream" means a course of running water flowing in a definite channel.

(G)

- (1) "GAC10" means granular activated carbon filter beds with an empty-bed contact time of ten minutes based on average daily flow and a carbon reactivation frequency of every one hundred eighty days, except that the reactivation frequency for GAC10 used as a best available technology for compliance with rule 3745-81-12 of the Administrative Code shall be one hundred twenty days.
- (2) "GAC20" means granular activated carbon filter beds with an empty-bed contact time of twenty minutes based on average daily flow and a carbon reactivation frequency of every two hundred forty days.
- (3) "Grab sample" means a single, physical sample of water collected at a particular time and place which represents the composition of the water only at the time and place.
- (4) "Gross alpha particle activity" means the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.
- (5) "Gross beta particle activity" means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.
- (6) "Ground water" means any water below the surface of the earth in a zone of saturation which is not directly influenced by surface water, which is obtained through a well constructed in accordance with plans approved by the director under section 6109.07 of the Revised Code and Chapter 3745-9 of the Administrative Code.
- (7) "Ground water source," for the purpose of rules 3745-81-41 to 3745-81-45 of the Administrative Code, means a well.

- (8) "Ground water system" means any public water system that uses ground water except for those that combine all of their ground water with surface water prior to treatment under rule 3745-81-71 of the Administrative Code. A ground water system also includes consecutive systems receiving finished ground water.

(H)

- (1) "Haloacetic acids (five)" or "HAA5" means the sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid and dibromoacetic acid), rounded to two significant figures after addition.
- (2) "Halogen" means one of the following chemical elements: chlorine, bromine or iodine.
- (3) "High background count" or "HBC" means that the total number of bacterial colonies exceeds two hundred on a forty-seven-millimeter diameter membrane filter used for coliform detection.
- (4) "Human consumption" means the ingestion or absorption of water or water vapor as the result of drinking, cooking, dishwashing, hand washing, bathing, showering or oral hygiene.
- (5) "Hydrogeologic barriers" means physical, biologic or chemical factors, singularly or in combination, that prevent the movement of viable pathogens from a contamination source to a water supply well.
- (6) "Hydrogeologic sensitivity assessment" or "HSA" means an evaluation of a ground water source's susceptibility to pathogen contamination at a specific site, using all available data. All available data may include well construction, hydrogeologic, geologic and water quality data, which is evaluated in conjunction with the local distribution of pathogen sources.

(I) [Reserved.]

(J) [Reserved.]

(K) [Reserved.]

(L)

- (1) "Lake/reservoir" means a natural or man-made basin or hollow on the Earth's surface in which water collects or is stored that may or may not have a current or single direction of flow.
- (2) "Large water system," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means a public water system that serves more than fifty thousand persons.
- (3) "Lead service line" means a service line made of lead which connects a water main to a building inlet and any lead pigtail, gooseneck, or other fitting which is connected to such a lead line.
- (4) "Lead threshold level" means the concentration of lead in an individual tap water sample as specified in rule 3745-81-80 of the Administrative Code.
- (5) "Legionella" means a genus of bacteria, some species of which may cause Legionnaires' disease.
- (6) "Level one assessment" means an evaluation to identify the possible presence of significant deficiencies, deficiencies in distribution system coliform monitoring practices and, when possible, the likely reason that the public water system triggered the assessment. A level one assessment is conducted by the public water system operator or owner. The system shall conduct the assessment consistent with any instructions from the director that tailor specific assessment elements with respect to the size and type of

the system and the size, type and characteristics of the distribution system. Minimum elements of a level one assessment include all of the following:

- (a) Review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired.
  - (b) Changes in distribution system maintenance and operation that could affect distributed water quality, including water storage.
  - (c) Source and treatment considerations that could affect distributed water quality, where appropriate (e.g., whether a ground water system is disinfected).
  - (d) Existing water quality monitoring data.
  - (e) Inadequacies in sample sites, sampling protocol and sample processing.
- (7) "Level two assessment" means an evaluation to identify the possible presence of significant deficiencies, deficiencies in distribution system coliform monitoring practices and, when possible, the likely reason that the public water system triggered the assessment. A level two assessment provides a more detailed examination of the public water system (including the public water system's monitoring and operational practices) than does a level one assessment, through the use of a more comprehensive investigation and review of available information, additional internal and external resources, and other relevant practices. A level two assessment is conducted by an individual approved by the director. The public water system shall comply with any expedited actions or additional actions required by the director in the case of an *Escherichia coli* maximum contaminant level violation. Minimum elements of a level two assessment are the same as those for a level one assessment, which include all of the following:
- (a) Review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired.
  - (b) Changes in distribution system maintenance and operation that could affect distributed water quality, including water storage.
  - (c) Source and treatment considerations that could affect distributed water quality, where appropriate (e.g., whether a ground water system is disinfected).
  - (d) Existing water quality monitoring data.
  - (e) Inadequacies in sample sites, sampling protocol and sample processing.
- (8) "Limited scope site visit" or "LSSV" means an onsite review, which may include aspects of a sanitary survey as defined in this rule. The onsite review may be triggered when determined by the agency that a portion of the public water system is to be evaluated, when the system is in need of technical assistance, or for any other purpose identified by the agency to review compliance with rule requirements.
- (9) "Locational running annual average" or "LRAA" means the average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

(M)

- (1) "Man-made beta particle and photon emitters" means all radionuclides emitting beta particles or photons listed in the maximum permissible body burdens and maximum permissible concentrations of radionuclides in air and water for occupational exposures, "NBS Handbook 69," except the daughter

products of thorium-232, uranium-235 and uranium-238.

- (2) "Maximum contaminant level" or "MCL" means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.
- (3) "Maximum contaminant level goal" or "MCLG" means the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
- (4) "Maximum residual disinfectant level" or "MRDL" means the highest level of disinfectant allowed under conditions specified in rule 3745-81-10 of the Administrative Code.
- (5) "Medium water system," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means a public water system that serves greater than three thousand three hundred and less than or equal to fifty thousand persons.
- (6) "Membrane filtration" means a pressure or vacuum driven separation process in which particulate matter larger than one micrometer is rejected by an engineered barrier, primarily through a size-exclusion mechanism, and which has a measurable removal efficiency of a target organism that can be verified through the application of a direct integrity test. This definition includes the common membrane technologies of microfiltration, ultrafiltration, and reverse osmosis.
- (7) "Method detection limit" or "MDL" is the minimum concentration of a substance that can be measured and reported with ninety-nine per cent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.
- (8) "Minimal treatment," for the purpose of rule 3745-81-42 of the Administrative Code, means either no treatment, treatment consisting of only cartridge filtration or cation exchange, or a combination of only cartridge filtration and cation exchange.
- (9) "Monitor" means the sampling of public drinking water, the submittal of samples to a laboratory certified for the appropriate analysis, and the analysis for the contaminants or characteristics of the water.

(N)

- (1) "New source" means any of the following:
  - (a) A well that is located in a new well field.
  - (b) A new well that is located in an existing well field for which the results of source water analysis conducted in accordance with rule 3745-9-09 or 3745-91-06 of the Administrative Code indicate the presence of any primary inorganic or radiological contaminant above eighty per cent of the MCL standard or any organic contaminant (except trihalomethanes) at detectable concentrations.
  - (c) An intake that is located in a surface water body not previously used.
  - (d) A new intake that is located in a previously used surface water body for which the results of source water analysis conducted in accordance with rule 3745-91-06 of the Administrative Code indicate the presence of any primary inorganic or radiological contaminant above eighty per cent of the MCL standard or any organic contaminant (except trihalomethanes) at detectable concentrations.
- (2) "Normal operating conditions" means the operational and treatment processes routinely used by a public water system which are representative of the practices under which water is typically delivered to consumers. Public water systems required to collect samples during normal operating conditions shall

not deliberately change distribution or treatment processes, or operating practices during or just prior to sample collection for the sole purpose of influencing sample results collected for compliance purposes. Practices not considered normal operating conditions include but are not limited to the following examples for the collection of disinfection byproduct or total organic carbon samples: deliberately flushing the distribution system just prior to the collection of samples; temporarily performing enhanced coagulation or softening just prior to the collection of samples; deliberately reducing chlorine dosage just prior to the collection of samples; deliberately turning off pre-chlorination just prior to the collection of samples. For systems that do not have an approved disinfection treatment system, practices not considered normal operating conditions also include adding disinfectant to any part of the water system prior to collecting a total coliform compliance sample or having a chlorine residual in the distribution system at the time of collecting a total coliform compliance sample.

- (O) "Optimal corrosion control treatment," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means the corrosion control treatment that minimizes the lead and copper concentrations at users' taps while ensuring that the treatment does not cause the water system to violate any national primary drinking water regulations.
- (P)
- (1) "Person" means an individual, corporation, company, association, partnership, the state, any political subdivision, agency, institution, or instrumentality thereof or federal agency.
  - (2) "Picocurie" or "pCi" means that quantity of radioactive material producing two and twenty-two hundredths nuclear transformations per minute.
  - (3) "Plant intake" means the works or structures at the head of a conduit through which water is diverted from a source (e.g., river or lake) into the treatment plant.
  - (4) "Point of disinfectant application" means a location where disinfectant is added to a water system, and water downstream of this location is protected from recontamination.
  - (5) "Point-of-entry treatment device" is a treatment device applied to the drinking water entering a house or building for the purpose of reducing the contaminants in the drinking water distributed through all, or a portion of, the house or building.
  - (6) "Point-of-use treatment device" is a treatment device applied to a single tap used for the purpose of reducing contaminants in drinking water at that one tap.
  - (7) "Potable water" means water that is intended for human consumption.
  - (8) "Presedimentation" means a preliminary treatment process used to remove gravel, sand and other particulate material from the source water through settling before the water enters the primary clarification and filtration processes in a treatment plant.
  - (9) "Public education" for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means delivery of educational materials, in accordance with rule 3745-81-85 of the Administrative Code, when an action level is exceeded.
  - (10) "Public notification" means notification to persons served by a public water system of violations or other situations in accordance with rule 3745-81-32 of the Administrative Code.
  - (11) "Public water system" or "PWS" means a system which provides water for human consumption through



pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least sixty days out of the year. Such term includes any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system, and any water supply system serving an agriculture labor camp, as defined in section 3733.41 of the Revised Code. Such term does not include any "special irrigation district," as defined in 40 CFR 141.2. A public water system is either a "community water system" or a "noncommunity water system." An existing public water system is prohibited from splitting the distribution system or adding additional sources to avoid regulation by Chapter 6109. of the Revised Code.

- (a) "Community water system" or "CWS" means a public water system which serves at least fifteen service connections available for use by year-round residents or regularly serves at least twenty-five year-round residents. For the purposes of determining regulation under Chapter 6109. of the Revised Code, the population calculations and defaults in this rule will be used unless documentation proving otherwise is presented and is acceptable to the director.

The population of a CWS shall be determined by an actual count of residents or by multiplying the number of service connections by the average household size.

In the case of a prison cell, nursing home bed, or an otherwise occupied or intended to be occupied living space that is or may be occupied on a day-to-day basis by an individual, the population shall be determined by an actual count of beds available.

- (b) "Noncommunity water system" or "NCWS" means a public water system that is not a community water system. A noncommunity water system is either a "nontransient noncommunity water system" or a "transient noncommunity water system." For the purposes of determining regulation under Chapter 6109. of the Revised Code, the population calculations and defaults in this rule will be used unless documentation proving otherwise is presented and is acceptable to the director.

When the average number of individuals regularly served by a noncommunity water system cannot be readily determined, the director shall determine the population served on a case by case basis. In making this determination, the director may consider an actual daily count of individuals, sales receipts, seating capacity or the issued certificate or certificates of occupancy as in the case of a building as defined by section 3781.06 of the Revised Code, or any other information deemed reliable regarding the potential population served.

- (i) "Nontransient noncommunity water system" or "NTNCWS" means a public water system that regularly serves at least twenty-five of the same persons over six months per year and is not a CWS.
- (ii) "Transient noncommunity water system" or "TNCWS" means a noncommunity public water system that does not regularly serve at least twenty-five of the same persons over six months per year and is not a CWS or a NTNCWS. Examples of TNCWS may include, but are not limited to, systems serving gas stations, taverns, motels, restaurants, churches, campgrounds and parks.

(Q) [Reserved.]

(R)

- (1) "Radiation equivalent man" or "rem" means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A "millirem (mrem)" is one one-thousandth of a rem.

- (2) "Raw water" means source water before any treatment.
- (3) "Required CT" means the CT value that is considered sufficient disinfection treatment to consistently and reliably achieve at least 99.9 per cent (3 log) inactivation or removal of *Giardia lamblia* cysts and at least 99.99 per cent (4 log) inactivation or removal of viruses as determined in accordance with rule 3745-81-72 of the Administrative Code.
- (4) "Residual disinfectant concentration" ("C" in CT calculations) means the concentration of disinfectant measured in milligrams per liter in a representative sample of water.

(S)

- (1) "Safe Drinking Water Act" or "SDWA" means the Safe Drinking Water Act, 88 Stat. 1660 (1974), 42 U.S.C. 300(f) and regulations adopted thereunder.
- (2) "Sampling point" means the following:
  - (a) For groundwater systems, each entry point to the distribution system which is representative of each well after treatment.
  - (b) For surface water systems, each entry point to the distribution system after any application of treatment or in the distribution system at points representative of each source.
- (3) "Sanitary survey" means an onsite review to evaluate the adequacy of the water source, treatment, distribution system, finished water storage, pumps, pump facilities and controls, monitoring, reporting and data verification, system management and operation, and to review operator compliance with state requirements.
- (4) "Seasonal system" means a noncommunity water system that has distinct seasonal fluctuations in its operations and population served during the course of a year such that all or most of the system is not operated on a year-round basis.
- (5) "Sedimentation" means a process for removal of solids before filtration.
- (6) "Service connection," for the purposes of this chapter, is the active or inactive pipe, gooseneck, pigtail and any other fitting that connects or has the potential to connect each individual house, apartment unit, condominium, mobile home or any structure with human consumption available to the public water system regardless of whether the water usage is metered.
- (7) "Service line sample" means a one-liter sample of water, collected in accordance with paragraph (B)(3) of rule 3745-81-86 of the Administrative Code, that has been standing for at least six hours in a service line.
- (8) "Significant deficiency," means a defect in design, operation, maintenance, administration, or a failure or malfunction in a system component, including sources, treatment, storage or distribution system that does any of the following:
  - (a) May provide a pathway of entry for microbial or other contamination into the distribution system or that is indicative of a failure in a barrier that is already in place.
  - (b) Causes, or has the potential to cause, an unacceptable risk to health or that could affect the reliable delivery of safe drinking water, as determined by the director.

- (9) "Single family structure," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means a building constructed as a single-family residence that is currently used as either a residence or a place of business.
- (10) "Slow sand filtration" means a process of passing raw water through a porous granular medium, at a rate of less than one hundred fifty gallons per day per square foot of sand area, with substantial removal of particles by physical and biological mechanisms.
- (11) "Small water system," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means a public water system that serves three thousand three hundred persons or fewer.
- (12) "Source" means the site or area from which water is obtained for the purpose of supplying water to a public water system. Sources include, but are not limited to, aquifers, wells, lakes, rivers, streams and reservoirs.
- (13) "Source water at the entry point to the distribution system," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means finished water (as defined in this rule) or water that is introduced into the distribution system of a public water system and is intended for distribution and consumption without further treatment, except as necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals).
- (14) "State primary drinking water rules" means rules of Chapter 3745-81 of the Administrative Code.
- (15) "Supplier of water" means any person who owns or operates a public water system.
- (16) "Surface water" means either of the following:
  - (a) All water which is open to the atmosphere and subject to surface runoff.
  - (b) A source which has been designated by the director as surface water in accordance with rule 3745-81-76 of the Administrative Code.
- (17) "Surface water system" means a public water system which uses surface water, in whole or in part, as its source of water.
- (18) "SUVA" means specific ultraviolet absorption at two hundred fifty-four nanometers. It is calculated by dividing a sample's ultraviolet absorption at a wavelength of two hundred fifty-four nanometers ( $UV_{254}$ ) [in reciprocal meters ( $M^{-1}$ )] by its concentration of dissolved organic carbon (DOC) [in milligrams per liter (mg/L)].
- (19) "System with a single service connection" means a public water system which supplies drinking water to consumers via a single service line.

(T)

- (1) "Third party" means a team of persons conducting a comprehensive performance evaluation who are not employees of the public water system owner and who are independent of the public water system.
- (2) "Total trihalomethanes" or "TTHM" means the sum of the concentrations in milligrams per liter of the trihalomethane compounds trichloromethane (chloroform), dibromochloromethane, bromodichloromethane and tribromomethane (bromoform), rounded to two significant figures after addition.

- (3) "Treatment technique" means a method for treating water to achieve acceptable levels of the contaminants in lieu of establishing a maximum contaminant level.
- (4) "Treatment technique requirement" means a requirement of the state primary drinking water rules which specifies for a contaminant a specific treatment technique or techniques known to the director which leads to a reduction in the level of such a contaminant sufficient to comply with the requirements of this chapter.
- (5) "Trihalomethane" or "THM" means one of the family of organic compounds, named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.
- (6) "Total organic carbon" or "TOC" means total organic carbon in milligrams per liter (mg/L) measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two significant figures.
- (7) "Two-stage lime softening" means a process in which chemical addition and hardness precipitation occur in each of two distinct unit clarification processes in series prior to filtration.

(U) [Reserved.]

(V)

- (1) "Virus" means a virus which is infectious to humans by waterborne transmission.
- (2) "Volatile organic chemicals" or "VOCs" are the chemicals identified in paragraph (D) of rule 3745-81-12 of the Administrative Code.

(W)

- (1) "Waterborne disease outbreak" means the significant occurrence of acute or chronic infectious illness, epidemiologically associated with the ingestion of water from a public water system.
- (2) "Wholesale system" means a public water system that treats source water as necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

(X) [Reserved.]

(Y) [Reserved.]

(Z) [Reserved.]

[Comment: The 40 CFR 141.2 refers to the "Code of Federal Regulations" published on July 1, 2017. A copy of this code may be obtained from the "U.S. Government Bookstore" toll-free at (866) 512-1800 or <https://www.gpo.gov/fdsys>, or from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752. The code is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure," NBS (National Bureau of Standards) Handbook 69 as amended August 1963, U.S. department of commerce. Copies of this document are available from the national technical information service, NTIS ADA 280 282, U.S. department of

commerce, 5285 Port Royal road, Springfield, Virginia 22161. Copies may be inspected at EPA's "Drinking Water Docket," 401 M street, SW., Washington, DC 20460; or at the national archives and records administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html).]

Effective: 5/1/2018

Five Year Review (FYR) Dates: 1/31/2018 and 05/01/2023

Promulgated Under: 119.03

Statutory Authority: 6109.121, 6109.04

Rule Amplifies: 6109.04, 6109.121

Prior Effective Dates: 8/24/81, 12/28/89, 12/31/90, 9/13/93, 1/1/02, 8/3/04,  
8/1/05, 7/24/09, 1/1/10, 10/31/10, 6/19/14, 4/1/16

3745-81-02

**Coverage.**

This chapter shall apply to each public water system, unless the public water system meets all of the following conditions:

- (A) Consists only of distribution and storage facilities (and does not have any collection and treatment facilities);~~;~~
- (B) Obtains all of its water from, but is not owned or operated by, a public water system to which this chapter applies;~~;~~
- (C) Does not sell water to any person;~~and~~ as determined by the director.
- (D) Is not a carrier which conveys passengers in interstate commerce.

Nothing herein limits the director's authority set forth in sections 6109.02 and 6109.05 of the Revised Code.

Effective: 11/8/2018

Five Year Review (FYR) Dates: 8/23/2018 and 11/08/2023

CERTIFIED ELECTRONICALLY

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Certification

10/29/2018

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Date

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.04, 6109.02  
Prior Effective Dates: 12/27/1978



### **3745-81-03. Siting requirements.**

Before a person may enter into a financial commitment for or initiate construction of a new public water system or increase the capacity of an existing public water system, he shall notify the director and, to the extent practicable, avoid locating part or all of the new or expanded facility at a site which:

- (A) Is subject to a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or
- (B) Except for intake structures, is within the floodplain of a one- hundred-year flood or is lower than any recorded high tide where appropriate records exist.

Effective: December 27,1978

Promulgated under: Section 3, Am. Sub. S.B. 445, 112th General Assembly  
Rule amplifies: RC Section 6109.04

**3745-81-04 Administrative penalties.**

(A) Pursuant to section 6109.23 of the Revised Code, the director may assess and collect administrative penalties from any person who owns or operates a public water system and violates Chapter 6109. of the Revised Code or the administrative rules adopted thereunder. Administrative penalties for a public water system shall be calculated according to this rule in the following manner:

- (1) Each violation of the public water system shall be assigned a value of one thousand dollars. This amount represents the threat to public health caused by the public water system's failure to comply with the applicable regulations.
- (2) The value is then multiplied by a number, expressed as a decimal, which represents the public water system's size, in accordance with the following list in order to determine the penalty amount for each day of each violation:

System Size (number of people served)	Number
At least 15 service connections or 25 to 3,300	0.25
3,301 to 6,700	0.50
6,701 to 10,000	0.75
10,001 or more	1.00

(B) Lead and copper rule administrative penalties. Pursuant to section 6109.121 of the Revised Code, the director shall assess and collect administrative penalties from any person who owns or operates a community or nontransient noncommunity water system and violates paragraphs (A)(1) and (C)(1) of rule 3745-81-85 of the Administrative Code. Administrative penalties shall be assessed in accordance with the following tables:

Violation of paragraph (A)(1) of rule 3745-81-85 of the Administrative Code (consumer notification)

Population Served	Penalty Assessed (dollars per day per notification)
25 - 3,300	\$25.00
3,301 - 10,000	\$50.00
10,001 - 25,000	\$75.00
25,001 or more	\$100.00

Violation of paragraph (C)(1) of rule 3745-81-85 of the Administrative Code (lead public notification)

Population Served	Penalty Assessed (dollars per day per notification)
25 - 3,300	\$250.00
3,301 - 10,000	\$500.00
10,001 - 25,000	\$750.00
25,001 or more	\$1,000.00

Replaces:	3745-81-04
Effective:	5/1/2018
Five Year Review (FYR) Dates:	05/01/2023
Promulgated Under:	119.03
Statutory Authority:	6109.23, 6109.121, 6109.04
Rule Amplifies:	6109.04, 6109.23, 6109.121
Prior Effective Dates:	10/1/1999, 10/17/03

**Maximum residual disinfectant levels.**

- (A) Community and nontransient noncommunity public water systems that supply water treated with chlorine and/or chloramines shall comply with the total chlorine MRDL.
- (B) Public water systems that treat their water with chlorine dioxide shall comply with the chlorine dioxide MRDL.
- (C) Maximum residual disinfectant levels (MRDLs) are as follows:

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Disinfectant residual	MRDL (mg/l)
Total chlorine	4.0 (as Cl <sub>2</sub> ).

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Chlorine dioxide	0.8 (as ClO <sub>2</sub> ).

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- (D) The director identifies the following as the best available technology for achieving compliance with the MRDLs identified in paragraph (C) of this rule: control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

Effective: 01/01/2010

R.C. 119.032 review dates: 01/01/2015 and 1/29/2020

Promulgated Under: 119.03

Statutory Authority: 6109.03, 6109.04

Rule Amplifies: 6109.04

Prior Effective Dates: 1/1/02

**Maximum contaminant levels and best available technologies for inorganic contaminants.**

- (A) The following maximum contaminant levels (MCLs) for inorganic contaminants apply to all public water systems.

Contaminant	MCL in milligrams per liter
Nitrate (as nitrogen)	10
Nitrite (as nitrogen)	1
Total nitrate and nitrite (as nitrogen)	10

- (B) The following MCLs for inorganic contaminants apply to all community and nontransient noncommunity public water systems.

Contaminant	MCL in milligrams per liter
Antimony	0.006
Arsenic	0.010
Asbestos	7 <sub>a</sub>
Barium	2
Beryllium	0.004
Cadmium	0.005
Chromium	0.1
Cyanide (as free cyanide)	0.2
Fluoride	4.0
Mercury	0.002
Selenium	0.05
Thallium	0.002
a. In units of millions of fibers per liter, where only fibers longer than ten micrometers are counted.	

- (C) The following MCL for bromate applies to all community and nontransient noncommunity public water systems that treat their water with ozone.

Contaminant	MCL in milligrams per liter
Bromate	0.010

- (D) The following MCL for chlorite applies to all community and nontransient noncommunity public water systems that treat their water with chlorine dioxide.

Contaminant	MCL in milligrams per liter
Chlorite	1.0

(E) The director may determine that a public water system shall apply best available technology in order to reduce the level of a contaminant to below its MCL. The director identifies the following as the best available technologies (BATs) for removal of the following inorganic contaminants from water.

Contaminant	BATs
Antimony	2,7
Arsenic <sup>a</sup>	1, 2, 5, 6, 7, 9, 12 <sup>b</sup>
Asbestos	2, 3, 8
Barium	5, 6, 7, 9
Beryllium	1, 2, 5, 6, 7
Bromate	14
Cadmium	2, 5, 6, 7
Chlorite	15
Chromium	2, 5, 6 <sup>c</sup> ,
Cyanide	5, 7, 13
Mercury	2 <sup>d</sup> , 4, 6 <sup>d</sup> , 7 <sup>d</sup>
Nitrate	5, 7, 9
Nitrite	5, 7
Selenium	1, 2 <sup>e</sup> , 6, 7, 9
Thallium	1, 5
a. BATs for arsenic (V). Pre-oxidation may be required to convert arsenic (III) to arsenic (V)	
b. To obtain high removals the iron to arsenic ratio must be at least 20:1	
c. BAT for chromium (III) only	
d. BAT only for mercury concentrations of ten micrograms per liter or less	
e. BAT for selenium (IV) only	
Key to BATs in table:	
1 = Activated alumina	
2 = Coagulation/filtration (not BAT for systems < 500 service connections)	
3 = Direct filtration	
4 = Granular activated carbon	
5 = Ion exchange	
6 = Lime softening (not BAT for systems < 500 service connections)	
7 = Reverse osmosis	
8 = Corrosion control	
9 = Electrodialysis	
10 = Chlorine	
11 = Ultraviolet	
12 = Oxidation/filtration	

13 = Alkaline chlorination (pH >8.5)
14 = Control of ozone treatment process to reduce production of bromate
15 = Control of treatment processes to reduce disinfectant demand and control of disinfectant treatment processes to reduce disinfectant levels

Effective: 02/22/2010

R.C. 119.032 review dates: 02/22/2015 and 01/29/2020

Promulgated Under: 119.03

Statutory Authority: 6109.03, 6109.04

Rule Amplifies: 6109.04

Prior Effective Dates: 12/27/78, 03/01/88, 09/13/93, 01/01/02, 08/01/05

3745-81-12      **Maximum contaminant levels and best available technologies for organic contaminants.**

(A) The director may determine that a public water system shall apply the following best available technology (BAT), for achieving compliance with the maximum contaminant levels (MCLs) for organic disinfection byproducts identified in this table:

Contaminant	MCL (mg/L)	BAT
Total trihalomethanes	0.080	Enhanced coagulation or enhanced softening plus GAC10; or nanofiltration with a molecular weight of less than or equal to 1000 Daltons; or GAC20
Haloacetic acids (five)	0.060	Enhanced coagulation or enhanced softening plus GAC10; or nanofiltration with a molecular weight of less than or equal to 1000 Daltons; or GAC20

(B) The director may determine that a public water system shall apply the following best technology, treatment techniques or other means available for achieving compliance with the MCLs for TTHM and HAA5 identified in this rule for consecutive systems and applies only to the disinfected water that consecutive systems buy or otherwise receive:

Contaminant	MCL (mg/L)	BAT
Total trihalomethanes	0.080	Systems serving greater than or equal to 10,000: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance. Systems serving less than 10,000: Improved distribution system and storage tank management to reduce residence time.



Haloacetic acids (five)	0.060	Systems serving greater than or equal to 10,000: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance. Systems serving less than 10,000: Improved distribution system and storage tank management to reduce residence time.
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(C) The following maximum contaminant levels (MCLs) apply to community public water systems and nontransient noncommunity public water systems. The associated BATs, designated as GAC for granular activated carbon and PTA for packed-tower aeration, identify the best technology, treatment techniques or other means available for achieving compliance with the stated MCLs. The director may determine that a public water system shall apply best available technology in order to reduce the level of a contaminant to below its MCL.

Contaminant	CAS number	MCL (mg/L)	BAT
Vinyl chloride	75-01-4	0.002	PTA
Benzene	71-43-2	0.005	GAC PTA
Carbon tetrachloride	56-23-5	0.005	GAC PTA
p-Dichlorobenzene	106-46-7	0.075	GAC PTA
1,2-Dichloroethane	107-06-2	0.005	GAC PTA
1,1-Dichloroethylene	75-35-4	0.007	GAC PTA
Trichloroethylene	79-01-6	0.005	GAC PTA
1,1,1-Trichloroethane	71-55-6	0.2	GAC PTA
o-Dichlorobenzene	95-50-1	0.6	GAC PTA
cis-1,2-Dichloroethylene	156-59-2	0.07	GAC PTA
trans-1,2-Dichloroethylene	156-60-5	0.1	GAC PTA
1,2-Dichloropropane	78-87-5	0.005	GAC PTA
Dichloromethane	75-09-2	0.005	PTA
Ethylbenzene	100-41-4	0.7	GAC PTA
Monochlorobenzene	108-90-7	0.1	GAC PTA
Styrene	100-42-5	0.1	GAC PTA

Tetrachloroethylene	127-18-4	0.005	GAC PTA
Toluene	108-88-3	1	GAC PTA
1,2,4-Trichlorobenzene	120-82-1	0.07	GAC PTA
1,1,2-Trichloroethane	79-00-5	0.005	GAC PTA
Xylenes (total)	1330-20-7	10	GAC PTA

(D) The following maximum contaminant levels apply to community public water systems and nontransient noncommunity water systems. The associated BATs, designated as GAC for granular activated carbon, PTA for packed-tower aeration, and OX for oxidation with chlorine or ozone, identify the best technology, treatment technique or other means available for achieving compliance with the stated MCLs. The director may determine that a public water system shall apply BAT in order to reduce the level of a contaminant to below its MCL.

Contaminant	CAS number	MCL (mg/L)	BAT
Alachlor	15972-60-8	0.002	GAC
Atrazine	1912-24-9	0.003	GAC
Benzo[a]pyrene	50-32-8	0.0002	GAC
Carbofuran	1563-66-2	0.04	GAC
Chlordane	57-74-9	0.002	GAC
2,4-D	94-75-7	0.07	GAC
Dalapon	75-99-0	0.2	GAC
Dibromochloropropane (DBCP)	96-12-8	0.0002	GAC PTA
Di(2-ethylhexyl) adipate	103-23-1	0.4	GAC
Di(2-ethylhexyl) phthalate	117-81-7	0.006	GAC
Dinoseb	88-85-7	0.007	GAC
Diquat	85-00-7	0.02	GAC
Endothall	145-73-3	0.1	GAC
Endrin	72-20-8	0.002	GAC
Ethylene dibromide (EDB)	106-93-4	0.00005	GAC PTA
Glyphosate	1071-53-6	0.7	OX
Heptachlor	76-44-8	0.0004	GAC
Heptachlor epoxide	1024-57-3	0.0002	GAC
Hexachlorobenzene	118-74-1	0.001	GAC
Hexachlorocyclopentadiene	77-47-4	0.05	GAC PTA
Lindane	58-89-9	0.0002	GAC
Methoxychlor	72-43-5	0.04	GAC

Oxamyl (Vydate)	23135-22-0	0.2	GAC
Picloram	1918-02-1	0.5	GAC
Polychlorinated biphenyls (PCBs)	1336-36-3	0.0005	GAC
Pentachlorophenol	87-86-5	0.001	GAC
Simazine	122-34-9	0.004	GAC
2,3,7,8-TCDD (Dioxin)	1745-01-6	$3 \times 10^{-8}$	GAC
Toxaphene	8001-35-2	0.003	GAC
2,4,5-TP (Silvex)	93-72-1	0.05	GAC

Effective: 04/01/2016

Five Year Review (FYR) Dates: 01/15/2016 and 04/01/2021

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 12/27/78, 8/24/81, 5/22/89, 9/13/93, 1/1/02, 1/1/10

3745-81-14      **Maximum contaminant levels for microbiological contaminants.**

- (A) Until March 31, 2016, a public water system which monitors with at least forty samples per month is in compliance with the maximum contaminant level (MCL) for total coliforms when no more than 5.0 per cent of the total number of samples during a month are total coliform-positive.
- (B) Until March 31, 2016, a public water system which monitors with fewer than forty samples per month is in compliance with the MCL for total coliforms when no more than one sample during a month is total coliform-positive.
- (C) Until March 31, 2016, a public water system is in violation of the MCL for total coliforms, and may pose an acute risk to human health, if any repeat sample collected in accordance with rule 3745-81-21 of the Administrative Code meets any of the following:
  - (1) Fecal coliform-positive.
  - (2) *Escherichia coli*-positive (*E. coli*-positive).
  - (3) Total coliform-positive following a fecal coliform-positive routine sample.
  - (4) Total coliform-positive following an *E. coli*-positive routine sample.
- (D) Beginning April 1, 2016, a public water system is in violation of the MCL for *E. coli*, and may pose an acute risk to human health, for samples collected in accordance with rules 3745-81-50 to 3745-81-55 of the Administrative Code if any of the following occur:
  - (1) The system has an *E. coli*-positive repeat sample following a total coliform-positive routine sample.
  - (2) The system has a total coliform-positive repeat sample following an *E. coli*-positive routine sample.
  - (3) The system fails to collect all required repeat samples following an *E. coli*-positive routine sample.
  - (4) The system fails to test for *E. coli* when any repeat sample is total coliform-positive.
- (E) Until March 31, 2016, a public water system shall determine compliance with the MCL for total coliforms as set forth in paragraphs (A), (B) and (C) of this rule for each period in which the public water system is required to monitor for total coliforms.
- (F) Beginning April 1, 2016, a public water system shall determine compliance with the MCL for *E. coli* as set forth in paragraph (D) of this rule for each period in which the public water system is required to monitor for total coliforms.
- (G) Until March 31, 2016, a public water system which exceeds any MCL for total coliforms set forth in paragraphs (A), (B) and (C) of this rule shall do all of the following:
  - (1) Report the violation to the director no later than the end of the next business day after the public water system learns of the violation.

- (2) Notify the public in accordance with rule 3745-81-32 of the Administrative Code.
  - (3) Determine the source of contamination.
  - (4) Eliminate the source of contamination.
- (H) The director may determine that a public water system shall apply best available technology in order to reduce the level of a contaminant to below its MCL. The director identifies the following as the best available technology for achieving compliance with the MCL for total coliforms and E. coli as set forth in this rule:
- (1) Protection of wells from fecal contamination by coliforms by appropriate placement and construction in accordance with Chapter 3745-9 of the Administrative Code.
  - (2) Maintenance of a disinfectant residual throughout the distribution system in accordance with rule 3745-81-72 of the Administrative Code and paragraph (C) of rule 3745-83-01 of the Administrative Code.
  - (3) Proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks and reservoirs, continual maintenance of positive water pressure in all parts of the distribution system and backflow prevention as described in Chapter 3745-95 of the Administrative Code.
  - (4) Filtration or disinfection by public water systems using surface water, in whole or in part, as required by rules 3745-81-64 to 3745-81-69 and 3745-81-71 to 3745-81-75 of the Administrative Code, or disinfection of ground water, as required by rules 3745-81-41 to 3745-81-45 of the Administrative Code, using strong oxidants such as chlorine, chlorine dioxide or ozone .
  - (5) Where appropriate, the development and implementation of a source water assessment and protection program approved by the director.

Effective: 04/01/2016

Five Year Review (FYR) Dates: 01/15/2016 and 04/01/2021

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.03, 6109.04  
Prior Effective Dates: 12/27/78, 11/26/80, 3/1/88, 5/22/89, 12/31/90,  
9/13/93, 4/1/99, 8/3/04, 1/1/08

**3745-81-15 Maximum contaminant levels and best available technologies for radionuclide contaminants.**

- (A) Combined radium-226 and radium-228: the maximum contaminant level (MCL) for combined radium-226 and radium-228 is five picocuries per liter (pCi/L). The combined radium-226 and radium-228 value is determined by the addition of the results of the analysis for radium-226 and the analysis for radium-228.
- (B) Gross alpha particle activity: the MCL for gross alpha particle activity (including radium-226 but excluding radon and uranium) is fifteen pCi/L. The gross alpha particle activity value may be adjusted by subtracting the result of the analysis for uranium. If the result for uranium is reported as a mass measurement in micrograms per liter ( $\mu\text{g/L}$ ), the activity value in pCi/L shall be obtained by multiplying the result with a conversion factor of 0.67 pCi/ $\mu\text{g}$ .
- (C) Beta particle and photon radioactivity:
  - (1) The MCL for beta particle and photon radioactivity from man-made radionuclides is an annual dose equivalent of four millirem/year (mrem/yr) to the total body or any internal organ. The annual dose equivalent is determined by converting the running annual average concentration for the radionuclide from pCi/L to mrem/yr (running annual average concentration divided by the dose equivalent for the radionuclide). If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed four mrem/yr.
  - (2) The annual dose equivalent for radionuclides may be determined using the conversion table below. For radionuclides not listed, the concentration causing four mrem/yr total body or organ dose equivalents may be obtained from appendix I of the "Implementation Guidance for Radionuclides" dated March 2002 and designated EPA 816-F-00-002.

[Comment: This rule references the U.S. EPA "Implementation Guidance for Radionuclides" and "Implementation Guidance for Radionuclides Appendices A - J," issued March 2002. This document is available from the "U.S. EPA Office of Ground Water and Drinking Water, Ariel Rios Building, 1200 Pennsylvania Ave., N.W., Washington, D.C. 20460-0003, (202) 564-3750, [www.epa.gov/safewater](http://www.epa.gov/safewater)." A copy may also be obtained by contacting "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

Dose Equivalents Assumed to Produce a Total Body or Organ Dose of four mrem/yr



Radionuclide	Critical Organ	pCi/L
Tritium	Total body	20,000
Strontium-89	Bone marrow	20
Strontium-90	Bone marrow	8
Iodine-131	Thyroid	3
Cesium-134	Total body	80

- (D) Uranium: the MCL for uranium is thirty µg/L (activity level of twenty pCi/L). If the result for uranium is reported as an activity measurement in pCi/L, the mass in µg/L shall be obtained by multiplying the result with a conversion factor of 1.49 µg/pCi.
- (E) The director may determine that a public water system shall apply best available technology in order to reduce the level of a contaminant to below its MCL. The director hereby identifies the following technologies, treatment techniques, or other means as the best available technologies (BATs) for removal of the following radionuclide contaminants from water.

Contaminant	BATs
Combined radium-226 and radium-228	1 <sup>a</sup> , 2 <sup>b</sup> , 3 <sup>c</sup> , 4 <sup>d</sup> , 5 <sup>e</sup> , 6, 7 <sup>f</sup>
Gross alpha particle activity (excluding Radon and Uranium)	2 <sup>b</sup>
Beta particle and photon radioactivity	1 <sup>a</sup> , 2 <sup>b</sup>
Uranium	1 <sup>a</sup> , 2 <sup>b</sup> , 3 <sup>c</sup> , 8 <sup>a,g</sup> , 9 <sup>h</sup>

Key to BATs in table:

1 = Ion exchange

2 = Reverse Osmosis

3 = Lime softening

4 = Green sand filtration

5 = Co-precipitation with barium sulfate

6 = Electrodialysis/electrodialysis reversal

7 = Pre-formed hydrous manganese oxide filtration

8 = Activated alumina

9 = Enhanced coagulation/filtration

Limitations footnotes:

- a) The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.
- b) Reject water disposal options and other reverse osmosis limitations should be carefully considered before choosing this technology.
- c) This technology should not be used for public water systems serving a population of five hundred or less.
- d) Removal efficiencies can vary depending on water quality.
- e) This technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration, it is most applicable to the systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.
- f) This technology is most applicable to small systems that already have filtration in place.
- g) Competing anion concentrations may affect regeneration frequency. Handling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.
- h) Assumes modification to a coagulation/filtration process already in place.

Effective: 02/23/2015

R.C. 106.03 review dates: 11/17/2014 and 11/17/2019

Promulgated Under: 106.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.04

Prior Effective Dates: 12/27/78, 09/15/04,

### **3745-81-17 Treatment techniques.**

- (A) This rule establishes treatment techniques in lieu of maximum contaminant levels for specified contaminants.
- (B) Treatment techniques for acrylamide and epichlorohydrin. Each public water system utilizing polymers containing acrylamide or epichlorohydrin shall certify annually in writing to the director (using third-party or manufacturer's certification) that when polymers containing acrylamide or epichlorohydrin are used in the drinking water system, the combination (or product) of dose and monomer level does not exceed either of the levels specified as follows:

Acrylamide monomer level of 0.05 per cent in polymers added to water at 1 part per million (or equivalent), or

Epichlorohydrin monomer level of 0.01 per cent in polymers added to water at 20 parts per million (or equivalent).

Certifications can rely on manufacturers or third parties, as approved by the director.

Effective: September 13, 1993

Promulgated under: RC Chapter 119

Rule amplifies: RC Section 6109.04

**Use of bottled water and point-of-use or point-of-entry treatment devices.**

- (A) Public water systems shall not use bottled water to achieve compliance with the requirements of this chapter. Upon approval of the director, bottled water may be used on a temporary basis to avoid an increased risk to health from contaminant levels exceeding the maximum contaminant level (MCL). The bottled water shall be of a quality acceptable to the director.
- (B) Except as provided below, a public water system may not use point-of-use or point-of-entry treatment devices to achieve compliance with a MCL. A nontransient noncommunity public water system may use a point-of-use or point-of-entry treatment device to achieve compliance with the MCL for arsenic if the following conditions are met:
  - (1) Point-of-use and point-of-entry treatment devices shall be owned, controlled, and maintained by the public water system, or by a person under contract with the public water system, to ensure proper operation and maintenance and compliance with the arsenic maximum contaminant level.
  - (2) Before any new point-of-use or point-of-entry treatment devices are installed for compliance with the arsenic MCL, or any existing point-of-use or point-of-entry treatment devices are used for compliance with the arsenic MCL, the public water system shall obtain approval of detail plans in accordance with Chapter 3745-91 of the Administrative Code. Chemical and microbiological analyses for constituents that may affect the performance or maintenance of the proposed point-of-entry or point-of-use device must be performed on water entering the treatment device and reported in the detail plans. Results of samples collected more than twelve months prior to plan submittal may not be accepted. Detail plans shall include data from an acceptable demonstration study and a monitoring plan which ensures that the treatment devices provide health protection equivalent to that provided by central water treatment. "Equivalent" means that the water would meet all primary drinking water regulations and would be of acceptable quality similar to water distributed by a well operated central treatment plant. Detail plans shall describe how the system design shall ensure that water of increased corrosivity shall not be released to the drinking water distribution system. The monitoring plan shall include at least the following parts:
    - (a) Description of and schedule for the recording of physical measurements and observations such as total flow treated and mechanical condition of the treatment equipment.

- (b) An explanation of how consumers will be educated as to which taps are suitable for ingestion.
  - (c) The location of treatment devices and sampling points, and the frequency of sample collection for arsenic analysis. At least one treatment device (or a minimum of twenty-five per cent of treatment devices) shall be sampled for arsenic each quarter unless otherwise approved by the director. Each treatment device shall be sampled at least once annually.
  - (d) A schedule to collect any additional data required by the director to demonstrate consistency of treatment performance of the point-of-use or point-of-entry treatment device.
- (3) The public water system must apply effective technology under a plan approved by the director. The microbiological safety of the water must be maintained at all times.
  - (4) The design and application of any point-of-entry or point-of-use treatment device shall consider the potential for increase in bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contactor disinfection, and bacteria monitoring to ensure the microbiological safety of the water is not compromised.
  - (5) The public water system shall ensure that all buildings connected to the system have sufficient point-of-use or point-of-entry treatment devices that are properly installed, maintained, and monitored such that all consumers will be protected. Public water systems using point-of-use technology must install devices at every tap where common practice is to obtain water for ingestion.
  - (6) All point-of-use and point-of-entry treatment devices shall be equipped with mechanical warnings that automatically alert consumers of operational problems.
  - (7) The point-of-entry or point-of-use treatment device shall be certified by an accredited "American National Standards Institute" (ANSI) certification program for drinking water treatment units in accordance with one of the following "American National Standards Institute/National Sanitation Foundation" (ANSI/NSF) standards: standard 58 "Reverse Osmosis Drinking Water Treatment Systems 58-2007 (October 22, 2007)"; standard 62 "Drinking Water Distillation Systems 62-2004 (March 16, 2004)"; or standard 53 "Drinking Water Treatment Units-Health Effects 53-2007a (July 10, 2007)".

- (8) Maintenance of the treatment device shall occur according to manufacturers suggestions, or at an interval determined during a demonstration period, whichever time period is shorter.
- (9) Upon failure of the point-of-entry or point-of-use treatment device, all repairs or replacements must be completed as soon as practical, but no later than fourteen days after the failure.
- (10) The point-of-entry or point-of-use treatment device must be operational at all times to provide water that meets the arsenic standard at required taps.
  - (a) Under temporary circumstances during required maintenance of the point-of-entry or point-of-use treatment device or equipment failure, bottled water may be required to be provided as specified in paragraph (A) of this rule for a period not to exceed fourteen days.
  - (b) At any time a point-of-use or point-of-entry treatment device is not operating due to maintenance or failure of the device, a notice shall be posted at any tap served by that device. The notice shall inform consumers that the water from that tap is not suitable for ingestion due to elevated arsenic concentration and direct them to alternative taps or sources that are suitable for ingestion.
- (11) Maintenance records of all treatment devices must be maintained for three years and available for review during a sanitary survey.

[Comment: This rule adopts the ANSI/NSF standards 53, 58, and 62 by reference. Copies may be obtained from "NSF International, 789 Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48113-0140, (734) 769-8010", [www.nsf.org](http://www.nsf.org). These documents are available for review at the "Ohio EPA Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215".]

[Comment: This rule references the ANSI accreditation program for third party certification of drinking water units. A list of ANSI accredited third party product certification programs may be obtained from the "American National Standards Institute, 25 West 43rd Street, New York, NY 10036, (212) 642-4900" or [www.ansi.org](http://www.ansi.org).]

Effective: 02/22/2010

R.C. 119.032 review dates: 02/22/2015 and 01/29/2020

Promulgated Under: 119.03

Statutory Authority: 6109.03, 6109.04

Rule Amplifies: 6109.04

Prior Effective Dates: 08/01/05

**3745-81-21 Coliform monitoring requirements.**

The provisions of paragraph (A) of this rule are applicable until March 31, 2016. The provisions of paragraphs (B), (C) and (D) of this rule are applicable until all repeat monitoring required in paragraph (B) of this rule and all fecal coliform or E. coli testing required in paragraph (C) of this rule that were initiated by a total coliform-positive sample taken before April 1, 2016 are completed, as well as analytical method, reporting, recordkeeping, public notification, and consumer confidence report requirements associated with that monitoring and testing.

Beginning April 1, 2016, the provisions of rules 3745-81-50 to 3745-81-55 of the Administrative Code are applicable, with systems required to begin regular monitoring at the same frequency as the system-specific frequency required on March 31, 2016.

(A) Public water systems shall collect total coliform routine samples at sites which are representative of water throughout the distribution system according to a written sample siting plan. Such plans are subject to review and revision by the director. Samples for determination of compliance with this chapter shall be analyzed in a laboratory holding valid certification to analyze drinking water for microbiological contaminants under Chapter 3745-89 of the Administrative Code. The samples shall be analyzed by one or more of the approved methods listed in rule 3745-81-27 of the Administrative Code.

(1) Community water systems.

(a) The minimum monitoring frequency for total coliforms for community water systems is based on the population served by the community water system, except as provided for in paragraphs (A)(1)(b) and (A)(4) of this rule, as follows:

Population served	Minimum number of samples per month
Less than or equal to 1,000	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25



25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,001 or more	480

(b) A community water system using a surface water source, in whole or in part, serving fewer than three thousand three hundred one persons shall monitor at regular intervals for total coliforms no less than four times per month.

(2) Noncommunity water systems.

(a) A noncommunity water system using only ground water or purchased water and serving not more than one thousand persons shall monitor with at least one sample each calendar quarter that the noncommunity water system provides water to the public.

(b) A noncommunity water system using only ground water and serving more than one thousand persons during any month shall monitor at the same frequency as a community water system serving the same number of persons, as specified in paragraph (A)(1)(a) of this rule.

(c) A noncommunity water system using a surface water source, in whole or in part, and serving a population of greater than four thousand one hundred persons shall monitor at the same frequency as a community water system serving the same

number of persons, as specified in paragraph (A)(1)(a) of this rule. A noncommunity water system using surface water, in whole or in part, serving a population of fewer than four thousand one hundred one persons shall monitor at least four times per month for any month the noncommunity water system serves water to the public.

- (3) Public water systems shall monitor with samples taken at regular time intervals throughout the month in accordance with the system's sample siting plan.
  - (4) Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, shall not be used to determine compliance with the maximum contaminant level (MCL) for total coliforms as set forth in rule 3745-81-14 of the Administrative Code. The special purpose samples shall be marked as such before analysis. Repeat samples taken pursuant to paragraph (B) of this rule are not considered special purpose samples, and shall be used to determine compliance with the MCL for total coliforms as set forth in rule 3745-81-14 of the Administrative Code.
  - (5) Based on the results of a sanitary survey, the director may increase the frequency of total coliform monitoring. On the basis of subsequent sanitary surveys, the increased monitoring frequency may be reduced. Under no circumstances shall the required monitoring be less than that prescribed by this rule.
- (B) Follow-up to total coliform-positive samples.
- (1) When a routine sample is determined to be total coliform-positive, the public water system shall monitor with a set of four repeat samples within twenty-four hours of being notified of the positive result. Upon a request from a public water system, the director may extend the twenty-four-hour limit on a case-by-case basis when the public water system has a logistical problem collecting the repeat samples within twenty-four hours which is beyond the control of the public water system. When an extension is granted by the director, the director shall specify how much time the public water system has to monitor with repeat samples.
  - (2) The public water system shall monitor with at least one repeat sample from the sampling tap where the original total coliform-positive sample was taken, and at least one repeat sample at a tap within five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. The fourth repeat sample shall be collected within five service connections upstream or downstream of the original sampling site. When a total coliform-positive sample was taken at an end of the distribution system or one service connection away from an end of the distribution system, the director may waive the requirement to monitor with at least one repeat sample upstream or downstream of the original sampling site.
  - (3) Public water systems shall collect all total coliform repeat samples on the same day.
  - (4) When one or more repeat samples in the set is total coliform-positive, the public water system shall continue to monitor with additional sets of repeat samples in the manner

specified in paragraphs (B)(1) to (B)(3) of this rule until total coliforms are not detected in one complete set of repeat samples or the system determines that the MCL for total coliforms in rule 3745-81-14 of the Administrative Code has been exceeded and notifies the director no later than the end of the next business day after the public water system learns of the violation.

- (5) Until March 31, 2016, failure to monitor and report required repeat samples is a monitoring and reporting violation, for which public notification shall be issued in accordance with rule 3745-81-32 of the Administrative Code.
  - (6) Until March 31, 2016, public notification issued as a result of a violation in paragraph (C) of rule 3745-81-14 of the Administrative Code or paragraph (B)(5) of this rule, and which may cause an acute risk to human health, shall remain in effect until total coliforms are not detected in one complete set of repeat samples.
  - (7) When a public water system monitoring with fewer than five routine samples per month has one or more total coliform-positive samples, the public water system shall monitor with at least five routine samples during the next month that the public water system provides water to the public. The director shall not waive the requirement for a public water system to collect repeat samples in paragraphs (B)(1) to (B)(4) of this rule.
  - (8) After a public water system monitors with a routine sample and before the public water system learns the results of the analysis of that sample, when the public water system collects other routine samples from within five adjacent service connections of the initial sample, and the initial sample, after analysis, is found to contain total coliforms, then the public water system may consider the subsequent samples as repeat instead of as routine samples.
  - (9) When a routine or repeat total coliform sample is analyzed by a membrane filter technique and produces a high background count (HBC) or confluent growth, the HBC or confluent growth culture shall be further analyzed for total coliforms in accordance with a method included in the membrane filter techniques referred to in paragraph (D) of rule 3745-81-27 of the Administrative Code. Gas production of any amount in the inner fermentation tube of brilliant green lactose bile broth indicates a positive coliform test. When an HBC or confluent growth culture is analyzed for total coliforms and none are found, the sample shall be considered invalid and the public water system shall monitor with a replacement sample within twenty-four hours of being notified of the invalid sample. Upon a request from a public water system, the director may extend the twenty-four-hour limit on a case-by-case basis when the public water system has a logistical problem collecting the repeat samples within twenty-four hours which is beyond the control of the public water system. When an extension is granted by the director, the director shall specify how much time the public water system has to monitor with repeat samples.
- (C) If any routine or repeat sample is total coliform-positive, that total coliform-positive culture shall be further analyzed to determine if fecal coliforms are present, except that the culture may be tested for *E. coli* in lieu of fecal coliforms. If fecal coliforms or *E. coli* are present,

the system shall notify the director by the end of the day when the system is notified of the test result, unless the system is notified of the result after the director's office is closed, in which case the system shall notify the director before the end of the next business day. All repeat sample results shall be submitted no later than the end of the next business day following analysis.

- (D) Failure to comply with a coliform monitoring requirement, as set forth in this rule, is a monitoring violation. A public water system which has failed to comply with a coliform monitoring requirement, as set forth in this rule, shall report the monitoring violation to the director within ten days after the public water system discovers the violation, and notify the public in accordance with rule 3745-81-32 of the Administrative Code.

Effective: 04/01/2016

Five Year Review (FYR) Dates: 01/15/2016 and 04/01/2021

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04, 6109.12

Prior Effective Dates: 12/27/78, 12/31/90, 9/13/93, 4/1/99, 1/1/08

**3745-81-23 Inorganic chemical monitoring requirements.**

All public water systems shall monitor as described in paragraphs (B) and (C) of this rule to determine compliance with the maximum contaminant levels (MCLs) for nitrate and nitrite. In addition, all community water systems and all nontransient noncommunity water systems shall monitor as described in paragraphs (D) and (E) of this rule for the inorganic contaminants with MCLs listed in paragraph (B) of rule 3745-81-11 of the Administrative Code. Public water systems shall monitor inorganic chemicals according to a schedule provided by the director.

(A) Monitoring for inorganic chemicals with MCLs shall be conducted as follows.

- (1) Groundwater systems and surface water systems shall monitor with a minimum of one sample at each sampling point. After the initial set of samples, the system shall take each repeat sample at the same sampling point as used before unless conditions make another sampling point more representative of a source or treatment plant.
- (2) If a public water system draws water from more than one source and the sources are combined before distribution, the system shall monitor at each sampling point during periods of normal operating conditions and shall keep a record of and report the sources providing water for each sample. When a sample does not contain water from all the sources which serve the sampling point, a schedule prepared by the public water system shall be followed so that the next monitoring sample at this sampling point for the same inorganic chemical(s) will include water from sources not included in the previous sample or samples. Thus, successive samples from the same sampling point for the same inorganic chemical(s) shall sample water supplied from different sources until all of the sources supplying that sampling point have been monitored. Note that when inorganic chemicals have different monitoring periods, they require separate monitoring schedules.
- (3) The frequency of monitoring for nitrate shall be according to paragraph (B) of this rule; the frequency of monitoring for nitrite shall be conducted according to paragraph (C) of this rule; the frequency of monitoring for asbestos shall be conducted according to paragraph (D) of this rule; and the frequency of monitoring for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, and thallium shall be according to paragraph (E) of this rule. The frequency of monitoring for bromate shall be conducted according to paragraph (L) of this rule. The frequency of monitoring for chlorite shall be conducted according to paragraph (M) of this rule.

(B) All public water systems shall monitor to determine compliance with the MCL for

nitrate in rule 3745-81-11 of the Administrative Code.

- (1) All public water systems which are groundwater systems shall monitor for nitrate annually.
  - (2) All public water systems which are surface water systems shall monitor for nitrate monthly.
  - (3) The repeat monitoring frequency for nitrate for public groundwater systems shall be quarterly for at least one year following any one sample in which the concentration is at least fifty per cent of the MCL. The director may reduce the monitoring frequency of a groundwater system to annually after four consecutive quarterly samples are less than eighty per cent of the MCL. If a groundwater system consistently operates less than four quarters per year, then the director may reduce the monitoring frequency to annually after samples collected during each of the system's operating quarters are less than eighty per cent of the MCL.
  - (4) After the initial round of quarterly repeat monitoring for nitrate is completed, each groundwater system which is monitoring annually shall take subsequent samples during the quarter(s) which previously resulted in the highest analytical result.
- (C) All public water systems shall monitor to determine compliance with the maximum contaminant level for nitrite in rule 3745-81-11 of the Administrative Code.
- (1) All public water systems shall monitor initially for nitrite with one sample at each sampling point.
  - (2) After the initial sample, public water systems where an analytical result for nitrite is less than fifty per cent of the MCL shall monitor at the frequency specified by the director.
  - (3) The repeat monitoring frequency for nitrite for public water systems shall be quarterly for at least one year following any one sample in which the concentration is at least fifty per cent of the MCL. The director may reduce the monitoring frequency to annually after a determination that the nitrite concentration for a public water system is less than eighty per cent of the MCL. If a groundwater system consistently operates less than four quarters per year, then the director may reduce the monitoring frequency to annually after samples collected during each of the public water system's operating quarters are less than eighty per cent of the MCL.
  - (4) After the initial round of quarterly repeat monitoring for nitrite is

completed, each public water system which is monitoring annually shall take each subsequent sample during the quarter(s) which previously resulted in the highest analytical result.

- (D) The frequency of monitoring conducted by community water systems and nontransient noncommunity water systems to determine compliance with the MCL for asbestos specified in rule 3745-81-11 of the Administrative Code shall be as follows:
- (1) Each community and nontransient noncommunity water system shall monitor for asbestos during the first three-year compliance period for each nine-year compliance cycle, except when a waiver is granted.
  - (2) A public water system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.
  - (3) A public water system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provision of paragraph (A) of this rule.
  - (4) A public water system vulnerable to asbestos contamination due both to its source water supply and corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.
  - (5) A public water system which exceeds eighty per cent of the MCL for asbestos as determined in paragraph (H) of this rule shall monitor quarterly beginning in the next quarter after the violation occurred.
  - (6) The director may decrease the quarterly monitoring requirement for asbestos to the frequency specified in paragraph (D)(1) of this rule provided the director has determined that the asbestos concentration for a public water system does not exceed eighty per cent of the MCL. In no case can the director make this determination unless a groundwater system takes a minimum of two quarterly samples or a surface water system takes a minimum of four quarterly samples.
- (E) The frequency of monitoring conducted by community water systems and nontransient noncommunity water systems for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, and thallium to determine compliance with the MCLs in rule 3745-81-11 of the Administrative Code shall be as follows:



- (1) Ground water systems shall take and analyze one sample at each sampling point during each compliance period. Surface water systems shall take and analyze one sample annually at each sampling point.
- (2) Monitoring to determine initial compliance with the arsenic MCL of 0.010 mg/L, effective January 1, 2006, shall be as follows:
  - (a) Community and nontransient noncommunity public water systems scheduled by the director to monitor for arsenic in 2005 which detect arsenic shall collect an additional sample for arsenic analysis after December 31, 2005 as scheduled by the director, and in no case later than December 31, 2007 for groundwater systems, or December 31, 2006 for surface water systems, in order to demonstrate compliance with the MCL for arsenic. Community and nontransient noncommunity public water systems scheduled by the director to monitor for arsenic in 2005 which detect arsenic above 0.008 mg/L shall collect a sample for arsenic analysis quarterly in 2006.
  - (b) Arsenic sampling results shall be reported to the nearest 0.001 mg/L.
- (3) The director may grant a waiver from the monitoring frequencies specified in paragraph (E)(1) of this rule for all of the contaminants listed in paragraph (E) of this rule except fluoride; no waivers shall be granted for fluoride. Waivers for cyanide monitoring may be granted only when the director determines that the public water system is not vulnerable due to any industrial source of cyanide.
- (4) Waivers granted under this rule shall require that the public water system monitor with at least one sample while the waiver is in effect. The term during which a waiver is in effect shall not exceed one compliance cycle (i.e., nine years).
- (5) Waivers may be granted under this rule only to surface water systems which have monitored annually for at least three years and to groundwater systems which have conducted at least three rounds of monitoring, with at least one monitoring using samples taken after January 1, 1990. Both surface and groundwater systems shall demonstrate that all previous analytical results were less than the MCLs. New public water systems that use a new water source are not eligible for a waiver until three rounds of monitoring of water from the new source have been completed.
- (6) In determining the appropriate reduced monitoring frequency, the director

shall consider:

- (a) Reported concentrations from all previous monitoring;
  - (b) The degree of variation in reported concentrations; and
  - (c) Other factors which may affect contaminant concentrations such as changes in groundwater pumping rates, changes in the system's configuration, changes in the system's operating procedures, or changes in stream flows or characteristics.
- (7) A decision by the director to grant a waiver shall be made in writing and shall set forth the basis for the determination. The director shall review and, where appropriate, revise his determination of the appropriate monitoring frequency when the system submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.
- (8) A public water system, which exceeds eighty per cent of a MCL as calculated in paragraph (H) of this rule, shall monitor quarterly for that contaminant beginning in the next quarter after the result was reported.
- (9) A public water system that uses a new source of water after January 1, 2004, or a public water system that begins operation after January 1, 2004, shall monitor initially for each contaminant listed in paragraph (E) of this rule in the first quarter of the next calendar year after operation of the new source or public water system begins. New public water systems shall sample at each sampling point. Existing water systems with a new source of water shall sample at the sampling point related to the new source.
- (10) If, during the initial sampling required in paragraph (E)(9) of this rule, the analytical result for any inorganic contaminant does not exceed eighty per cent of the MCL in rule 3745-81-11 of the Administrative Code, then the public water system shall monitor for that inorganic contaminant according to the frequency specified in paragraph (E)(1) of this rule, or at a frequency determined by the director.
- (11) If, during the initial sampling required in paragraph (E)(9) of this rule, any contaminant is reported as a concentration above eighty per cent of the MCLs listed in rule 3745-81-11 of the Administrative Code, at any sampling point, the public water system shall monitor quarterly for that contaminant at that sampling point beginning in the next quarter after the result is reported.

- (12) The director may decrease the quarterly monitoring requirement for one or more inorganic contaminants to the frequency specified in paragraph (E)(1) of this rule, or to a frequency determined by the director, provided the director has determined that the system does not exceed eighty per cent of the MCL. In no case may the director make this determination unless a groundwater system takes minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples. The director may also require additional data demonstrating consistency of treatment performance.
  - (13) Monitoring for arsenic at nontransient noncommunity public water systems which have installed approved point-of-use or point-of-entry treatment devices for arsenic removal in accordance with rule 3745-81-19 of the Administrative Code shall be conducted at sampling point(s) specified in a monitoring plan approval by the director and in accordance with a schedule provided by the director.
- (F) Confirmation samples:
  - (1) Where nitrate or nitrite monitoring indicates an exceedance of the MCL, the director may require the public water system to monitor with a confirmation sample within twenty-four hours of the public water system's receipt of notification of the analytical results of the first sample. Public water systems unable to comply with the twenty-four hour sampling requirement shall immediately notify the consumers in the area served by the public water system in accordance with rule 3745-81-32 of the Administrative Code. Public water systems giving immediate notification shall monitor with a confirmation sample within two weeks of notification of the analytical results of the first sample.
  - (2) Where the results of monitoring for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, or thallium indicate an exceedance of a MCL, the director may require that a confirmation sample be collected at the same sampling point as soon as possible (but not to exceed two weeks) after notification of the initial monitoring result.
  - (3) With confirmation samples required under paragraphs (F)(1) and (F)(2) of this rule, the results of analysis of the initial and confirmation samples shall be averaged. The resulting average shall be used to determine the water system's compliance in accordance with paragraph (H) of this rule.
  - (4) If a public water system fails to collect the number of samples required in paragraph (F) of this rule, compliance (average concentration) will be based on the total number of samples collected.

- (G) The director may require more frequent monitoring than specified in paragraphs (B), (C), (D), and (E) of this rule or may require confirmation samples for positive and negative results at his discretion. The director has discretion to delete results of obvious sampling or analytical errors.
- (H) Compliance with rule 3745-81-11 of the Administrative Code shall be determined based on the analytical result(s) obtained at each sampling point.
  - (1) Compliance with the MCLs for nitrate and nitrite is determined based on one sample if the levels of these contaminants are below the MCLs. If the levels of nitrate and/or nitrite exceed the MCLs in the initial sample, and a confirmation sample is required in accordance with paragraph (F)(1) of this rule, and compliance shall be determined based on the average of the initial and confirmation samples. Failure to take a confirmation sample will result in a MCL violation based on the level of the initial sample.
  - (2) For public water systems which are conducting monitoring at a frequency greater than annual, compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, and thallium is determined by a running annual average at each sampling point. The public water system will not be considered in violation of the MCL until it has completed one year of quarterly sampling. If, however, any one sample result would cause the running annual average to exceed the MCL, then the public water system is out of compliance immediately. If one sampling point is in violation of the MCL, the system is in violation of the MCL. If a public water system fails to collect the required number of samples, compliance with the MCL (average concentration) will be based on the total number of samples collected. Any sample result below the following method detection limit (MDL) shall be calculated as zero for the purpose of determining the running annual average.

Method Detection Limits for Inorganic Contaminants			
Contaminant	Analytical Method Type	Analytical Method Number(s) <sup>1</sup>	Method Detection Limit (Milligram/Liter)
Antimony	AA, furnace	3113 B	0.003
	AA, platform	200.9	0.0008
	AA, gaseous hydride	D-3697-92	0.001
	ICP-MS	200.8	0.0004
Arsenic	AA, furnace	3113 B	0.001
	AA, platform stabilized temp	200.9	0.0005 <sup>2</sup>
	AA, gaseous hydride	3114 B	0.001
	ICP-MS	200.8	0.0014 <sup>3</sup>
Asbestos	Transition electron microscopy		0.01 MFL <sup>4</sup>
Barium	AA, furnace	3113 B	0.002
	AA, direct aspiration	3111 D	0.1
	ICP	200.7, 3120 B	0.002 (0.001)
	ICP-MS	200.8	0.0008
Beryllium	AA, furnace	3113 B	0.0002
	AA, platform	200.9	0.00002
	ICP	200.7, 3120 B	0.0003
	ICP-MS	200.8	0.0003
Cadmium	AA, furnace	3113 B	0.0001
	ICP	200.7	0.001
Chromium	AA, furnace	3113 B	0.001
	ICP	200.7, 3120 B	0.007 (0.001)
Cyanide	Distillation, spectrophotometric <sup>5</sup>	4500-CN E	0.02
	Distillation, amenable, spectrophotometric <sup>6</sup>	4500-CN G	0.02
	Distillation, automated, spectrophotometric <sup>5</sup>	335.4	0.005
Mercury	Manual cold vapor	245.1, 3112 B	0.0002
	Automated cold vapor	245.2	0.0002

Nickel	AA, furnace	3113_	0.001
	AA, platform	200.9	0.0006
	ICP	200.7, 3120 B	0.005
	ICP-MS	200.8	0.0005
Selenium	AA, furnace	3113 B	0.002
	AA, gaseous hydride	3114 B	0.002
Thallium	AA, platform	200.9	0.0007
	ICP-MS	200.8	0.0003

<sup>1</sup> Analytical method numbers, names, and references are identified in paragraph (A) of rule 3745-81-27 of the Administrative Code. Type labels include AA for atomic absorption, ICP for inductively coupled plasma, and MS for mass spectrometry.

<sup>2</sup> The MDL reported for EMSL94 method 200.0 (May 1994) was determined using a two times concentration step during sample digestion. The MDL determined for samples analyzed using direct analyses (i.e. no sample digestion) will be higher. Using multiple depositions, EMSL94 method 200.9 is capable of obtaining a MDL of 0.0001 mg/L.

<sup>3</sup> Using selective ion monitoring EMSL94 method 200.8 (May 1994) is capable of obtaining a MDL of 0.00001 mg/L.

<sup>4</sup> MFL means "million fibers longer than ten micrometers per liter of water".

<sup>5</sup> Screening method for total cyanides

<sup>6</sup> Measures "free" cyanides

(a) For public water systems which are monitoring annually, or less frequently, for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, or thallium, when the average of a sample collected pursuant to paragraph (E) of this rule and a confirmation sample exceeds eighty per cent of the MCL, the public water system shall begin quarterly sampling at that sampling point. If a confirmation sample was not collected the public water system shall begin quarterly monitoring based on the level of the initial sample.

(b) If a public water system is monitoring annually, or less frequently, for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, or thallium because of a reduction from quarterly monitoring granted by the director pursuant to paragraph (E)(12) of the rule, the public water system is not required to return to quarterly monitoring unless the

sample result exceeds the MCL.

- (I) Each public water system shall monitor at the time designated by the director during each compliance period.
- (J) Sample collection for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium, and thallium under this rule shall be conducted using the sample preservation, container, and maximum holding time procedures specified in the following table:

Contaminant	Preservative <sup>1</sup>	Container <sup>2</sup>	Time <sup>3</sup>
Antimony	HNO <sub>3</sub> to pH <2	P or G	6 months
Arsenic	HNO <sub>3</sub> to pH <2	P or G	6 months
Asbestos	Cool, 4°c		48 hours
Barium	HNO <sub>3</sub> to pH <2	P or G	6 months
Beryllium	HNO <sub>3</sub> to pH <2	P or G	6 months
Cadmium	HNO <sub>3</sub> to pH <2	P or G	6 months
Chromium	HNO <sub>3</sub> to pH <2	P or G	6 months
Cyanide	Cool, 4°c, NaOH to pH >12 <sup>3</sup>	P or G	14 days
Fluoride	None	P or G	1 month
Mercury	HNO <sub>3</sub> to pH <2	P or G	28 days
Nickel	HNO <sub>3</sub> to pH <2	P or G	6 months
Nitrate	Cool, 4°c	P or G	48 hours <sup>5</sup>
Nitrate/nitrite <sup>6</sup>	H <sub>2</sub> SO <sub>4</sub> to pH <2	P or G	28 days
Nitrite	Cool, 4°c	P or G	48 hours
Selenium	HNO <sub>3</sub> to pH <2	P or G	6 months
Thallium	HNO <sub>3</sub> to pH <2	P or G	6 months

<sup>1</sup> For cyanide determinations samples must be adjusted with sodium hydroxide to pH 12 at the time of collection. When chilling is indicated the samples must be shipped and stored at four degrees Celsius or less. Acidification of nitrate or metals samples may be with a concentrated acid or dilute (fifty per cent by volume) solution of the applicable concentrated acid. Acidification of samples for metals analysis is encouraged and allowed at the laboratory rather than at the time of sampling provided the shipping time and other instructions in Section 8.3 of EMSL94 Methods 200.7, 200.8, or 200.9 (May 1994) are followed. EMSL94 methods 200.7, 200.8, and 200.9 are specified in paragraph (A) of rule 3745-81-27 of the Administrative Code.

<sup>2</sup> P means plastic, hard or soft; G means glass.

<sup>3</sup> In all cases, samples should be analyzed as soon after collection as possible. Follow any additional information on preservation, containers, or holding times specified in the method.

<sup>4</sup> Instructions for containers, preservation, procedures, and holding time as specified in

“Technical Notes” Method 100.2 (October 1994) must be adhered to for all compliance analyses including those conducted with “Technical Notes” Method 100.1 (October 1994). “Technical Notes” methods 100.1 and 100.2 are specified in paragraph (A) of rule 3745-81-27 of the Administrative Code.

- <sup>5</sup> If the sample is chlorinated, the holding time for an unacidified sample may be extended to fourteen days.
- <sup>6</sup> Nitrate-Nitrite refers to a measurement to total nitrate.
- (K) Analyses conducted to determine compliance with rule 3745-81-11 of the Administrative Code shall be performed in accordance with methods listed in paragraph (A) of rule 3745-81-27 of the Administrative Code and shall be performed in laboratories approved in accordance with Chapter 3745-89 of the Administrative Code.
- (L) All community and nontransient noncommunity public water systems that treat their water with ozone shall monitor to determine compliance with the maximum contaminant level for bromate in rule 3745-81-11 of the Administrative Code.
- (1) Surface water public water systems serving ten thousand or more persons shall comply with paragraph (L) of this rule beginning January 1, 2002. Surface water public water systems serving less than ten thousand persons and ground water systems shall comply with paragraph (L) of this rule beginning January 1, 2004.
- (2) Each public water system required to monitor for bromate shall develop and implement a monitoring plan. This plan shall be maintained and made available for inspection by the director and the general public no later than thirty days following the applicable compliance dates in paragraph (L)(1) of this rule. All public water systems using surface water as a source and serving more than three thousand three hundred people shall submit a copy of the monitoring plan to the director no later than the date of the first report required under rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements. The public water system shall modify the plan as required by the director. The plan shall include at least the specific locations and schedules for collecting samples for bromate, and how the public water system will calculate compliance with the MCL for bromate. If a public water system is approved for monitoring as a consecutive system, or provides water to a consecutive system, under the provisions of rule 3745-81-29 of the Administrative Code, its sampling plan must reflect the entire distribution system. Failure to monitor according to the monitoring plan is a monitoring violation.



- (3) Public water systems shall take all bromate samples during normal operating conditions.
- (4) Routine monitoring for bromate shall be one sample per month for each treatment plant in the system using ozone. The sample shall be taken at the entrance to the distribution system while the ozonation system is operating under normal conditions.
- (5) Public water systems may use data collected under the provisions of this rule to qualify for reduced monitoring. Public water systems may use another data set to qualify for reduced monitoring, provided it has been approved by the director.
- (6) Reduced monitoring: public water systems required to analyze for bromate may reduce monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/l, based upon representative monthly bromide measurements for one year. The public water system must continue bromide monitoring to remain on reduced bromate monitoring. The public water system may remain on reduced bromate monitoring until the running annual average source water bromide concentration, computed quarterly, is equal to or greater than 0.05 mg/l based upon representative monthly measurements. If the running annual average source water bromide concentration is equal to or greater than 0.05 mg/l, the public water system shall resume routine monitoring required by paragraph (L)(4) of this rule.
- (7) Compliance with the MCL for bromate shall be based on a running annual arithmetic average, computed quarterly, of monthly samples. For months in which the public water system takes more than one sample, the average of all samples taken during the month shall be used to compute the monthly average. These samples shall be collected as prescribed by paragraphs (L)(4) and (L)(6) of this rule.
- (8) If the average of samples covering any consecutive four-quarter period exceeds the MCL, the public water system is in violation of the MCL and must notify the public according to rule 3745-81-32 of the Administrative Code. Public notification is in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.
- (9) All samples taken and analyzed under the provisions of paragraphs (L)(4) and (L)(6) of this rule shall be included in determining compliance, even if that number is greater than the minimum required.
- (10) If, during the first year of monitoring under paragraph (L)(4) or (L)(6) of

this rule, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the public water system is in violation at the end of that quarter.

- (11) Failure to complete the required monitoring is a monitoring violation. The public water system will be in violation for the entire period covered by the running annual average. If a public water system fails to complete twelve consecutive months of monitoring, compliance with the MCL for the last four-quarter compliance period shall be based on an average of the available data.
- (M) All community and nontransient noncommunity public water systems that treat their water with chlorine dioxide shall monitor to determine compliance with the maximum contaminant level for chlorite in rule 3745-81-11 of the Administrative Code.
  - (1) Surface water public water systems serving ten thousand or more persons shall comply with paragraph (M) of this rule beginning January 1, 2002. Surface water public water systems serving less than ten thousand persons and ground water systems shall comply with paragraph (M) of this rule beginning January 1, 2004.
  - (2) Each public water system required to monitor for chlorite shall develop and implement a monitoring plan. This plan shall be maintained and made available for inspection by the director and the general public no later than thirty days following the applicable compliance dates in paragraph (M)(1) of this rule. All public water systems using surface water as a source and serving more than three thousand three hundred people shall submit a copy of the monitoring plan to the director no later than the date of the first report required under rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements. The public water system shall modify the plan as required by the director. The plan shall include at least the specific locations and schedules for collecting samples for chlorite, and how the public water system will calculate compliance with the MCL for chlorite. If a public water system is approved for monitoring as a consecutive system, or provides water to a consecutive system, under the provisions of rule 3745-81-29 of the Administrative Code, their sampling plan must reflect the entire distribution system. Failure to monitor according to the monitoring plan is a monitoring violation.
  - (3) Public water systems shall take all chlorite samples during normal operating conditions.

- (4) Routine daily monitoring: public water systems shall take daily chlorite samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite MCL, the system shall take additional samples in the distribution system the following day at the locations required by paragraph (M)(6) of this rule, in addition to the sample required at the entrance to the distribution system.
- (5) Routine monthly monitoring: public water systems shall take a three-sample set each month in the distribution system. The system shall take one sample for chlorite at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time of the water in the distribution system. Any additional distribution system sampling shall be conducted in the same manner (as three-sample sets, at the specified locations). The system may use the results of additional monitoring conducted under paragraph (M)(6) of this rule to meet the requirement for monitoring in this paragraph.
- (6) Additional monitoring: on each day following a daily sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the public water system is required to take three samples for chlorite in the distribution system. Samples shall be taken at the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system.
- (7) Chlorite monitoring at the entrance to the distribution system required by paragraph (M)(4) of this rule may not be reduced.
- (8) Public water systems may use data collected under the provisions of this rule to qualify for reduced chlorite monitoring in the distribution system. Public water systems may use another data set to qualify for reduced distribution system monitoring, provided it has been approved by the director.
- (9) Chlorite monitoring in the distribution system required by paragraph (M)(5) of this rule may be reduced to one three-sample set per quarter after one year of monitoring where no individual chlorite sample taken in the distribution system under paragraph (M)(5) of this rule has exceeded the chlorite MCL and the system has not been required to conduct monitoring under paragraph (M)(6) of this rule.
- (10) public water system may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the

distribution system under paragraph (M)(5) exceeds the chlorite MCL or the system is required to conduct monitoring under paragraph (M)(6) of this rule, at which time the system must revert to routine monitoring.

- (11) Compliance with the MCL for chlorite shall be based on an arithmetic average of each three-sample set taken in the distribution system as prescribed by paragraphs (M)(5) and (M)(6) of this rule. All samples taken and analyzed under the provisions of paragraphs (M)(5) and (M)(6) of this rule shall be included in determining compliance, even if that number is greater than the minimum required. If the arithmetic average of any three-sample set exceeds the MCL, the system is in violation of the MCL and must notify the public according to rule 3745-81-32 of the Administrative Code, in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.

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All public water systems shall monitor as described in paragraphs (B) and (C) of this rule to determine compliance with the maximum contaminant levels (MCLs) for nitrate and nitrite. In addition, all community water systems and all nontransient noncommunity water systems shall monitor as described in paragraphs (D) and (E) of this rule for the inorganic contaminants with MCLs listed in paragraph (B) of rule 3745-81-11 of the Administrative Code. Public water systems shall monitor inorganic chemicals according to a schedule provided by the director.

(A) Monitoring for inorganic chemicals with MCLs shall be conducted as follows.

- (1) Groundwater systems and surface water systems shall monitor with a minimum of one sample at each sampling point. After the initial set of samples, the system shall take each repeat sample at the same sampling point as used before unless conditions make another sampling point more representative of a source or treatment plant.
- (2) If a public water system draws water from more than one source and the sources are combined before distribution, the system shall monitor at each sampling point during periods of normal operating conditions and shall keep a record of and report the sources providing water for each sample. When a sample does not contain water from all the sources which serve the sampling point, a schedule prepared by the public water system shall be followed so that the next monitoring sample at this sampling point for the same inorganic chemical(s) will include water from sources not included in the previous sample or samples. Thus, successive samples from the same sampling point for the same inorganic chemical(s) shall sample water supplied from different sources until all of the sources supplying that sampling point have been monitored. Note that when inorganic chemicals have different monitoring periods, they require separate monitoring schedules.
- (3) The frequency of monitoring for nitrate shall be according to paragraph (B) of this rule; the frequency of monitoring for nitrite shall be conducted according to paragraph (C) of this rule; the frequency of monitoring for asbestos shall be conducted according to paragraph (D) of this rule; and the frequency of monitoring for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, and thallium shall be according to paragraph (E) of this rule. The frequency of monitoring for bromate shall be conducted according to paragraph (L) of this rule. The frequency of monitoring for chlorite shall be conducted according to paragraph (M) of this rule.

(B) All public water systems shall monitor to determine compliance with the MCL for nitrate in rule 3745-81-11 of the Administrative Code.

- (1) All public water systems which are groundwater systems shall monitor for nitrate annually.
- (2) All public water systems which are surface water systems shall monitor for nitrate monthly.
- (3) The repeat monitoring frequency for nitrate for public groundwater systems shall be quarterly for at least one year following any one sample in which the concentration is at least fifty per cent of the MCL. The director may reduce the monitoring frequency of a groundwater system to annually after four consecutive quarterly samples are less than eighty per cent of the MCL. If a groundwater system consistently operates less than four quarters per year, then the director may reduce the monitoring frequency to annually after samples collected during each of the system's operating quarters are less than eighty per cent of the MCL.
- (4) After the initial round of quarterly repeat monitoring for nitrate is completed, each groundwater system which is monitoring annually shall take subsequent samples during the quarter(s) which previously resulted in the highest analytical result.

(C) All public water systems shall monitor to determine compliance with the maximum contaminant level for nitrite in rule 3745-81-11 of the Administrative Code.

- (1) All public water systems shall monitor initially for nitrite with one sample at each sampling point.
- (2) After the initial sample, public water systems where an analytical result for nitrite is less than fifty per cent of the MCL shall monitor at the frequency specified by the director.
- (3) The repeat monitoring frequency for nitrite for public water systems shall be quarterly for at least one year following any one sample in which the concentration is at least fifty per cent of the MCL. The director may reduce the monitoring frequency to annually after a determination that the nitrite concentration for a public water system is less than eighty per cent of the MCL. If a groundwater system consistently operates less than four quarters per year, then the director may reduce the monitoring frequency to annually after samples collected during each of the public water system's operating quarters are less than eighty per cent of the MCL.

- (4) After the initial round of quarterly repeat monitoring for nitrite is completed, each public water system which is monitoring annually shall take each subsequent sample during the quarter(s) which previously resulted in the highest analytical result.
- (D) The frequency of monitoring conducted by community water systems and nontransient noncommunity water systems to determine compliance with the MCL for asbestos specified in rule 3745-81-11 of the Administrative Code shall be as follows:
- (1) Each community and nontransient noncommunity water system shall monitor for asbestos during the first three-year compliance period for each nine-year compliance cycle, except when a waiver is granted.
  - (2) A public water system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.
  - (3) A public water system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provisions of paragraph (A) of this rule.
  - (4) A public water system vulnerable to asbestos contamination due both to its source water supply and corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.
  - (5) A public water system which exceeds eighty per cent of the MCL for asbestos as determined in paragraph (H) of this rule shall monitor quarterly beginning in the next quarter after the violation occurred.
  - (6) The director may decrease the quarterly monitoring requirement for asbestos to the frequency specified in paragraph (D)(1) of this rule provided the director has determined that the asbestos concentration for a public water system does not exceed eighty per cent of the MCL. In no case can the director make this determination unless a groundwater system takes a minimum of two quarterly samples or a surface water system takes a minimum of four quarterly samples.
- (E) The frequency of monitoring conducted by community water systems and nontransient noncommunity water systems for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, and thallium to determine compliance with the MCLs in rule 3745-81-11 of the Administrative Code shall be as follows:

- (1) Ground water systems shall take and analyze one sample at each sampling point during each compliance period. Surface water systems shall take and analyze one sample annually at each sampling point.
- (2) Arsenic sampling results shall be reported to the nearest 0.001 mg/L.
- (3) The director may grant a waiver from the monitoring frequencies specified in paragraph (E)(1) of this rule for all of the contaminants listed in paragraph (E) of this rule except fluoride; no waivers shall be granted for fluoride. Waivers for cyanide monitoring may be granted only when the director determines that the public water system is not vulnerable due to any industrial source of cyanide.
- (4) Waivers granted under this rule shall require that the public water system monitor with at least one sample while the waiver is in effect. The term during which a waiver is in effect shall not exceed one compliance cycle (i.e., nine years).
- (5) Waivers may be granted under this rule only to surface water systems which have monitored annually for at least three years and to groundwater systems which have conducted at least three rounds of monitoring, with at least one monitoring using samples taken after January 1, 1990. Both surface and groundwater systems shall demonstrate that all previous analytical results were less than the MCLs. New public water systems that use a new water source are not eligible for a waiver until three rounds of monitoring of water from the new source have been completed.
- (6) In determining the appropriate reduced monitoring frequency, the director shall consider:
  - (a) Reported concentrations from all previous monitoring;
  - (b) The degree of variation in reported concentrations; and
  - (c) Other factors which may affect contaminant concentrations such as changes in groundwater pumping rates, changes in the system's configuration, changes in the system's operating procedures, or changes in stream flows or characteristics.
- (7) A decision by the director to grant a waiver shall be made in writing and shall set forth the basis for the determination. The director shall review, and, where appropriate, revise the director's determination of the appropriate monitoring frequency when the system submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.



- (8) A public water system, which exceeds eighty per cent of a MCL as calculated in paragraph (H) of this rule, shall monitor quarterly for that contaminant beginning in the next quarter after the result was reported.
- (9) A public water system that uses a new source of water or begins operation shall monitor initially for each contaminant listed in paragraph (E) of this rule in the first quarter of the next calendar year after operation of the new source or public water system begins. New public water systems shall sample at each sampling point. Existing public water systems with a new source of water shall sample at the sampling point related to the new source.
- (10) If, during the initial sampling required in paragraph (E)(9) of this rule, the analytical result for any inorganic contaminant does not exceed eighty per cent of the MCL in rule 3745-81-11 of the Administrative Code, then the public water system shall monitor for that inorganic contaminant according to the frequency specified in paragraph (E)(1) of this rule, or at a frequency determined by the director.
- (11) If, during the initial sampling required in paragraph (E)(9) of this rule, any contaminant is reported as a concentration above eighty per cent of the MCLs listed in rule 3745-81-11 of the Administrative Code, at any sampling point, the public water system shall monitor quarterly for that contaminant at that sampling point beginning in the next quarter after the result is reported.
- (12) The director may decrease the quarterly monitoring requirement for one or more inorganic contaminants to the frequency specified in paragraph (E)(1) of this rule, or to a frequency determined by the director, provided the director has determined that the system does not exceed eighty per cent of the MCL. In no case may the director make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples. The director may also require additional data demonstrating consistency of treatment performance.
- (13) Monitoring for arsenic at nontransient noncommunity public water systems which have installed approved point-of-use or point-of-entry treatment devices for arsenic removal in accordance with rule 3745-81-19 of the Administrative Code shall be conducted at sampling point(s) specified in a monitoring plan approval by the director and in accordance with a schedule provided by the director.

(F) Confirmation samples:

- (1) Where nitrate or nitrite monitoring indicates an exceedance of the MCL, the director may require the public water system to monitor with a confirmation sample within twenty-four hours of the public water system's receipt of notification of the analytical results of the first sample. Public water systems unable to comply with the twenty-four hour sampling requirement shall immediately notify the consumers in the area served by the public water system in accordance with rule 3745-81-32 of the Administrative Code. Public water systems giving immediate notification shall monitor with a confirmation sample within two weeks of notification of the analytical results of the first sample.
  - (2) Where the results of monitoring for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, or thallium indicate an exceedance of a MCL, the director may require that a confirmation sample be collected at the same sampling point as soon as possible (but not to exceed two weeks) after notification of the initial monitoring result.
  - (3) With confirmation samples required under paragraphs (F)(1) and (F)(2) of this rule, the results of analysis of the initial and confirmation samples shall be averaged. The resulting average shall be used to determine the water system's compliance in accordance with paragraph (H) of this rule.
  - (4) If a public water system fails to collect the number of samples required in paragraph (F) of this rule, compliance (average concentration) will be based on the total number of samples collected.
- (G) The director may require more frequent monitoring than specified in paragraphs (B), (C), (D), and (E) of this rule or may require confirmation samples for positive and negative results at the director's discretion. The director has discretion to delete results of obvious sampling or analytical errors.
- (H) Compliance with rule 3745-81-11 if the Administrative Code shall be determined based on the analytical result(s) obtained at each sampling point.
- (1) Compliance with the MCLs for nitrate and nitrite is determined based on one sample if the levels of these contaminants are below the MCLs. If the levels of nitrate and/or nitrite exceed the MCLs in the initial sample, and a confirmation sample is required in accordance with paragraph (F)(1) of this rule, compliance shall be determined based on the average of the initial and confirmation samples. Failure to take a confirmation sample will result in an MCL violation based on the level of the initial sample.

(2) For public water systems which are conducting monitoring at a frequency greater than annual, compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, and thallium is determined by a running annual average at each sampling point. The public water system will not be considered in violation of the MCL until it has completed one year of quarterly sampling. If, however, any one sample result would cause the running annual average to exceed the MCL, then the public water system is out of compliance immediately. If one sampling point is in violation of the MCL, the system is in violation of the MCL. If a public water system fails to collect the required number of samples, compliance with the MCL (average concentration) will be based on the total number of samples collected. Any sample result below the following method detection limit (MDL) shall be calculated as zero for the purpose of determining the running annual average.

(3) Method detection limits for inorganic contaminants.

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Method Detection Limits for Inorganic Contaminants			
Contaminant	Analytical Method Type	Analytical Method Number(s) <sup>1</sup>	Method Detection Limit (Milligram/Liter)
Antimony	AA, furnace	3113 B	0.003
	AA, platform	200.9	0.0008 <sup>7</sup>
	AA, gaseous hydride	D-3697-92	0.001
	ICP-MS	200.8	0.0004
Arsenic	AA, furnace	3113 B	0.001
	AA, platform stabilized temp	200.9	0.0005 <sup>2</sup>
	AA, gaseous hydride	3114 B	0.001
	ICP-MS	200.8	0.0014 <sup>3</sup>
Asbestos	Transmission electron microscopy	100.1	0.01 MFL <sup>4</sup>
Barium	AA, furnace	3113 B	0.002
	AA, direct aspiration	3111 D	0.1
	ICP	200.7, 3120 B	0.002 (0.001)
	ICP-MS	200.8	0.0008

Beryllium	AA, furnace	3113 B	0.0002
	AA, platform	200.9	0.00002 <sup>7</sup>
	ICP	200.7, 3120 B	0.0003
	ICP-MS	200.8	0.0003
Cadmium	AA, furnace	3113 B	0.0001
	ICP	200.7	0.001
	ICP-MS	200.8	0.0005
Chromium	AA, furnace	3113 B	0.001
	ICP	200.7, 3120 B	0.007 (0.001)
	ICP-MS	200.8	0.0009
Cyanide	Distillation spectrophotometric <sup>5</sup>	4500-CN E	0.02
	Distillation amenable, spectrophotometric <sup>6</sup>	4500-CN G	0.02
	Distillation automated, spectrophotometric <sup>5</sup>	335.4	0.005
	UV, distillation, spectrophotometric <sup>5</sup>	Kelada-01	0.0005
Fluoride	Ion chromatography	300.0, 300.1, 4110 B, 4110 B-00	0.5
	Manual electrode	4500-F-C	0.5
	Automated electrode	Technicon 380-75 WE	0.5
Mercury	Manual cold vapor	245.1, 3112 B	0.0002
	Automated cold vapor	245.2	0.0002
Nickel	AA, furnace	3113	0.001
	AA, platform	200.9	0.0006 <sup>7</sup>
	ICP	200.7 <sup>9</sup> , 3120 B	0.005
	ICP-MS	200.8	0.0005
Nitrate	Ion chromatography	300.0, 300.1, 4110 B, 4110 B-00, Waters B-1011	0.01

	Automated cadmium reduction	353.2, 4500-NO3-F, 4500-NO3-F-00	0.05
	Ion selective electrode	4500-NO3-D, 4500-NO3-D-00	0.25
	Manual cadmium reduction	4500-NO3-E, 4500-NO3-E-00	0.01
Nitrite	Ion chromatography	300.0, 300.1, 4110 B, 4110 B-00, Waters B-1011	0.004
	Automated cadmium reduction	353.2, 4500-NO3-F, 4500-NO3-F-00	0.05
	Spectrophotometric	4500-NO2-B, 4500-NO2-B-00	0.01
	Manual cadmium reduction	4500-NO3-E, 4500-NO3-E-00	0.01
Selenium	AA, furnace	3113 B	0.002
	AA, gaseous hydride	3114 B	0.002
	ICP-MS	200.8	0.0079
Thallium	AA, platform	200.9	0.0007 <sup>7</sup>
	ICP-MS	200.8	0.0003

<sup>1</sup> Analytical method numbers, names, and references are identified in paragraph (A) of rule 3745-81-27 of the Administrative Code. Type labels include AA for atomic absorption, ICP for inductively coupled plasma, and MS for mass spectrometry.

<sup>2</sup> Using multiple depositions, EMSL94 method 200.9 is capable of obtaining a MDL of 0.0001 mg/L. Because MDLs reported in EPA Method 200.9 was determined using a 2X preconcentration step during sample digestion, MDLs determined when samples are analyzed by direct analysis (i.e., no sample digestion) will be higher. Using multiple depositions, EPA 200.9 is capable of obtaining MDL of 0.0001 mg/L.

<sup>3</sup> Using selective ion monitoring, EMSL94 method 200.8 (May 1994) is capable of obtaining a MDL of 0.0001 mg/L.

<sup>4</sup> MFL means "million fibers longer than ten micrometers per liter of water".

<sup>5</sup> Screening method for total cyanides.

<sup>6</sup> Measures "free" cyanides.

<sup>7</sup> Lower MDLs are reported using stabilized temperature graphite furnace atomic adsorption.

<sup>8</sup> Measures total cyanides when UV-digester is used, and "free" cyanides when UV-digester is bypassed.

<sup>9</sup> Using a 2X preconcentration setp as noted in Method 200.7. Lower MDLs may be achieved when using a 4X preconcentration.

(4)

(a) For public water systems which are monitoring annually, or less frequently, for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, or thallium, when the average of a sample collected pursuant to paragraph (E) of this rule and a confirmation sample exceeds eighty per cent of the MCL, the public water system shall begin quarterly sampling at that sampling point. If a confirmation sample was not collected the public water system shall begin quarterly monitoring based on the level of the initial sample.

(b) If a public water system is monitoring annually, or less frequently, for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, or thallium because of a reduction from quarterly monitoring granted by the director pursuant to paragraph (E)(12) of this rule, the public water system is not required to return to quarterly monitoring unless the sample result exceeds the MCL.

(I) Each public water system shall monitor at the time designated by the director during each compliance period.

(J) Sample collection for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium, and thallium under this rule shall be conducted using the sample preservation, container, and maximum holding time procedures specified in the following table:

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Contaminant	Preservative <sup>1</sup>	Container <sup>2</sup>	Time <sup>3</sup>
Antimony	HNO <sub>3</sub> to pH <2	P or G	6 months
Arsenic	HNO <sub>3</sub> to pH <2	P or G	6 months
Asbestos	Cool, 4°C	P or G	48 hours <sup>4</sup>
Barium	HNO <sub>3</sub> to pH <2	P or G	6 months

Beryllium	HNO <sub>3</sub> to pH <2	P or G	6 months
Cadmium	HNO <sub>3</sub> to pH <2	P or G	6 months
Chromium	HNO <sub>3</sub> to pH <2	P or G	6 months
Cyanide	Cool, 4°C, NaOH to pH>12 <sup>3</sup>	P or G	14 days
Fluoride	None	P or G	1 month <sup>5</sup>
Mercury	HNO <sub>3</sub> to pH <2	P or G	28 days
Nickel	HNO <sub>3</sub> to pH <2	P or G	6 months
Nitrate	Cool, 4°C	P or G	48 hours <sup>6</sup>
Nitrate/nitrites <sup>7</sup>	H <sub>2</sub> SO <sub>4</sub> to pH <2	P or G	28 days
Nitrite	Cool, 4°C	P or G	48 hours
Selenium	HNO <sub>3</sub> to pH <2	P or G	6 months
Thallium	HNO <sub>3</sub> to pH <2	P or G	6 months

<sup>1</sup> For cyanide determinations samples must be adjusted with sodium hydroxide to pH 12 at the time of collection. When chilling is indicated the samples must be shipped and stored at four degrees Celsius or less. Acidification of nitrate or metals samples may be with a concentrated acid or a dilute (fifty per cent by volume) solution of the applicable concentrated acid. Acidification of samples for metals analysis is encouraged and allowed at the laboratory rather than at the time of sampling provided the shipping time and other instructions in Section 8.3 of EMSL94 Methods 200.7, 200.8, or 200.9 (May 1994) are followed. EMSL94 methods 200.7, 200.8, and 200.9 are specified in paragraph (A) of rule 3745-81-27 of the Administrative Code.

<sup>2</sup> P means plastic, hard or soft; G means glass.

<sup>3</sup> In all cases, samples should be analyzed as soon after collection as possible. Follow any additional information on preservation, containers, or holding times specified in the method.

<sup>4</sup> Instructions for containers, preservation, procedures, and holding time as specified in "Technical Notes" Method 100.2 (October 1994) must be adhered to for all compliance analyses including those conducted with "Technical Notes" Method 100.1 (October 1994). "Technical Notes" methods 100.1 and 100.2 are specified in paragraph (A) of rule 3745-81-27 of the Administrative Code.

<sup>5</sup> This is the maximum holding time for analytical purposes. For public water systems that add fluoride to the water supply, a shorter sample turnaround time is required in accordance with rule 3745-83-01 of the Administrative Code for operational purposes.

<sup>6</sup> If the sample is chlorinated, the holding time for an unacidified sample kept at four degrees Celsius or less may be extended to fourteen days.

<sup>7</sup> Nitrate-Nitrite refers to a measurement of total nitrate.

- (K) Analyses conducted to determine compliance with rule 3745-81-11 of the Administrative Code shall be performed in accordance with methods listed in paragraph (A) of rule 3745-81-27 of the Administrative Code and shall be performed in laboratories approved in accordance with Chapter 3745-89 of the Administrative Code.
- (L) All community and nontransient noncommunity public water systems that treat their water with ozone shall monitor to determine compliance with the maximum contaminant level for bromate in rule 3745-81-11 of the Administrative Code.
  - (1) Each public water system required to monitor for bromate shall develop and implement a monitoring plan. This plan shall be maintained and made available for inspection by the director and the general public. All public water systems using surface water as a source and serving more than three thousand three hundred people shall submit a copy of the monitoring plan to the director no later than the date of the first report required under rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements. The public water system shall modify the plan as required by the director. The plan shall include at least the specific locations and schedules for collecting samples for bromate, and how the public water system will calculate compliance with the MCL for bromate. If a public water system is approved for monitoring as a consecutive system, or provides water to a consecutive system, under the provisions of rule 3745-81-29 of the Administrative Code, its sampling plan must reflect the entire distribution system. Failure to monitor according to the monitoring plan is a monitoring violation.
  - (2) Public water systems shall take all bromate samples during normal operating conditions.
  - (3) Routine monitoring for bromate shall be one sample per month for each treatment plant in the system using ozone. The sample shall be taken at the entrance to the distribution system while the ozonation system is operating under normal conditions.
  - (4) Public water systems may use data collected under the provisions of this rule to qualify for reduced monitoring. Public water systems may use another data set to qualify for reduced monitoring, provided it has been approved by the director.



- (5) Reduced monitoring: A system required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system's running annual average bromate concentration is less than or equal to 0.0025 mg/L based on monthly bromate measurements under paragraph (L)(3) of this rule for the most recent four quarters, with samples analyzed in accordance with methods listed in paragraph (A) of rule 3745-81-27 of the Administrative Code. If a system has qualified for reduced bromate monitoring under this paragraph prior to April 1, 2009, that system may remain on reduced monitoring as long as the running annual average of quarterly bromate samples is less than or equal to 0.0025 mg/L based on samples analyzed in accordance with methods listed in paragraph (A) of rule 3745-81-27 of the Administrative Code. If the running annual average bromate concentration is greater than 0.0025 mg/L, the system must resume routine monitoring required by paragraph (L)(3) of this rule.
- (6) Compliance with the MCL for bromate shall be based on a running annual arithmetic average, computed quarterly, of monthly samples. For months in which the public water system takes more than one sample, the average of all samples taken during the month shall be used to compute the monthly average. These samples shall be collected as prescribed by paragraphs (L)(3) and (L)(5) of this rule.
- (7) If the average of samples covering any consecutive four-quarter period exceeds the MCL, the public water system is in violation of the MCL and must notify the public according to rule 3745-81-32 of the Administrative Code. Public notification is in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.
- (8) All samples taken and analyzed under the provisions of paragraphs (L)(3) and (L)(5) of this rule shall be included in determining compliance, even if that number is greater than the minimum required.
- (9) If, during the first year of monitoring under paragraph (L)(3) or (L)(5) of this rule, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the public water system is in violation at the end of that quarter.
- (10) Failure to complete the required monitoring is a monitoring violation. The public water system will be in violation for the entire period covered by the running annual average. If a public water system fails to complete twelve consecutive months of monitoring, compliance with the MCL for the last four-quarter compliance period shall be based on an average of the available data.
- (M) All community and nontransient noncommunity public water systems that treat their water with chlorine dioxide shall monitor to determine compliance

with the maximum contaminant level for chlorite in rule 3745-81-11 of the Administrative Code.

- (1) Each public water system required to monitor for chlorite shall develop and implement a monitoring plan. This plan shall be maintained and made available for inspection by the director and the general public. All public water systems using surface water as a source and serving more than three thousand three hundred people shall submit a copy of the monitoring plan to the director no later than the date of the first report required under rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements. The public water systems shall modify the plan as required by the director. The plan shall include at least the specific locations and schedules for collecting samples for chlorite, and how the public water system will calculate compliance with the MCL for chlorite. If a public water system is approved for monitoring as a consecutive system, or provides water to a consecutive system, under the provisions of rule 3745-81-29 of the Administrative Code, their sampling plan must reflect the entire distribution system. Failure to monitor according to the monitoring plan is a monitoring violation.
- (2) Public water systems shall take all chlorite samples during normal operating conditions.
- (3) Routine daily monitoring: public water systems shall take daily chlorite samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite MCL, the system shall take additional samples in the distribution system the following day at the locations required by paragraph (M)(5) of this rule, in addition to the sample required at the entrance to the distribution system.
- (4) Routine monthly monitoring: public water systems shall take a three-sample set each month in the distribution system. The system shall take one sample for chlorite at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time of the water in the distribution system. Any additional distribution system sampling shall be conducted in the same manner (as three-sample sets, at the specified locations). The system may use the results of additional monitoring conducted under paragraph (M)(5) of this rule to meet the requirement for monitoring in this paragraph.
- (5) Additional monitoring: on each day following a daily sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the public water system is required to take three samples for

chlorite in the distribution system. Samples shall be taken at the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system.

- (6) Chlorite monitoring at the entrance to the distribution system required by paragraph (M)(3) of this rule may not be reduced.
- (7) Public water systems may use data collected under the provisions of this rule to qualify for reduced chlorite monitoring in the distribution system. Public water systems may use another data set to qualify for reduced distribution system monitoring, provided it has been approved by the director.
- (8) Chlorite monitoring in the distribution system required by paragraph (M)(4) of this rule may be reduced to one three-sample set per quarter after one year of monitoring where no individual chlorite sample taken in the distribution system under paragraph (M)(4) of this rule has exceeded the chlorite MCL and the system has not been required to conduct monitoring under paragraph (M)(5) of this rule.
- (9) The public water system may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the distribution system under paragraph (M)(8) of this rule exceeds the chlorite MCL or the system is required to conduct monitoring under paragraph (M)(5) of this rule, at which time the system must revert to routine monitoring.
- (10) Compliance with the MCL for chlorite shall be based on an arithmetic average of each three-sample set taken in the distribution system as prescribed by paragraphs (M)(4) and (M)(5) of this rule. All samples taken and analyzed under the provisions of paragraphs (M)(4) and (M)(5) of this rule shall be included in determining compliance, even if that number is greater than the minimum required. If the arithmetic average of any three-sample set exceeds the MCL, the system is in violation of the MCL and must notify the public according to rule 3745-81-32 of the Administrative Code, in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.

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#### 3745-81-24 **Organic chemical monitoring requirements.**

Monitoring requirements for organic chemical contaminants of drinking water are stated in this rule. Analytical procedures which are acceptable for monitoring for organic contaminants in drinking water are listed in rule 3745-81-27 of the Administrative Code. Analyses under this rule shall only be conducted by laboratories that are certified for these analyses under Chapter 3745-89 of the Administrative Code. Community public water systems and nontransient noncommunity public water systems shall monitor for organic chemicals according to a schedule provided by the director.

- (A) Monitoring for volatile organic chemicals with maximum contaminant levels (MCLs) listed in paragraph (D) of rule 3745-81-12 of the Administrative Code shall be conducted by community public water systems and nontransient noncommunity public water systems as follows:
- (1) Groundwater systems shall monitor with a minimum of one sample at each respective sampling point during each compliance period. Surface water systems shall monitor with a minimum of one sample annually at each sampling point. After the first set of samples, each repeat sample shall be taken at the same sampling point as used before unless conditions make another sampling point more representative of a source, treatment plant, or part of the distribution system.
  - (2) If a public water system draws water from more than one source and the sources are combined before distribution, the public water system shall monitor at each sampling point during periods of normal operating conditions and shall keep a record of and report the sources providing water for each sample. When a sample does not contain water from all the sources which serve the sampling point, the public water system shall prepare and follow a schedule such that the next monitoring sample at this sampling point for the same volatile organic chemicals will include water from sources not included in the previous sample or samples. Thus, successive samples from the same sampling point for the same volatile organic chemicals shall sample water supplied from different sources until all the sources supplying that sampling point have been monitored.
  - (3) Each new community and new nontransient noncommunity public water system and public water systems that use a new source of water shall monitor initially with four consecutive quarterly samples for each contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code beginning in the first quarter of the next calendar year after operation of the new source of system begins. New public water systems shall sample at each sampling point; systems with a new source of water shall sample at the sampling point related to the new source.
  - (4) If the initial monitoring for the contaminants listed in paragraph (D) of rule 3745-81-12 of the Administrative Code has been completed and the public

water system did not detect any contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code, then the public water system shall monitor with one sample annually. For any contaminant detected during the initial monitoring, the public water system shall continue quarterly monitoring until eligible for a reduction under paragraph (A)(6)(b) of this rule.

- (5) The director may, after a minimum of three years of annual monitoring with no detection of any contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code, reduce monitoring by a groundwater system to one sample during each compliance period.
- (6) If a contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code is detected at a level exceeding 0.0005 milligram per liter in any sample, then:
  - (a) The public water system shall monitor quarterly at each sampling point which resulted in a detection. If a public water system is monitoring annually or less frequently for a previously detected contaminant, then the public water system does not have to return to quarterly monitoring for that contaminant unless the sample result exceeds eighty per cent of the MCL.
  - (b) The director may decrease the quarterly monitoring requirement specified in paragraph (A)(6)(a) of this rule to annual monitoring provided the director has determined that the public water system does not exceed eighty per cent of the MCL for that contaminant. In no case shall the director make this determination unless a groundwater system has monitored with a minimum of two consecutive quarterly samples and a surface water system has monitored with a minimum of four consecutive quarterly samples.
  - (c) Public water systems which monitor annually for a previously detected contaminant shall monitor during the quarter(s) which previously yielded the highest analytical result.
- (7) The director may require a confirmation sample for positive or negative results. If a confirmation sample is required by the director, the result shall be averaged with the first sampling result and the average used for the compliance determination as specified by paragraph (A)(8) of this rule.
- (8) Compliance with paragraph (D) of rule 3745-81-12 of the Administrative Code shall be determined based on the analytical results obtained at each sampling point.
  - (a) For public water systems which are conducting monitoring at a frequency greater than annually, compliance is determined by a running

annual average of all samples taken at each sampling point. If the running annual average of any sampling point is greater than the MCL, then the public water system is out of compliance. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling. If, however, the initial sample or a subsequent sample would cause the running annual average to exceed the MCL, then the public water system is out of compliance immediately. Any samples below the detection limit shall be counted as zero for purposes of determining the running annual average.

- (b) For public water systems monitoring annually or less frequently, when the average of a result and a required confirmation sample exceeds eighty per cent of the MCL, the public water system shall begin quarterly monitoring at that sample point. If a confirmation sample was not collected, the public water system shall begin quarterly monitoring if the level of the initial sample exceeds eighty per cent of the MCL. Compliance with a MCL will be determined by a running annual average as stated in paragraph (A)(8)(a) of this rule. If one sampling point is in violation of the MCL, the system is in violation of the MCL.
  - (c) If a public water system fails to collect the required number of samples, compliance will be based on the total number of samples collected.
- (9) Analysis for the contaminants listed in paragraph (D) of rule 3745-81-12 of the Administrative Code shall be conducted using the methods in rule 3745-81-27 of the Administrative Code
  - (10) Analysis under this rule shall only be conducted by laboratories that are approved under Chapter 3745-89 of the Administrative Code.
  - (11) The director has discretion to delete results of obvious sampling or analytical errors.
  - (12) The director may increase required monitoring where necessary to detect variations within the public water system.
  - (13) Each approved laboratory shall determine the method detection limit (MDL), as defined in the appendix to rule 3745-89-03 of the Administrative Code, at which it is capable of detecting volatile organic chemicals. The acceptable MDL is 0.0005 milligram per liter. This concentration is the detection concentration for purposes of this rule.
- (B) Monitoring of the organic chemical contaminants with maximum contaminant levels listed in paragraph (E) of rule 3745-81-12 of the Administrative Code shall be conducted by community public water systems and nontransient noncommunity public water systems as described below.

- (1) Groundwater systems and surface water systems shall monitor with a minimum of one sample at each sampling point each time monitoring is required in paragraph (B) of this rule. After the initial set of samples, each sample shall be taken at the same sampling point as used before unless conditions make another sampling point more representative of a source or treatment plant.
- (2) If the public water system draws water from more than one source and the sources are combined before distribution, the public water system shall monitor at each sampling point during periods of normal operating conditions and shall keep a record of and report the sources providing water for each sample. When a sample does not contain water from all the sources which serve the sampling point, a schedule prepared by the public water system shall be followed so that the next monitoring sample at this sampling point for the same organic chemical(s) will include water from sources not included in the previous sample or samples. Thus, successive samples from the same sampling point for the same organic chemical(s) shall sample water supplied from different sources until all the sources supplying that sampling point have been monitored.
- (3) Monitoring frequency:
  - (a) Each community public water system and nontransient noncommunity public water system shall monitor with four consecutive quarterly samples at each sampling point for each organic chemical contaminant listed in paragraph (E) of rule 3745-81-12 of the Administrative Code during each compliance period.
  - (b) Public water systems serving more than three thousand three hundred persons which do not detect a contaminant listed in paragraph (E) of rule 3745-81-12 of the Administrative Code in their first compliance period may reduce the sampling frequency to a minimum of two quarterly samples in one year during each following compliance period.
  - (c) Public water systems serving fewer than three thousand three hundred one persons which do not detect a contaminant listed in paragraph (E) of rule 3745-81-12 of the Administrative Code in their first compliance period may reduce the sampling frequency to a minimum of one sample during each following compliance period.
  - (d) Public water systems that use a new source of water and new public water systems shall begin initial quarterly monitoring for each contaminant listed in paragraph (E) of rule 3745-81-12 of the Administrative Code in a quarter designated by the director during the



next calendar year after operation of the new source or system begins. New public water systems shall sample at each sampling point. Public water systems with a new source of water shall sample at the sampling point related to the new source.

- (4) The director may grant a waiver from one or more requirements of paragraphs (B)(3)(a) to (B)(3)(c) of this rule. Each waiver is valid for only one compliance period.
- (5) The director may grant a waiver after evaluating the previous use (including transport, storage, or disposal) of a contaminant listed in paragraph (E) of rule 3745-81-12 of the Administrative Code within the watershed or zone of influence of the public water system. If a determination by the director reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted. If the contaminant has been used previously or if its previous use is unknown, then the following factors shall be used to determine whether a waiver is granted.
  - (a) Previous analytical results.
  - (b) The proximity of the public water system to a potential point or nonpoint source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities or from hazardous and municipal waste landfills and other waste handling or treatment facilities. Nonpoint sources include the use of pesticides to control insect and weed pests on agricultural areas, forest lands, homes and gardens, and other land application uses.
  - (c) The environmental persistence and transport of the organic chemicals listed in paragraph (E) of rule 3745-81-12 of the Administrative Code.
  - (d) How completely the water source is protected against contamination due to such factors as the depth of the well, the type of soil, and the integrity of the well casing.
  - (e) Elevated nitrate levels at the public water system source.
  - (f) Use of polychlorinated biphenyls in equipment used in the production, storage, or distribution of water (e.g., polychlorinated biphenyls used in pumps, transformers, etc.).
- (6) If an organic chemical contaminant listed in paragraph (E) of rule

3745-81-12 of the Administrative Code is detected (as defined by paragraph (B)(14) of this rule) in any sample, then:

- (a) Each public water system shall monitor quarterly at each sampling point which resulted in a detection. If a public water system is monitoring annually or less frequently for a previously detected contaminant, then the public water system does not have to return to quarterly monitoring unless the sample result exceeds eighty per cent of the MCL.
  - (b) The director may decrease the quarterly monitoring requirement specified in paragraph (B)(6)(a) of this rule to annual monitoring provided the director has determined that the public water system does not exceed eighty per cent of the MCL. In no case shall the director make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.
  - (c) Public water systems which monitor annually shall monitor during the quarter that previously yielded the highest analytical result.
  - (d) For public water systems which have three consecutive annual samples with no detection of a contaminant listed in paragraph (E) of rule 3745-81-12 of the Administrative Code, the director may grant a waiver as specified in paragraph (B)(4) of this rule.
  - (e) If monitoring results in detection of one or more of certain related contaminants (heptachlor, heptachlor epoxide), then subsequent monitoring shall analyze for all related contaminants.
- (7) The director may require a confirmation sample for positive or negative results. If a confirmation sample is required by the director, the result shall be averaged with the first monitoring result and the average used for the compliance determination as specified by paragraph (B)(8) of this rule.
- (8) Compliance with paragraph (E) of rule 3745-81-12 of the Administrative Code shall be determined based on the analytical results obtained at each sampling point.
- (a) For public water systems which are conducting monitoring at a frequency greater than annual, compliance is determined by a running annual average of all samples taken at each sampling point. The system will not be considered in violation of the MCL until it has completed one year of quarterly monitoring. If, however,

the initial result or a subsequent result would cause the running annual average to exceed the MCL, then the public water system is out of compliance immediately. If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected. If one sampling point is in violation of the MCL, the system is in violation of the MCL. Any results below the detection limit shall be calculated as zero for purposes of determining the running annual average.

- (b) For public water systems monitoring annually or less frequently, when the average of a result and a confirmation sample exceeds eighty per cent of the MCL the public water system shall begin quarterly monitoring at that sample point. If a confirmation sample was not collected, the public water system shall begin quarterly monitoring if the level of the initial sample exceeds eighty percent of the MCL. Compliance with the MCL will then be determined by a running annual average as stated in paragraph (B)(8)(a) of this rule.
- (9) Analysis for the organic chemical contaminants listed in paragraph (E) of rule 3745-81-12 of the Administrative Code shall be conducted by using methods set forth in rule 3745-81-27 of the Administrative Code.
- (10) Analysis for polychlorinated biphenyls shall be conducted as follows:
  - (a) Each public water system which monitors for polychlorinated biphenyls shall analyze or have analyzed each sample using a technique set forth in rule 3745-81-27 of the Administrative Code.
  - (b) If polychlorinated biphenyls (as one of seven aroclors) are detected (as designated in this paragraph) in any sample analyzed using a technique set forth in rule 3745-81-27 of the Administrative Code, the sample shall be reanalyzed using a technique set forth in rule 3745-81-27 of the Administrative Code to quantitate polychlorinated biphenyls (as decachlorobiphenyl).
  - (c) Compliance with the MCL for polychlorinated biphenyls shall be determined based upon the quantitative results of analyses using a technique set forth in rule 3745-81-27 of the Administrative Code.

<b>Aroclor</b>	<b>Detection limit (Milligrams per liter)</b>
1016	0.00008
1221	0.02

1232	0.0005
1242	0.0003
1248	0.0001
1254	0.0001
1260	0.0002

- (11) The director has discretion to delete results of obvious sampling or analytical errors.
- (12) The director may increase the required monitoring frequency, where necessary, to detect variations within the public water system (e.g., fluctuations in concentration due to seasonal use, changes in water source).
- (13) Each public water system shall monitor at the time designated by the director within each compliance period.
- (14) Detection as used in this rule shall be defined as greater than or equal to the following concentration for each contaminant.

<b>Contaminant</b>	<b>Detection limit (Milligrams per liter)</b>
Alachlor	0.0002
Atrazine	0.0001
Benzo(A)pyrene	0.00002
Carbofuran	0.0009
Chlordane	0.0002
Dalapon	0.001
1,2-Dibromo-3-chloropropane (DBCP)	0.00002
Di(2-ethylhexyl) adipate	0.0006
Di(2-ethylhexyl) phthalate	0.0006
Dinoseb	0.0002
Diquat	0.0004
2,4-d	0.0001
Endothall	0.009

Endrin	0.00001
Ethylene dibromide (EDB)	0.00001
Glyphosate	0.006
Heptachlor	0.00004
Heptachlor epoxide	0.00002
Hexachlorobenzene	0.0001
Hexachlorocyclopentadiene	0.0001
Lindane	0.00002
Methoxychlor	0.0001
Oxamyl	0.002
Pentachlorophenol	0.00004
Picloram	0.0001
Pentachlorophenol	0.00004
Polychlorinated biphenyls (PCBs) (As decachlorobiphenyl)	0.0001
Simazine	0.00007
Toxaphene	0.001
2,3,7,8-TCDD (dioxin)	0.000000005
2,4,5-TP (silvex)	0.0002

(C) Monitoring for total trihalomethanes (TTHM) and haloacetic acids five (HAA5).

- (1) Community public water systems and nontransient noncommunity public water systems that treat their water with any combination of primary or residual disinfectant, other than ultraviolet light, or delivers water that has been treated with any combination of primary or residual disinfectant, other than ultraviolet light, shall monitor for TTHM and HAA5 according to paragraph (C) of this rule. The director will determine compliance with MCLs for TTHMs and HAA5.
- (2) For public water systems required to conduct quarterly monitoring, compliance with MCLs for TTHMs and HAA5 shall be based on a locational running annual arithmetic average at each monitoring location, calculated quarterly, at the end of the fourth calendar quarter following the compliance date and at the end of each subsequent quarter (or earlier if the LRAA calculated based on fewer than four quarters of data would cause the MCL

to be exceeded regardless of the monitoring results of subsequent quarters). For public water systems monitoring quarterly, if the system fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four quarter compliance period must be based on the average of the available data from the most recent four quarters.

- (3) If the public water system is required to conduct monitoring at a frequency that is less than quarterly, compliance with MCLs shall be based on the LRAA calculations beginning with the first compliance sample taken after the compliance date. If any sample result exceeds the MCL, the public water system must comply with the requirements of paragraphs (C)(18) to (C)(20) of this rule. If no sample exceeds the MCL, the sample result for each monitoring location is considered the LRAA for that monitoring location.
- (4) If a public water system takes more than one sample per quarter at a monitoring location, the average of all samples taken in the quarter at that location must be used to determine a quarterly average to be used in the LRAA calculation.
- (5) If the public water system fails to monitor according to the sample monitoring plan, the system will be in violation for the entire period covered by the locational running annual average. Public water systems shall take all samples during normal operating conditions.
- (6) Routine monitoring for TTHMs and HAA5: Public water systems are required to begin monitoring at the locations and the time period identified in the sample monitoring plan developed under paragraph (C)(9) of this rule. Public water systems specified in paragraph (C)(1) of this rule shall monitor at the frequency indicated and at no fewer than the number of locations identified in the following table:

Source water type	Population size category	Monitoring frequency <sup>1</sup>	Sample Type <sup>2</sup>	Distribution system monitoring location total per monitoring period <sup>2</sup>
Surface Water	<500	Per year	Individual samples	2
	500-3,300	Every 90 days	Individual samples	2
	3,301-9,999	Every 90 days	Dual sample set	2

	10,000-49,999	Every days	90	Dual sample set	4
	50,000-249,999	Every days	90	Dual sample set	8
	250,000-999,999	Every days	90	Dual sample set	12
	1,000,000-4,999,999	Every days	90	Dual sample set	16
	≥5,000,000	Every days	90	Dual sample set	20
Ground Water	<500	Per year		Individual samples	2
	500-9,999	Per year		Dual sample set	2
	10,000-99,999	Every days	90	Dual sample set	4
	100,000-499,999	Every days	90	Dual sample set	6
	≥500,000	Every days	90	Dual sample set	8

<sup>1</sup>All systems must monitor during month of highest DBP concentrations.

<sup>2</sup>Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location except for surface water systems serving 500-3,300. Ground water systems serving 500-9,999 on annual monitoring must take dual sample sets at each monitoring location. All other systems on annual monitoring and surface water systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. For systems serving fewer than 500 people, only one location with a dual sample set per monitoring period is needed if the highest TTHM and HAA5 concentrations occur at the same location and month.

- (7) Systems on quarterly monitoring are required to monitor every ninety days. The ninety day monitoring frequency may be extended or reduced by five days to allow for unplanned circumstances that prevent monitoring precisely ninety days apart, as long as the samples are collected during

each calendar quarter.

- (8) If a system that does not disinfect begins using a disinfectant other than UV light, the system must consult with the director to identify compliance monitoring locations and develop a monitoring plan under paragraph (C)(9) of this rule that includes those monitoring locations.
- (9) Each public water system required to monitor for TTHM and HAA5 shall develop and implement a sample monitoring plan. The public water system shall maintain the plan and make it available for inspection by the director and the general public. The monitoring plan must contain the following elements: monitoring locations (including both a location address and sample monitoring point code); monitoring dates; and alternate monitoring locations (in the event access to a primary location is not available). The director will determine compliance with MCLs for TTHMs and HAA5.
- (10) Monitoring locations must be chosen by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations have been identified. Public water systems must also provide the rationale for identifying the locations as having high levels of TTHM or HAA5. If a public water system has more monitoring locations than required for compliance monitoring according to paragraph (C) of this rule, systems must identify which locations will be used for compliance monitoring by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations have been identified.
- (11) All surface water systems must submit a copy of the monitoring plan to the director. The director may require new community and non-transient non-community water systems that treat their water with any combination of primary or residual disinfectant, other than ultraviolet light, or deliver water that has been treated with any combination of primary or residual disinfectant, other than ultraviolet light to develop and submit a sample monitoring plan within twelve months of becoming active.
- (12) A public water system may revise the monitoring plan to reflect changes in treatment, distribution system operations and layout (including new service areas), or other factors that may affect TTHM or HAA5 formation, or for director approved reasons, after consultation with the director regarding the need for changes and the appropriateness of changes. If a system changes monitoring locations, the locations must replace existing compliance monitoring locations with the lowest LRAA with new locations that reflect the current distribution system locations with expected high TTHM or HAA5 levels. The director may also require modifications in the monitoring plan. Surface water systems must submit a copy of the



modified monitoring plan to the director prior to the date required to comply with the revised monitoring plan.

- (13) Reduced monitoring for TTHMs and HAA5: Public water systems may reduce monitoring to the level specified in the following table any time the LRAA is less than or equal to 0.040 mg/L for TTHM and less than or equal to 0.030 mg/L for HAA5 at all monitoring locations. Systems may only use data collected under the provisions of paragraph (C) of this rule to qualify for reduced monitoring. In addition, the source water annual average TOC level, before any treatment, must be less than or equal to 4.0 mg/L at each treatment plant treating surface water, based on monitoring conducted under rule 3745-81-77 of the Administrative Code.

Source water type	Population size category	Monitoring frequency <sup>1</sup>	Distribution system monitoring location total per monitoring period
Surface Water:	<500	NA	Monitoring may not be reduced
	500-3,300	Per year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	3,301-9,999	Per year	2 dual sample sets: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement.
	10,000-49,999	Every days 90	2 dual sample sets at the locations with the highest TTHM and highest HAA5 LRAAs.
	50,000-249,999	Every days 90	4 dual sample sets-at the locations with the two highest TTHM and two highest HAA5 LRAAs.
	250,000-999,999	Every days 90	6 dual sample sets-at the locations with the three highest TTHM and three highest HAA5 LRAAs.
	1,000,000-	Every 90	8 dual sample sets-at the locations with

	4,999,999	days	the four highest TTHM and four highest HAA5 LRAAs.
	≥5,000,000	Every 90 days	10 dual sample sets-at the locations with the five highest TTHM and five highest HAA5 LRAAs.
Ground Water	<500	Every third year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	500-9,999	Per year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	10,000-99,999	Per year	2 dual sample sets: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement.
	100,000-499,999	Every 90 days	2 dual sample sets; at the locations with the highest TTHM and highest HAA5 LRAAs.
	≥500,000	Every 90 days	4 dual sample sets at the locations with the two highest TTHM and two highest HAA5 LRAAs.
<sup>1</sup> Systems on quarterly monitoring must take dual sample sets every 90 days.			

- (14) Public water systems may remain on reduced monitoring as long as the TTHM LRAA is less than or equal to 0.040 mg/L and the HAA5 LRAA is less than or equal to 0.030 mg/L at each monitoring location (for systems with quarterly reduced monitoring) or each TTHM sample is less than or equal to 0.060 mg/L and each HAA5 sample is less than or equal to 0.045 mg/L (for systems with annual or less frequent monitoring). In addition, the source water annual average TOC level, before any treatment, must

be less than or equal to 4.0 mg/L at each treatment plant treating surface water, based on monitoring conducted under rule 3745-81-77 of the Administrative Code.

- (15) If the LRAA based on quarterly monitoring at any monitoring location exceeds either 0.040 mg/L for TTHM or 0.030 mg/L for HAA5 or if the annual (or less frequent) sample at any location exceeds either 0.060 mg/L for TTHM or 0.045 mg/L for HAA5, or if the source water annual average TOC level, before any treatment, greater than 4.0 mg/L at any treatment plant treating surface water, the system must resume routine monitoring under paragraph (C)(6) of this rule or begin increased monitoring if paragraph (C)(18) of this rule applies.
- (16) The director may return a public water system to routine monitoring at the director's discretion, for reasons including but not limited to: treatment change, significant distribution changes, or disinfectant changes.
- (17) Consecutive systems that do not add a disinfectant but deliver water that has been treated with a primary or residual disinfectant other than ultraviolet light, must comply with analytical, monitoring, and compliance requirements for chlorine and chloramines in rules 3745-81-27 and 3745-81-70 of the Administrative Code and report monitoring results under paragraph (G)(4) of rule 3745-81-75 of the Administrative Code.
- (18) If a public water system is required to monitor at a particular location annually or less frequently than annually under paragraph (C)(6) or (C)(13) of this rule, the system must increase monitoring to dual sample sets once per quarter (taken every ninety days) at all locations if a TTHM sample is greater than 0.080 mg/L or a HAA5 sample is greater than 0.060 mg/L at any location.
- (19) A public water system is in violation of the MCL when the LRAA exceeds the MCLs in rule 3745-81-12 of the Administrative Code, calculated based on four consecutive quarters of monitoring (or the LRAA calculated based on fewer than four quarters of data if the system fails to complete four consecutive quarters of monitoring, or if the MCL would be exceeded regardless of the monitoring results of subsequent quarters). The system is in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if the system fails to monitor.
- (20) Public water systems may return to routine monitoring once increased monitoring has been conducted for at least four consecutive quarters and the LRAA for every monitoring location is less than or equal to 0.060 mg/L for TTHM and less than or equal to 0.045 mg/L for HAA5.

- (21) Operational evaluation levels: A public water system has exceeded the operational evaluation level at any monitoring location where the sum of the two previous quarters' TTHM results plus twice the current quarter's TTHM result, divided by four to determine an average, exceeds 0.080 mg/L, or where the sum of the two previous quarters' HAA5 results plus twice the current quarter's HAA5 result, divided by four to determine an average, exceeds 0.060 mg/L.
- (a) If a public water system exceeds the operational evaluation level, the system must conduct an operational evaluation and submit a written report of the evaluation to the director no later than ninety days after being notified by the director of the analytical result that causes the system to exceed the operational evaluation level. The written report must be made available to the public upon request.
  - (b) The public water system's operational evaluation must include an examination of system treatment and distribution operational practices, including storage tank operations, excess storage capacity, distribution system flushing, changes in sources or source water quality, and treatment changes or problems that may contribute to TTHM and HAA5 formation and what steps could be considered to minimize future exceedences.
  - (c) A public water system may request and the director may allow the system to limit the scope of the evaluation if the system is able to identify the cause of the operational evaluation level exceedance.
  - (d) A request from the system to limit the scope of the evaluation does not extend the schedule in paragraph (C)(21)(a) of this rule for submitting the written report. The director must approve this limited scope of evaluation in writing and the system must keep that approval with the completed report.

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**3745-81-26      Radionuclide monitoring requirements.**

Community public water systems shall monitor as described in this rule to determine compliance with the maximum contaminant levels (MCLs) for radionuclides listed in rule 3745-81-15 of the Administrative Code. Analytical procedures which are acceptable for monitoring of radionuclide contaminants in drinking water are listed in rule 3745-81-27 of the Administrative Code. Community public water systems shall monitor for radionuclide contaminants according to a schedule provided by the director.

(A) Monitoring requirements for gross alpha particle activity, radium-226, radium-228, and uranium.

- (1) For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, uranium, and beta particle and photon radioactivity in drinking water, "detection limit" is defined as in paragraph (D) of this rule.
- (2) All existing community public water systems shall sample at every sampling point that is representative of all sources being used under normal operating conditions for that sampling point. The system shall take each sample at the same sampling point unless the director determines that conditions make another sampling location more representative of each source.
- (3) All new community public water systems or community public water systems that use a new source of water shall begin initial monitoring within the first quarter after initiating use of the source.
- (4) Initial monitoring. Systems shall conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:
  - (a) Systems shall collect four consecutive quarterly samples at all sampling points.
  - (b) For gross alpha particle activity, uranium, radium-226, and radium-228 monitoring, the director may waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the previous two quarters are below the detection limit.
- (5) If the average of the initial monitoring results for a sampling point is above the maximum contaminant level (MCL), the community public water system shall collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL.

(6) Reduced monitoring. The director may allow community public water systems to reduce the future frequency of monitoring from once every three years to once every six or nine years at each sampling point, based on the following criteria:

- (a) If the average of the initial monitoring results for each contaminant (i.e., gross alpha particle activity, uranium, radium-226, or radium-228) is below the detection limit specified in paragraph (D) of this rule, the community public system shall collect and analyze for that contaminant using at least one sample at that sampling point every nine years.
- (b) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is at or above the detection limit but at or below fifty per cent of the MCL, the community public water system shall collect and analyze for that contaminant using at least one sample at that sampling point every six years.

For combined radium-226 and radium-228, the analytical results shall be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is at or above the detection limit but at or below fifty per cent of the MCL, the community public water system shall collect and analyze for the contaminant(s) using at least one sample at that sample point every six years.

- (c) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above fifty per cent of the MCL but at or below the MCL, the community public water system shall collect and analyze at least one sample at that sampling point every three years.

For combined radium-226 and radium-228, the analytical results shall be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above fifty per cent of the MCL but at or below the MCL, the community public water system shall collect and analyze at least one sample at that sampling point every three years.

- (d) Community public water systems shall use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (e.g., if a system's sampling point is on a nine year monitoring period, and the sample result is above fifty per cent of MCL but at or below the MCL, then the next monitoring period for that sampling point is at least one sample every three years.)

- (e) If a community public water system has a monitoring result that exceeds the MCL while on reduced monitoring, the system shall collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL.
  - (7) A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not exceed five pCi/L. A gross alpha particle activity measurement may be substituted for the required uranium measurement provided that the measured gross alpha particle activity does not exceed fifteen pCi/L. The gross alpha measurement shall have a confidence interval of ninety-five per cent (1.96 sigma where sigma is the standard deviation of the net counting rate of the sample) for radium-226 and uranium. When a community public water system uses a gross alpha particle activity measurement in lieu of radium-226 and/or uranium measurement, the gross alpha particle activity analytical result will be used to determine the future monitoring frequency for radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, fifty per cent of the detection limit will be used to determine compliance and the future monitoring frequency.
- (B) Monitoring requirements for beta particle and photon radioactivity.
- (1) The director may designate a community public water system as vulnerable to beta particle and photon radioactivity contamination based on identified potential radioactive sources within the drinking water source protection area delineated or endorsed by the agency under Ohio's wellhead protection and source water assessment and protection programs. Community public water systems designated by the director as vulnerable shall sample for beta particle and photon radioactivity to determine compliance with the maximum contaminant levels listed in rule 3745-81-15 as follows:
    - (a) Community public water systems shall collect quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each sampling point, beginning within one quarter after being notified by the director. Systems designated as vulnerable shall continue to sample until the director removes the designation.
    - (b) If the gross beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to fifty pCi/L (screening level) and the combined monitoring results for all measured contaminants (i.e. tritium, strontium-90, and any other contaminants for beta particle and photon radioactivity as specified

by rule 3745-81-15 of the Administrative Code) are at or below the MCL, the director may reduce the frequency of monitoring at that sampling point to once every three years. Systems shall collect all samples required in paragraph (B)(1)(a) of this rule during the reduced monitoring period.

- (2) Community public water systems designated by the director as utilizing waters contaminated by effluents from nuclear facilities shall sample for beta particle and photon radioactivity to determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code as follows:
  - (a) Community public water systems shall collect monthly samples for gross beta particle activity and quarterly samples for iodine-131, tritium, and strontium-90 at each sampling point, beginning within one quarter after being notified in writing by the director. For iodine-131, five consecutive daily samples shall be analyzed once each quarter. As ordered by the director, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water. Systems designated by the director as using waters contaminated by effluents from nuclear facilities shall continue to sample until the director removes the designation.
  - (b) If the gross beta particle activity at a sampling point has a running average (computed quarterly) less than or equal to fifteen pCi/L (screening level) and the combined monitoring results are at or below the MCL for all measured contaminants (i.e., iodine-131, tritium, strontium-90, etc.), the director may reduce the frequency of monitoring at that sampling point to every three years. Community public water systems shall collect all samples required in paragraph (B)(2)(a) of this rule during the reduced monitoring period.
- (3) A waiver from the monitoring frequencies specified in paragraph (B)(1) or (B)(2) of this rule shall not be granted to community public water systems designated by the director as vulnerable to beta particle and photon radioactivity contamination.
- (4) Community public water systems may analyze for naturally occurring potassium-40 beta particle activity from the same or equivalent sample used for gross beta particle activity analysis. Systems may subtract the potassium-40 beta particle activity value from the total gross beta activity. The potassium-40 beta particle activity shall be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82 picocuries of potassium-40 per milligram of potassium.
- (5) If the gross beta particle activity (minus the naturally occurring potassium-40 beta particle activity) exceeds the appropriate screening level, an



analysis of the sample shall be performed to identify the major applicable radioactive constituents present in the sample and the appropriate doses shall be calculated and summed to determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code. Doses shall also be calculated and combined for measured levels of tritium and strontium to determine compliance.

- (6) Community public water systems shall monitor monthly at the sampling point(s) which exceed the MCLs as determined in rule 3745-81-15 of the Administrative Code beginning the month after the exceedance occurs. Systems shall continue monthly monitoring until the system has established, by a running average of three monthly samples, that the MCL is being met. Systems who establish that the MCL is being met shall return to quarterly monitoring until they meet the requirements set forth in paragraph (B)(1)(b) or (B)(2)(b) of this rule.
- (7) For community public water systems in the vicinity of a nuclear facility or other facility that is a radioactive source, the director may allow the systems to utilize environmental surveillance data collected by the nuclear facility (i.e., raw water data for locations within the vicinity of the systems) in lieu of monitoring at the system's sampling point(s), where the director determines that data is applicable to a particular water system. In the event that there is a release from a nuclear facility, community public water systems which are using surveillance data shall begin monitoring at the system's sampling point(s) in accordance with paragraph (B)(1) or (B)(2) of this rule.

(C) General monitoring and compliance requirements for radionuclides.

- (1) The director may require more frequent monitoring than specified in paragraphs (A) and (B) of this rule, or may require confirmation samples. The results of the initial and confirmation samples will be averaged for use in compliance determinations.
- (2) To determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.
- (3) Compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code will be determined based on the analytical result(s) obtained at each sampling point. If the average of any sampling point is greater than the MCL, then the community public water system is in violation of the MCL.

- (a) For community public water systems monitoring more than once per year, compliance with the MCL is determined quarterly by a running annual average at each sampling point. If the average of any sampling point is greater than the MCL, then the system is in violation of the MCL.
  - (b) For community public water systems monitoring more than once per year, if any sample result will cause the running annual average to exceed to MCL at any sampling point, the system is out of compliance with the MCL immediately.
  - (c) Community public water systems shall include all samples taken and analyzed under the provisions of this rule in determining compliance, even if that number is greater than the minimum required.
  - (d) If a community public water system does not collect all required samples when compliance is based on a running annual average, compliance will be based on the running average of the total number of samples collected.
  - (e) If a sample result is less than the detection limit, zero will be used to calculate the running annual average, unless a gross alpha particle activity result is being used in lieu of radium-226 or uranium. If the gross alpha particle activity result is less than detection, fifty per cent of the detection limit will be used to calculate the running annual average for radium-226 and/or uranium.
- (4) The director has the discretion to delete results of obvious sampling or analytical errors.
- (5) If a MCL set forth in rule 3745-81-15 of the Administrative Code is exceeded, the owner or operator of a community water system shall give notice to the director pursuant to rule 3745-81-31 of the Administrative Code and to the public as required by rule 3745-81-32 of the Administrative Code.
- (D) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit.
- (1) The detection limit shall be that concentration which can be counted with a precision of plus or minus one hundred per cent at the ninety-five per cent confidence level (1.96 sigma where sigma is the standard deviation of the net counting rate of the sample).

- (2) To determine compliance with rule 3745-81-15 of the Administrative Code, the detection limits shall not exceed the concentrations listed in the following table:

Radionuclide	Detection limit
Cesium-134	10 pCi/L
Iodine-131	1 pCi/L
Gross alpha	3 pCi/L
Gross beta	4 pCi/L
Radium-226	1 pCi/L
Radium-228	1 pCi/L
Strontium-89	10 pCi/L
Strontium-90	2 pCi/L
Tritium	1,000 pCi/L
Uranium	1 µg/L
Other beta/photon emitters	1/10 of the MCL (dose equivalent in pCi/L)

Effective: 02/22/2010

R.C. 119.032 review dates: 11/24/2009 and 02/22/2015

Promulgated Under: 119.03

Statutory Authority: 6109.03, 6109.04

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Prior Effective Dates: 12/27/78, 05/22/89, 09/15/04, 04/15/05

### 3745-81-26    **Radionuclide monitoring requirements.**

Community public water systems shall monitor as described in this rule to determine compliance with the maximum contaminant levels (MCLs) for radionuclides listed in rule 3745-81-15 of the Administrative Code. Analytical procedures which are acceptable for monitoring of radionuclide contaminants in drinking water are listed in rule 3745-81-27 of the Administrative Code. Community public water systems shall monitor for radionuclide contaminants according to a schedule provided by the director.

- (A) Monitoring requirements for gross alpha particle activity, radium-226, radium-228, and uranium.
  - (1) For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, uranium, and beta particle and photon radioactivity in drinking water, "detection limit" is defined as in paragraph (D) of this rule.
  - (2) All existing community public water systems shall sample at every sampling point that is representative of all sources being used under normal operating conditions for that sampling point. The system shall take each sample at the same sampling point unless the director determines that conditions make another sampling location more representative of each source.
  - (3) All new community public water systems or community public water systems that use a new source of water shall begin initial monitoring within the first quarter after initiating use of the source.
  - (4) Initial monitoring. Systems shall conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:
    - (a) Systems shall collect four consecutive quarterly samples at all sampling points.
    - (b) For gross alpha particle activity, uranium, radium-226, and radium-228 monitoring, the director may waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the previous two quarters are below the detection limit.
  - (5) If the average of the initial monitoring results for a sampling point is above the maximum contaminant level (MCL), the community public water system shall collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL.
  - (6) Reduced monitoring. The director may allow community public water systems to reduce the future frequency of monitoring from once every three years to once every six or nine years at each sampling point, based on the following criteria:
    - (a) If the average of the initial monitoring results for each contaminant (i.e., gross alpha particle activity, uranium, radium-226, or radium-228) is

below the detection limit specified in paragraph (D) of this rule, the community public system shall collect and analyze for that contaminant using at least one sample at that sampling point every nine years.

- (b) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is at or above the detection limit but at or below fifty per cent of the MCL, the community public water system shall collect and analyze for that contaminant using at least one sample at that sampling point every six years.

For combined radium-226 and radium-228, the analytical results shall be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is at or above the detection limit but at or below fifty per cent of the MCL, the community public water system shall collect and analyze for the contaminant(s) using at least one sample at that sample point every six years.

- (c) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above fifty per cent of the MCL but at or below the MCL, the community public water system shall collect and analyze at least one sample at that sampling point every three years.

For combined radium-226 and radium-228, the analytical results shall be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above fifty per cent of the MCL but at or below the MCL, the community public water system shall collect and analyze at least one sample at that sampling point every three years.

- (d) Community public water systems shall use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (e.g., if a system's sampling point is on a nine year monitoring period, and the sample result is above fifty per cent of MCL but at or below the MCL, then the next monitoring period for that sampling point is at least one sample every three years.)
  - (e) If a community public water system has a monitoring result that exceeds the MCL while on reduced monitoring, the system shall collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL.
- (7) A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not exceed five pCi/L. A gross alpha particle activity measurement may be substituted for the required uranium measurement provided that the measured gross alpha particle activity does not exceed fifteen pCi/L. The gross alpha measurement shall have a confidence interval of ninety-five per cent (1.96 sigma where sigma is the standard deviation of

the net counting rate of the sample) for radium-226 and uranium. When a community public water system uses a gross alpha particle activity measurement in lieu of radium-226 and/or uranium measurement, the gross alpha particle activity analytical result will be used to determine the future monitoring frequency for radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, fifty per cent of the detection limit will be used to determine compliance and the future monitoring frequency.

(B) Monitoring requirements for beta particle and photon radioactivity.

- (1) The director may designate a community public water system as vulnerable to beta particle and photon radioactivity contamination based on identified potential radioactive sources within the drinking water source protection area delineated or endorsed by the agency under Ohio's wellhead protection and source water assessment and protection programs. Community public water systems designated by the director as vulnerable shall sample for beta particle and photon radioactivity to determine compliance with the maximum contaminant levels listed in rule 3745-81-15 as follows:
  - (a) Community public water systems shall collect quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each sampling point, beginning within one quarter after being notified by the director. Systems designated as vulnerable shall continue to sample until the director removes the designation.
  - (b) If the gross beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to fifty pCi/L (screening level) and the combined monitoring results for all measured contaminants (i.e. tritium, strontium-90, and any other contaminants for beta particle and photon radioactivity as specified by rule 3745-81-15 of the Administrative Code) are at or below the MCL, the director may reduce the frequency of monitoring at that sampling point to once every three years. Systems shall collect all samples required in paragraph (B)(1)(a) of this rule during the reduced monitoring period.
- (2) Community public water systems designated by the director as utilizing waters contaminated by effluents from nuclear facilities shall sample for beta particle and photon radioactivity to determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code as follows:
  - (a) Community public water systems shall collect monthly samples for gross beta particle activity and quarterly samples for iodine-131, tritium, and strontium-90 at each sampling point, beginning within one quarter after being notified in writing by the director. For iodine-131, five consecutive daily samples shall be analyzed once each quarter. As ordered by the director, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water. Systems designated by the director as using waters contaminated by effluents from nuclear facilities shall

continue to sample until the director removes the designation.

- (b) If the gross beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to fifteen pCi/L (screening level) and the combined monitoring results are at or below the MCL for all measured contaminants (i.e., iodine-131, tritium, strontium-90, etc.), the director may reduce the frequency of monitoring at that sampling point to every three years. Community public water systems shall collect all samples required in paragraph (B)(2)(a) of this rule during the reduced monitoring period.
- (3) A waiver from the monitoring frequencies specified in paragraph (B)(1) or (B)(2) of this rule shall not be granted to community public water systems designated by the director as vulnerable to beta particle and photon radioactivity contamination.
- (4) Community public water systems may analyze for naturally occurring potassium-40 beta particle activity from the same or equivalent sample used for gross beta particle activity analysis. Systems may subtract the potassium-40 beta particle activity value from the total gross beta activity. The potassium-40 beta particle activity shall be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82 picocuries of potassium-40 per milligram of potassium.
- (5) If the gross beta particle activity (minus the naturally occurring potassium-40 beta particle activity) exceeds the appropriate screening level, an analysis of the sample shall be performed to identify the major applicable radioactive constituents present in the sample and the appropriate doses shall be calculated and summed to determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code. Doses shall also be calculated and combined for measured levels of tritium and strontium to determine compliance.
- (6) Community public water systems shall monitor monthly at the sampling point(s) which exceed the MCLs as determined in rule 3745-81-15 of the Administrative Code beginning the month after the exceedance occurs. Systems shall continue monthly monitoring until the system has established, by a running average of three monthly samples, that the MCL is being met. Systems who establish that the MCL is being met shall return to quarterly monitoring until they meet the requirements set forth in paragraph (B)(1)(b) or (B)(2)(b) of this rule.
- (7) For community public water systems in the vicinity of a nuclear facility or other facility that is a radioactive source, the director may allow the systems to utilize environmental surveillance data collected by the nuclear facility (i.e., raw water data for locations within the vicinity of the systems) in lieu of monitoring at the system's sampling point(s), where the director determines that data is applicable to a particular water system. In the event that there is a

release from a nuclear facility, community public water systems which are using surveillance data shall begin monitoring at the system's sampling point(s) in accordance with paragraph (B)(1) or (B)(2) of this rule.

(C) General monitoring and compliance requirements for radionuclides.

- (1) The director may require more frequent monitoring than specified in paragraphs (A) and (B) of this rule, or may require confirmation samples. The results of the initial and confirmation samples will be averaged for use in compliance determinations.
- (2) To determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.
- (3) Compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code will be determined based on the analytical result(s) obtained at each sampling point. If the average of any sampling point is greater than the MCL, then the community public water system is in violation of the MCL.
  - (a) For community public water systems monitoring more than once per year, compliance with the MCL is determined quarterly by a running annual average at each sampling point. If the average of any sampling point is greater than the MCL, then the system is in violation of the MCL.
  - (b) For community public water systems monitoring more than once per year, if any sample result will cause the running annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately.
  - (c) Community public water systems shall include all samples taken and analyzed under the provisions of this rule in determining compliance, even if that number is greater than the minimum required.
  - (d) If a community public water system does not collect all required samples when compliance is based on a running annual average, compliance will be based on the running average of the total number of samples collected.
  - (e) If a sample result is less than the detection limit, zero will be used to calculate the running annual average, unless a gross alpha particle activity result is being used in lieu of radium-226 or uranium. If the gross alpha particle activity result is less than detection, fifty per cent of the detection limit will be used to calculate the running annual average for radium-226 and/or uranium.
- (4) The director has the discretion to delete results of obvious sampling or analytical errors.



- (5) If a MCL set forth in rule 3745-81-15 of the Administrative Code is exceeded, the owner or operator of a community water system shall give notice to the director pursuant to rule 3745-81-31 of the Administrative Code and to the public as required by rule 3745-81-32 of the Administrative Code.
- (D) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit.
- (1) The detection limit shall be that concentration which can be counted with a precision of plus or minus one hundred per cent at the ninety-five per cent confidence level (1.96 sigma where sigma is the standard deviation of the net counting rate of the sample).
- (2) To determine compliance with rule 3745-81-15 of the Administrative Code, the detection limits shall not exceed the concentrations listed in the following table:

Radionuclide	Detection limit
Cesium-134	10 pCi/L
Iodine-131	1 pCi/L
Gross alpha	3 pCi/L
Gross beta	4 pCi/L
Radium-226	1 pCi/L
Radium-228	1 pCi/L
Strontium-89	10 pCi/L
Strontium-90	2 pCi/L
Tritium	1,000 pCi/L
Uranium	1 µg/L
Other beta/photon emitters	1/10 of the MCL (dose equivalent in pCi/L)

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Prior Effective Dates: 12/27/78, 05/22/89, 09/15/04, 04/15/05, 02/22/10

**3745-81-27 Analytical techniques.**

- (A) Inorganic chemical analyses conducted to determine compliance with rules 3745-81-11, 3745-81-23, 3745-81-80 to 3745-81-86, 3745-81-88, and 3745-83-01 of the Administrative Code shall be performed by a laboratory certified by the director pursuant to Chapter 3745-89 of the Administrative Code unless otherwise specified and shall be made in accordance with methods listed in this rule for the chemicals being analyzed. Inorganic chemical analyses required by rule 3745-81-87 of the Administrative Code also shall be made in accordance with methods listed in this rule for the chemicals being analyzed but do not require that the laboratory be certified pursuant to Chapter 3745-89 of the Administrative Code. Many of these inorganic chemical analysis methods are described in books and manuals referred to in this paragraph as "Standard Methods," "Standard Methods Online," "Technical Notes," EMSL94, and EMSL93. The United States environmental protection agency (or USEPA) books and manuals are available from the "National Technical Information Service (or NTIS), United States Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161," with telephone number 800-553-6847. USEPA books and manuals are also available from the "National Service Center for Environmental Publications (or NSCEP), P.O. Box 42419, Cincinnati, Ohio 45242-0419," or <http://www.epa.gov/nscep>.

"Standard Methods" stands for the eighteenth, nineteenth, twentieth, twenty-first or twenty-second editions of "Standard Methods for the Examination of Water and Wastewater, by the American Public Health Association, American Water Works Association, and Water Pollution Control Federation, 1992, 1995, 1998, 2006 and 2012, respectively." "Standard Methods Online" stands for online versions of "Standard Methods for the Examination of Water and Wastewater." These methods can be found at [www.standardmethods.org](http://www.standardmethods.org). The year in which each method was approved by the standard methods committee is designated by the last two digits in the method number. Frequently quoted methods of analysis for metals include method 3111 (atomic absorption spectrometry-direct aspiration flame), method 3113 (electrothermal atomic absorption spectrometry), method 3120 (inductively coupled plasma-emission spectroscopy), and method 4110 B (anion chromatography).

"Technical Notes" stands for "Technical Notes on Drinking Water Methods," dated October 1994 and designated EPA/600/R-94/173, by the "United States Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Cincinnati, OH 45268," available from NTIS as PB95-104766. "Technical Notes" contains mandatory and recommended modifications for some analytical methods included in this paragraph; criteria for analyzing arsenic, barium, beryllium, cadmium, calcium, chromium, copper, lead, nickel, selenium, sodium, and thallium with digestion or directly without digestion; and additional information pertinent to analysis of contaminants in drinking water.

"EMSL94" stands for "Methods for the Determination of Metals in Environmental Samples - Supplement I," dated May 1994 and designated EPA-600/R-94/111, by

the "United States Environmental Protection Agency, Environmental Monitoring Systems Laboratory-Cincinnati," available to government agencies from "ORD Publications, 26 West MLK Drive, Cincinnati Ohio 45268-1072," with telephone number 513-569-7562, and generally available from the NTIS with designation PB94-18942. Frequently quoted methods of analyses for metals include method 200.7 Rev. 4.4 (1994) (inductively coupled plasma-atomic emission spectrometry), method 200.8 Rev. 5.4 (1994) (inductively coupled plasma-mass spectrometry), and method 200.9 Rev. 2.2 (1994) (stabilized temperature graphite furnace atomic absorption spectrometry).

"EMSL93" stands for "Methods for the Determination of Inorganic Substances in Environmental Samples," dated August 1993 and designated EPA/600/R-93/100, by the "United States Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Cincinnati, Ohio 45268," available from NTIS as PB94-120821. Method 300.0 (inorganic anion determination by ion chromatography) is frequently quoted.

"EPA method 335.4" stands for "USEPA Method 335.4, Determination of Total Cyanide by Semi-Automated Colorimetry, Revision 1.0," dated August 1993 and designated EPA/600/R-93/100, available from NTIS as PB94-120821.

"Methods for the Determination of Inorganic Substances in Environmental Samples," dated August 1993, designated EPA/600/R-93/100 and available from NTIS as PB94-120821. This manual includes methods 353.2 and 335.4.

"EPA method 200.5" stands for "USEPA Method 200.5, Determination of Trace Elements in Drinking Water by Axially Viewed Inductively Coupled Plasma - Atomic Emission Spectrometry (AVICP-AES), Revision 4.2," dated October 2003 and designated EPA/600/R-06/115, available from USEPA's, "National Exposure Research Laboratory (NERL)."

Methods which have been determined to be equivalent to an approved method, by "USEPA Alternative Test Procedure (ATP) program at the Office of Ground Water and Drinking Water's Technical Support Center (OGWDW/TSC)," may be used for compliance monitoring. Equivalent methods will be referenced as the method is listed in rule 3745-81-27 with no special notation. The letter of equivalence issued by USEPA's ATP program at OGWDW/TSC must be maintained by the certified laboratory and be available for verification.

- (1) Aluminum: "Standard Methods" section 3111 D (eighteenth, nineteenth, twenty-first, twenty-second) or 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or "Standard Methods Online" section 3111 D-99 or 3113 B-10 or 3120 B-99 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.8 Rev. 5.4 (1994) or 200.9 Rev 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (2) Antimony: "Standard Methods" section 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or "Standard Methods Online" section 3113 B-10

or EMSL94 method 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).

- (3) Arsenic: "Standard Methods" section 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) (atomic absorption furnace) or 3114 B (eighteenth, nineteenth, twenty-first, twenty-second) (hydride atomic absorption) as modified in "Technical Notes" or "Standard Methods Online" section 3113 B10 or 3114 B-97 or EMSL94 method 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (4) Asbestos: "Technical Notes" method 100.1 and "Analytical Method for Determination of Asbestos Fibers in Water," EPA-600/4-83-043, September 1983, "United States Environmental Research Laboratory, Athens, Georgia 30613," available from NTIS as PB83-260471, or method 100.2, "Determination of Asbestos Structures Over 10  $\mu$ M in Length in Drinking Water," EPA/600/R-94/134, June 1994, available from NTIS as PB94-201902.
- (5) Barium: "Standard Methods" section 3111 D (eighteenth, nineteenth, twenty-first, twenty-second) or 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3120 B (twenty-first, twenty-second) or "Standard Methods Online" section 3111 D-99 or 3113 B-10 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.8 Rev. 5.4 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (6) Beryllium: "Standard Methods" section 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or "Standard Methods Online" section 3113 B-10 or 3120 B-99 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (7) Bromate: EPA method 300.1 Rev. 1.0 or 317.0 Rev. 2.0 or 302.0 or 326.0 Rev. 1.0 or 321.8 or 557. EPA methods 300.1 Rev. 1.0 and 321.8 are in "Methods for the Determination of Organic and Inorganic Compounds in Drinking Water, Volume 1, USEPA, August 2000, EPA 815-R-00-014" (available through NTIS, PB2000-106981). EPA Method 317.0 Rev 2.0, "Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis," USEPA, July 2001, EPA 815-B-01-001, EPA Method 326.0 Rev 1.0, "Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis," USEPA, June 2002, EPA 815-R-03-007. EPA method 302.0, "Determination of Bromate in Drinking Waters using Two-Dimensional Ion Chromatography with Suppressed Conductivity Detection," September 2009 (EPA 815-B-09-014) and EPA method 557, "Determination of Haloacetic Acids, Bromate and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry," August 2009 (EPA 815-B-09-012) may be used for the routine determination of bromate in drinking water and for reduced bromate monitoring. Copies of EPA method 302.0 and

EPA method 557 can be accessed and downloaded on-line at [http://epa.gov/safewater/methods/analyticalmethods\\_ogwdw.html](http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html). EPA methods 317.0 Rev 2.0, or 326.0 or 321.8 must be used for monitoring of bromate for purposes of demonstrating eligibility of reduced monitoring, as prescribed in paragraph (L)(6) of rule 3745-81-23 of the Administrative Code. EPA method 321.8 samples must be preserved at the time of sampling with fifty milligrams of ethylenediamine (EDA)/L of sample and must be analyzed within twenty-eight days. EPA method 317.0 Rev. 2.0, 326.0 Rev. 1.0 or 321.8 shall be used to qualify for reduced monitoring according to paragraph (L)(5) of rule 3745-81-23 of the Administrative Code, and laboratories using these methods must be able to meet minimum reporting limits as listed in Appendix B to rule 3745-89-03 of the Administrative Code.

- (8) Bromide: EMSL93 method 300.0 Rev. 2.1 or EPA method 300.1 Rev. 1.0 or EPA method 317.0 Rev 2.0 or EPA method 326.0 Rev. 1.0. "EPA method 300.1" stands for "USEPA Method 300.1, Determination of Inorganic Anions in Drinking Water by Ion Chromatography, Revision 1.0," dated 1997 and designated EPA/600/R-98/118, available from NTIS as PB98-169196.
- (9) Cadmium: "Standard Methods" section 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or "Standard Methods Online" section 3113 B-10 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (10) Calcium: "Standard Methods" section 3111 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or 3500 Ca D (eighteenth, nineteenth, twentieth) (EDTA titrimetric method) or 3500 Ca B (twenty-first, twenty-second) or "Standard Methods Online" section 3111 B-99 or 3120 B-99 or 3500 Ca D-97 or EMSL94 method 200.7 Rev. 4.4 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (11) Chloride: "Standard Methods" section 4500-Cl<sup>-</sup> B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second)(argentometric) or 4110 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or 4500-Cl<sup>-</sup> D (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (potentiometric) or "Standard Methods Online" 4500-CIB-97 or 4110 B-00 or 4500 CID-97 or EPA method 300.0 Rev. 2.1 or 300.1 Rev. 1.0.
- (12) Chlorite: "Standard Methods" section 4500-ClO<sub>2</sub> E (nineteenth, twentieth, twenty-first) or "Standard Methods Online" section 4500-ClO<sub>2</sub> E-00 or EPA method 327.0 Rev. 1.1, "Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry," USEPA, May 2005, EPA 815-R-05-008 may be used for routine daily monitoring of chlorite at the entrance of the distribution system. This analysis shall be performed by persons acceptable to the director. "ChlordioX Plus, Chlorine Dioxide and Chlorite in Drinking Water by Amperometry using Disposable Senosrs," November

2013. This analysis may be used for routine daily monitoring of chlorite at the entrance of the distribution system. EPA method 300.0 Rev. 2.1 or 300.1 Rev. 1.0 or 317.0 Rev. 2.0 or 326.0 Rev. 1.0 shall be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the distribution system. This analysis shall be performed by a laboratory certified by the director according to Chapter 3745-89 of the Administrative Code.

- (13) Chromium: "Standard Methods" section 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) as modified in "Technical Notes" or 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or "Standard Methods Online" section 3113 B-10 or 3120 B-99 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (14) Copper: "Standard Methods" section 3111 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or "Standard Methods Online" section 3111 B-10 or 3113 B-99 or 3120 B-99 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994). In addition, untreated raw water may be analyzed by "Standard Methods" section 3500-Cu E (eighteenth, nineteenth, twentieth) or "Standard Methods Online" 3500-Cu E-99) (bathocuproine) or EPA method 200.5 Rev. 4.2 (2003).
- (15) Cyanide: manual distillation by "Standard Methods" section 4500-CN<sup>-</sup> C (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) followed by "Standard Methods" section 4500-CN<sup>-</sup> E (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (colorimetric) or 4500-CN<sup>-</sup> F (eighteenth, nineteenth, twentieth, twenty-first, twenty-second)(selective electrode) or 4500-CN<sup>-</sup> G (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (amenable to chlorination) or "Standard Methods Online" section 4500-CN<sup>-</sup> E-99 or 4500-CN<sup>-</sup> F-99 or 4500-CN<sup>-</sup> G-99 or EPA method 335.4 Rev. 1.0 or Lachat QuikChem 10-204-00-1-X or Kelada 01 Rev. 1.2 or OIA-1677, DW. Some mandatory method modifications are given in "Technical Notes."
- (16) Fluoride: "Standard Methods" section 4110 B (eighteenth, nineteenth, twentieth, twenty-first) or 4500-F<sup>-</sup> C (eighteenth, nineteenth, twentieth, twenty-first) (ion-selective electrode) or 4500-F<sup>-</sup> E (eighteenth, nineteenth, twentieth, twenty-first)(automated Alizarin), or "Standard Methods Online" section 4110 B-00 or 4500-F<sup>-</sup> C-97 or 4500-F<sup>-</sup> E-97 or EPA method 300.0 Rev. 2.1 or 300.1 Rev. 1.0, or "Technicon Industrial Systems" method 380-75WE (February 1976) or 129-71W (December 1972), available from "Technicon Industrial Systems, Tarrytown NY 10591."
- (17) Iron: "Standard Methods" section 3111 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first) or 3500-Fe D (eighteenth, nineteenth, twentieth) (phenanthroline) or "Standard Methods

Online" section 3111 B-99 or 3113 B-10 or 3120 B-99 or 3500-Fe D-97 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).

- (18) Lead: "Standard Methods" section 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or "Standard Methods Online" section 3113 B-10 or EMSL94 method 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (19) Manganese: "Standard Methods" section 3111 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3113 B (eighteenth, nineteenth, twenty-first) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or 3500-Mn D (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (persulfate) or "Standard Methods Online" section 3111 B-99 or 3113 B-10 or 3120 B-99 or 3500-Mn D-99 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (20) Magnesium: "Standard Methods" section 3111 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or 3500-Mg B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or "Standard Methods Online" section 3111 B-99 or 3120 B-99 or 3500-Mg B-97 or EMSL 94 method 200.7 Rev. 4.4 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (21) Mercury: "Standard Methods" section 3112 B (eighteenth, nineteenth, twenty-first, twenty-second) (cold-vapor atomic absorption spectrometry) or "Standard Methods Online" section 3112 B-99 or EMSL94 method 200.8 Rev. 5.4 (1994) or 245.1 Rev. 3.0 (manual cold vapor technique) or EMSL93 method 245.2 (automated cold vapor technique).
- (22) Nickel: "Standard Methods" section 3111 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or "Standard Methods Online" section 3111 B-99 or 3113 B-10 or 3120 B-99 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (23) Nitrate: "Standard Methods" section 4110 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (ion chromatography) or 4500-NO<sub>3</sub><sup>-</sup> D (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (nitrate electrode) or 4500-NO<sub>3</sub><sup>-</sup> E (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (cadmium reduction) or 4500-NO<sub>3</sub><sup>-</sup> F (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (automated cadmium reduction), or "Standard Methods Online" section 4110 B-00 or 4500-NO<sub>3</sub><sup>-</sup> D-00 or 4500-NO<sub>3</sub><sup>-</sup> E-00 or 4500-NO<sub>3</sub><sup>-</sup> F-00, or EPA Method 300.0 Rev. 2.1 or 300.1 Rev. 1.0 or 353.2 Rev. 2.0 (cadmium reduction automated colorimetric), or method B-1011, "Waters Test Method for Determination of Nitrite/Nitrate in Water

- Using Single Column Ion Chromatography, August 1987." Copies may be obtained from Waters Corporation, Technical Services Division, 34 Maple Street, Millford, MA 01757-3696, 800-252-4752, or D6508 Rev. 2.0, "Waters Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte." Copies may be obtained from Waters Corp, 34 Maple St., Milford, MA, 01757-3696, 800-252-4752. "Systea Easy (1-Reagent) Nitrate Method" can be downloaded from the "National Environmental Methods Index (NEMI)" at <http://www.nemi.gov>, or obtained from "Systea Scientific, LLC, 900 Jorie Blvd., Suite 35, Oaks Brook, IL 60523, or by telephone at 630-645-0600."
- (24) Nitrite: "Standard Methods" section 4110 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (ion chromatography) or 4500-NO<sub>2</sub><sup>-</sup>B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (colorimetric) or 4500-NO<sub>3</sub><sup>-</sup>E (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (cadmium reduction) or 4500-NO<sub>3</sub><sup>-</sup>F (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (automated cadmium reduction), or "Standard Methods Online" section 4110 B-00 or 4500-NO<sub>2</sub><sup>-</sup>B-00 or 4500-NO<sub>3</sub><sup>-</sup>E-00 or 4500-NO<sub>3</sub><sup>-</sup>F-00, or EPA method 300.0 Rev. 2.1 or 300.1 Rev. 1.0 or 353.2 Rev. 2.0 (cadmium reduction automated colorimetric), or method B-1011, "Waters Test Method for Determination of Nitrite/Nitrate in Water Using Single Column Ion Chromatography, August 1987." Copies may be obtained from "Waters Corporation, Technical Services Division, 34 Maple Street, Millford, MA 01757-3696, 800-252-4752, or D6508 Rev. 2.0," "Waters Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte." Copies may be obtained from "Waters Corp, 34 Maple St., Milford, MA, 01757-3696, 800-252-4752." "Systea Easy (1-Reagent) Nitrate Method, February 4, 2009" can be downloaded from the "National Environmental Methods Index (NEMI)" at <http://www.nemi.gov>, or obtained from "Systea Scientific, LLC, 900 Jorie Blvd., Suite 35, Oaks Brook, IL 60523, or by telephone at 630-645-0600."
- (25) Orthophosphate: "Standard Methods" section 4110 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or 4500-P E (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) (ascorbic acid) or 4500-P F (eighteenth, nineteenth, twentieth, twenty-first, twenty-second)(automated ascorbic acid reduction), or "Standard Methods Online" section 4110 B-00 or 4500-P E-99 or 4500 P F-99 or EPA method 300.0 Rev. 2.1 or 300.1 Rev. 1.0 or method D6508 Rev. 2.0, "Waters Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte". Copies may be obtained from Waters Corp, 34 Maple St., Milford, MA, 01757-3696, 800-252-4752."
- (26) Selenium: "Standard Methods" section 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3114 B (eighteenth, nineteenth, twenty-first, twenty-second) (hydride generation/atomic absorption spectrometric) as modified in "Technical Notes" or "Standard Methods Online" 3113 B-10 or



- 3114 B-99 or EMSL94 method 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (27) Silica: "Standard Methods" section 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or 4500-Si D (eighteenth, nineteenth) (molybdosilicate) or 4500-Si E (eighteenth, nineteenth) (heteropoly blue) or 4500-Si F (eighteenth, nineteenth) (automated for molybdate-reactive silica) or 4500 SiO<sub>2</sub>-C (twentieth, twenty-first, twenty-second) or 4500 SiO<sub>2</sub>-D (twentieth, twenty-first, twenty-second) or 4500 SiO<sub>2</sub>-E (twentieth, twenty-first, twenty-second) or "Standard Methods Online" section 3120 B-99 or 4500 SiO<sub>2</sub> C-97 or 4500 SiO<sub>2</sub> D-97 or 4500 SiO<sub>2</sub> E-97 or EMSL94 method 200.7 Rev. 4.4 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (28) Silver: "Standard Methods" section 3111 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3113 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or "Standard Methods Online" section 3111 B-99, 3113 B-10 or 3120 B-99 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994) or EPA method 200.5 Rev. 4.2 (2003).
- (29) Sodium: "Standard Methods" section 3111 B (twenty-first, twenty-second) or EPA method 200.5 Rev. 4.2 (2003).
- (30) Sulfate: "Standard Methods" section 4110 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or 4500-SO<sub>4</sub><sup>2-</sup> C and D (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or 4500-SO<sub>4</sub><sup>2-</sup> F (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or 4500-SO<sub>4</sub><sup>2-</sup> E (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or "Standard Methods Online" section 4110 B-00 or 4500 SO<sub>4</sub> C-97 or 4500 SO<sub>4</sub> D-97 or 4500 SO<sub>4</sub> F-97 or 4500 SO<sub>4</sub> E-97 or EPA method 300.0 Rev. 2.1 or 300.1 Rev. 1.0, or 375.2 (automated colorimetry) or method D6508 Rev. 2.0, "Waters Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte." Copies may be obtained from "Waters Corp, 34 Maple St., Milford, MA, 01757-3696, 800-252-4752."
- (31) Temperature: "Standard Methods" section 2550 (twenty-first, twenty-second) or "Standard Methods Online" section 2550-10.
- (32) Thallium: EMSL94 method 200.8 Rev. 5.4 (1994) or 200.9 Rev. 2.2 (1994).
- (33) Total Phosphorous: "Standard Methods" section 4500-P B (eighteenth, nineteenth, twentieth, twenty-first) with 4500-P E (eighteenth, nineteenth, twentieth, twenty-first) or 4500-P F (eighteenth, nineteenth, twentieth, twenty-first) or "Standard Methods Online" section 4500 P E-99 or 4500 P F-99.
- (34) Zinc: "Standard Methods" section 3111 B (eighteenth, nineteenth, twenty-first, twenty-second) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first, twenty-second) or "Standard Methods Online" section 3111 B-99 or 3120 B-

99 or EMSL94 method 200.7 Rev. 4.4 (1994) or 200.8 Rev. 5.4 (1994) or EPA method 200.5 Rev. 4.2 (2003).

- (B) Organic chemical sampling and analyses, as required by rule 3745-81-24 of the Administrative Code, shall use the following procedures. Analyses shall be performed by a laboratory certified by the director pursuant to Chapter 3745-89 of the Administrative Code. Procedures for many of these specified organic chemical analyses are included in manuals prepared by the "Environmental Monitoring Systems Laboratory-Cincinnati of the United States Environmental Protection Agency (USEPA)." These manuals may be purchased from the "National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161," with telephone number 800-553-6847. They are also available to government agencies from "ORD Publications, 26 West MLK Drive, Cincinnati, Ohio 45268-1072," with telephone number 513-569-7562. USEPA books and manuals are also available from the "National Service Center for Environmental Publications (or NSCEP), P.O. Box 42419, Cincinnati, Ohio 45242-0419," or <http://www.epa.gov/nscep>.

Methods which have been determined to be equivalent to an approved method, by USEPA Alternative Test Procedure (ATP) program at the Office of Ground Water and Drinking Water's Technical Support Center (OGWDW/TSC), may be used for compliance monitoring. Equivalent methods will be referenced as the method is listed in this rule with no special notation. The letter of equivalence issued by USEPA's ATP program at OGWDW/TSC must be maintained by the certified laboratory and be available for verification.

One manual is "Methods for the Determination of Organic Compounds in Drinking Water, dated December 1988 (Revised July 1991), designated EPA/600/4-88/039R and available from NTIS as PB91-231480." This manual includes currently approved USEPA analysis methods 505, 507, 508, 508A, 515.1, and 531.1.

Another manual is "Methods for the Determination of Organic Compounds in Drinking Water-Supplement I, dated July 1990, designated EPA/600/4-90/020," and available from NTIS as PB91-146027. This manual includes currently approved USEPA analysis methods 547, 550, and 550.1.

A third manual is named "Methods for the Determination of Organic Compounds in Drinking Water-Supplement II," dated August 1992, designated EPA/600/R-92/129, available from NTIS as PB92-207703, and containing methods 515.2, 548.1, 549.1, 552.1 Rev. 1.0, and 555.

A fourth manual is named "Methods for the Determination of Organic Compounds in Drinking Water-Supplement III," dated August 1995, designated EPA/600/R-95/131, available from NTIS as PB95-261616, and containing methods 502.2 Rev. 2.1, 504.1, 508.1, 524.2, 525.2, 551.1 Rev. 1.0, and 552.2 Rev. 1.0.

A fifth manual is named "Methods for the Determination of Organic and Inorganic

Compounds in Drinking Water," dated August 2000, designated EPA 815-R-00-014, available from the "National Service Center for Environmental Publications (NSCEP)," P.O. Box 42419, Cincinnati, OH 45242-0419, telephone number 800-490-9198. This manual includes currently approved USEPA methods 515.3 and 549.2.

"Technical Notes" stands for "Technical Notes on Drinking Water Methods", dated October 1994 and designated "EPA/600/R-94/173, by the United States Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Cincinnati, OH 45268," available from NTIS as PB95-104766. "Technical Notes" contains mandatory and recommended modifications for some of the analytical methods referred to in this paragraph and also includes additional information pertinent to analysis of contaminants in drinking water.

USEPA method 1613, "Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope-Dilution HRGC/HRMS," designated EPA-821-B-94-005 and dated October 1994, available from NTIS as PB95-104774. Copies may be obtained from NTIS, 5285 Port Royal Road, Springfield, VA 22161, Phone: 703-605-6000 or 800-553-6847.

USEPA method 524.3 Version 1.0, "Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry," designated EPA 815-B-09-009 and dated June 2009, available at [http://epa.gov/safewater/methods/analyticalmethods\\_ogwdw.html](http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html).

Other sources of methods are the eighteenth, nineteenth, twentieth, twenty-first and twenty-second editions of "Standard Methods For the Examination of Water and Wastewater; by American Public Health Association, American Water Works Association, and Water Environment Federation"; dated 1992, 1995, 1998, 2006 and 2012, respectively; designated "Standard Methods"; and containing method 6651 which is pertinent to this paragraph. The eighteenth edition supplement was copyrighted in 1994 and contains method 6610 which is pertinent to this paragraph. Also, "Standard Methods Online" stands for online versions of "Standard Methods for the Examination of Water and Wastewater." These methods can be found at [www.standardmethods.org](http://www.standardmethods.org). The year in which each method was approved by the standard methods committee is designated by the last two digits in the method number.

- (1) Sampling and analyses for total trihalomethanes made to determine compliance with rules 3745-81-12 and 3745-81-24 of the Administrative Code shall be conducted by a method listed in paragraphs (B)(1)(a) to (B)(1)(c) of this rule. Samples for total trihalomethanes shall be dechlorinated upon collection to prevent further production of trihalomethanes, according to the procedures described in the following methods.
  - (a) USEPA method 502.2 Rev. 2.1, "Volatile Organic Compounds in Water by Purge and Trap Capillary Gas Chromatography with Photoionization and Electrolytic Conductivity Detector in Series." A photoionization

detector (PID) is not required if total trihalomethanes are the only analytes measured in the sample.

- (b) USEPA method 524.2 Rev. 4.1, 524.3 Version 1.0 or 524.4, "Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry."
  - (c) USEPA method 551.1 Rev. 1.0, "Determination of Chlorination Disinfection Byproducts, Chlorinated Solvents and Halogenated Pesticides/Herbicides in Drinking Water by Liquid-Liquid Extraction and Gas Chromatography with Electron-Capture Detection."
- (2) Sampling and analysis for haloacetic acids (five) made to determine compliance with rules 3745-81-12 and 3745-81-24 of the Administrative Code shall be conducted by one of the following methods:
- (a) USEPA method 552.1 Rev. 1.0, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Ion Exchange Liquid-Solid Extraction and Gas Chromatography with Electron Capture Detection." The samples must be extracted within fourteen days of sample collection.
  - (b) USEPA method 552.2 Rev. 1.0, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Extraction, Derivatization and Gas Chromatography with Electron Capture Detection."
  - (c) USEPA method 552.3, Rev 1.0 "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection" USEPA, July 2003, EPA-815-B-03-002.
  - (d) USEPA method 557, "Determination of Haloacetic Acids, Bromate and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (USEPA 2009e)," may be used for determining HAA5 in drinking water. A copy of this method can be accessed and downloaded on-line at [http://epa.gov/safewater/methods/analyticalmethods\\_ogwdw.html](http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html).
  - (e) "Standard Methods," 6251 B (nineteenth, twentieth, twenty-first, twenty-second). The samples must be extracted within fourteen days of sample collection.
  - (f) "Standard Methods Online," 6251 B-07.
- (3) Organic chemical analyses required by rule 3745-81-24 of the Administrative Code shall be conducted using the following United States environmental protection agency methods or their equivalent as approved by the United States environmental protection agency and the director. The following methods are contained in one of the manuals listed in paragraph (B) of this rule:

- (a) USEPA method 502.2 Rev. 2.1, "Volatile Organic Compounds in Water by Purge and Trap Capillary Gas Chromatography with Photoionization and Electrolytic Conductivity Detector in Series," as modified in "Technical Notes," may be used for analyzing for all the compounds referred to in paragraph (B)(3) of this rule.
  - (b) USEPA method 524.2 Rev. 4.1, "Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry," as modified in "Technical Notes" or USEPA method 524.3 Version 1.0 or USEPA method 524.4, may be used for analyzing for all the compounds referred to in paragraph (B)(3) of this rule.
  - (c) USEPA method 504.1, "1,2-Dibromoethane (EDB), 1,2-Dibromo-3-chloropropane (DBCP), and 1,2,3-Trichloropropane (123TCP) in Water By Microextraction and Gas Chromatography," may be used for analyzing 1,2,3-trichloropropane.
  - (d) USEPA method 551.1 Rev. 1.0, "Determination of Chlorination Disinfection Byproducts, Chlorinated Solvents and Halogenated Pesticides/Herbicides in Drinking Water by Liquid-Liquid Extraction and Gas Chromatography with Electron-Capture Detection," may be used for analyzing bromodichloromethane, bromoform, carbon tetrachloride, chlorodibromomethane, chloroform, tetrachloroethylene, 1,1,1-trichloroethane, and trichloroethylene.
- (4) Organic chemical analyses required in rule 3745-81-24 of the Administrative Code shall be conducted using the following approved methods:
- (a) USEPA method 314.0, "Determination of Perchlorate in Drinking Water using Ion Chromatography." Method 314.0 may be used for the determination of perchlorate in reagent water, surface water, ground water, and finished drinking water using ion chromatography.
  - (b) USEPA method 504.1, "1,2-Dibromoethane (EDB), 1,2-Dibromo-3-chloropropane (DBCP), and 1,2,3-Trichloropropane (123TCP) in Water by Microextraction and Gas Chromatography." Method 504.1 may be used to measure 1,2-dibromo-3-chloropropane (dibromochloropropane or DBCP) and 1,2-dibromoethane (ethylene dibromide or EDB).
  - (c) USEPA method 505, "Analysis of Organohalide Pesticides and Commercial Polychlorinated Biphenyl Products (Aroclors) in Water by Microextraction and Gas Chromatography." Method 505 may be used to measure alachlor, atrazine, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, simazine, and toxaphene. Method 505 may also be used as a screen for polychlorinated biphenyls (PCBs). When any aroclor (PCB) listed in rule 3745-81-24 of the Administrative Code is found to be present in a concentration of 0.0001 milligram per liter or more, the

sample shall be reanalyzed by method 508A to provide quantitative results for polychlorinated biphenyl concentrations in the water sample.

- (d) USEPA method 507, "Determination of Nitrogen- and Phosphorus-Containing Pesticides in Ground Water by Gas Chromatography with a Nitrogen-Phosphorus Detector." Method 507 may be used to measure alachlor, atrazine, and simazine.
- (e) USEPA method 508, "Determination of Chlorinated Pesticides in Water by Gas Chromatography with an Electron Capture Detector." Method 508 may be used to measure chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene (when "Technical Notes" requirement is met), lindane, methoxychlor, and toxaphene. Method 508 may also be used as a screen for polychlorinated biphenyls (PCBs). When any aroclor (PCB) listed in rule 3745-81-24 of the Administrative Code is found to be present in a concentration of 0.0001 milligram per liter or more, the sample shall be reanalyzed by method 508A to provide quantitative results for polychlorinated biphenyl concentrations in the water sample.
- (f) USEPA method 508.1, "Determination of Chlorinated Pesticides, Herbicides, and Organohalides by Liquid-Solid Extraction and Electron Capture Gas Chromatography." Method 508.1 may be used to measure alachlor, aldrin, atrazine, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, and simazine.
- (g) USEPA method 508A, "Screening for Polychlorinated Biphenyls by Perchlorination and Gas Chromatography." Method 508A is used to quantitate polychlorinated biphenyls as decachlorobiphenyl if one or more aroclor(s) (or PCBs) are detected in analysis by method 505, 508, or 508.1.
- (h) USEPA method 515.1, "Determination of Chlorinated Acids in Water by Gas Chromatography with an Electron Capture Detector" as revised May 1991. An alternate derivatization is given in "Technical Notes." Method 515.1 may be used to measure 2,4-D, dalapon, dinoseb, pentachlorophenol, picloram, and 2,4,5-TP (Silvex).
- (i) USEPA method 515.2, "Determination of Chlorinated Acids in Water Using Liquid-Solid Extraction and Gas Chromatography With an Electron Capture Detector." An alternate derivatization is given in "Technical Notes." Method 515.2 may be used to measure 2,4-D, dinoseb, pentachlorophenol, picloram, and 2,4,5-TP (Silvex).
- (j) USEPA method 515.3, "Determination of Chlorinated Acids in Drinking Water by Liquid-Liquid Extraction, Derivatization and Gas Chromatography with Electron-Capture Detection" may be used to

measure 2,4-D, 2,4,5-TP, dalapon, dinoseb, pentachlorophenol, and picloram.

- (k) USEPA method 525.2, "Determination of Organic Compounds in Drinking Water by Liquid-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry" as revised March 1994. Method 525.2 may be used to measure alachlor, atrazine, chlordane, di(2-ethylhexyl) adipate, di(2-ethylhexyl) phthalate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, pentachlorophenol, polynuclear aromatic hydrocarbons (including benzo(a)pyrene), simazine, and toxaphene.
- (l) USEPA method 531.1, "Measurement of N-Methyl Carbamoyloximes and N-Methyl Carbamates in Water by Direct Aqueous Injection HPLC with Post-Column Derivatization." Sample storage requirements are modified in "Technical Notes." Method 531.1 may be used to measure carbofuran and oxamyl.
- (m) USEPA method 531.2, "Measurement of N-Methylcarbamoyloximes and N-Methylcarbamates in Water by Direct Aqueous Injection HPLC with Postcolumn Derivatization."
- (n) USEPA method 547, "Determination of Glyphosate in Drinking Water by Direct-Aqueous-Injection HPLC, Post-Column Derivatization, and Fluorescence Detection." Method 547 may be used to measure glyphosate.
- (o) USEPA method 548.1, "Determination of Endothall in Drinking Water by Aqueous Derivatization, Liquid-Solid Extraction, and Gas Chromatography with Electron-Capture Detection." Method 548.1 may be used to measure endothall.
- (p) USEPA method 549.2, "Determination of Diquat and Paraquat in Drinking Water by Liquid-Solid Extraction and HPLC with Ultraviolet Detection." Sample bottle requirements are modified in "Technical Notes." Method 549.2 may be used to measure diquat.
- (q) USEPA method 550, "Determination of Polycyclic Aromatic Hydrocarbons in Drinking Water by Liquid-Liquid Extraction and HPLC with Coupled Ultraviolet and Fluorescence Detection." Method 550 may be used to measure polynuclear aromatic hydrocarbons, including benzo(a)pyrene.
- (r) USEPA method 550.1, "Determination of Polycyclic Aromatic Hydrocarbons in Drinking Water by Liquid-Solid Extraction and HPLC with Coupled Ultraviolet and Fluorescence Detection." Method 550.1 may be used to measure polynuclear aromatic hydrocarbons, including benzo(a)pyrene.

- (s) USEPA method 551.1, "Determination of Chlorination Disinfection Byproducts, Chlorinated Solvents and Halogenated Pesticides/Herbicides in Drinking Water by Liquid-Liquid Extraction and Gas Chromatography with Electron-Capture Detection." Method 551.1 may be used to measure 1,2-dibromo-3-chloropropane (dibromochloropropane or DBCP), 1,2-dibromoethane (ethylene dibromide or EDB), alachlor, atrazine, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor and simazine.
- (t) USEPA method 552.1 Rev. 1.0, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Ion Exchange Liquid-Solid Extraction and Gas Chromatography With Electron Detection." Method 552.1 may be used to measure dalapon.
- (u) USEPA 552.2 Rev. 1.0, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Extraction, Derivatization and Gas Chromatography with Electron-Capture Detection," may be used to measure dalapon.
- (v) USEPA 552.3 Rev. 1.0, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection."
- (w) USEPA method 555, "Determination of Chlorinated Acids in Water by High Performance Liquid Chromatography With a Photodiode Array Ultraviolet Detector." Method 555 may be used to measure 2,4-D, dicamba, dinoseb, pentachlorophenol, picloram, and 2,4,5-TP (Silvex).
- (x) USEPA method 1613, "Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope-Dilution HRGC/HRMS." Method 1613 may be used to measure the compounds in its title, including 2,3,7,8-TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin or dioxin).
- (y) "Standard Methods" and "Standard Methods Online" supplement method 6610 (nineteenth, twentieth, twenty-first, twenty-second), "Carbamate Pesticides High-Performance Liquid Chromatographic Method." Sample storage requirements are modified in "Technical Notes." This method 6610 may be used to measure carbofuran and oxamyl.
- (z) "Standard Methods" section 6651 (nineteenth, twentieth, twenty-first, twenty-second) and "Standard Methods Online" 6551 B-10, "Glyphosate Herbicide Liquid Chromatographic Postcolumn Fluorescence Method." Method 6651 may be used to measure glyphosate.
- (aa) "Standard Methods" section 6440 B (twenty-first and twenty-second) and "Standard Methods Online" 6440 B-06 may be used to measure 2, 4-D, 2, 4, 5-TP (silvex), dalapon, dinoseb, pentachlorophenol and picloram.



- (bb) "Syngenta" method AG-625, "Atrazine in Drinking Water by Immunoassay." Copies may be obtained from "Syngenta Crop Protection, P.O. Box 18300, Greensboro, NC, 27419, 800-334-9481 x2368."
- (C) Analyses conducted to determine compliance with rules 3745-81-10, 3745-81-43, 3745-81-70 to 3745-81-74, and 3745-83-01 of the Administrative Code shall use the following methods. The analytical methods referred to as "Standard Methods" sections in paragraphs (C)(1) to (C)(3) of this rule are printed in the indicated sections of the nineteenth, twentieth and twenty-first editions of "Standard Methods for the Examination of Water and Wastewater, by the American Public Health Association, American Water Works Association, and Water Pollution Control Association, dated 1992, 1995, 1998 and 2006 respectively." "Standard Methods Online" stands for online versions of "Standard Methods for the Examination of Water and Wastewater." These methods can be found at [www.standardmethods.org](http://www.standardmethods.org). The year in which each method was approved by the standard methods committee is designated by the last two digits in the method number. The method referred to as EMSL93 method 300.0 in paragraph (C)(4) of this rule may be found in the manual defined in paragraph (A) of this rule as EMSL93.

Methods which have been determined to be equivalent to an approved method, by "USEPA Alternative Test Procedure (ATP) program at the Office of Ground Water and Drinking Water's Technical Support Center (OGWDW/TSC)," may be used for compliance monitoring. Equivalent methods will be referenced as the method is listed in this rule with no special notation. The letter of equivalence issued by USEPA's ATP program at OGWDW/TSC must be maintained by the certified laboratory and be available for verification.

- (1) Residual disinfectant concentrations shall be analyzed by the following methods from "Standard Methods", subject to some corrections published in "Technical Notes" (defined in paragraph (A) of this rule):
  - (a) Residual disinfectant concentrations for free chlorine and combined chlorine (chloramines) shall be measured by persons acceptable to the director. Residual disinfectant concentrations shall be measured by a method in section 4500-Cl D (nineteenth, twentieth, twenty-first) (amperometric titration method) for free, combined, or total chlorine, section 4500-Cl E (nineteenth, twentieth, twenty-first) for total chlorine (low-level amperometric titration method), section 4500-Cl F (nineteenth, twentieth, twenty-first) (DPD ferrous titrimetric method) for free, combined or total chlorine, section 4500-Cl G (nineteenth, twentieth, twenty-first) (DPD colorimetric method) for free, combined or total chlorine, section 4500-Cl H (nineteenth, twentieth, twenty-first) (syringaldazine (FACTS) method) for free chlorine, section 4500-Cl I (nineteenth, twentieth, twenty-first) (iodometric electrode technique) for total chlorine, or "Standard Methods Online" section 4500-Cl D-00, section 4500-Cl E-00, section 4500-Cl F-00 section 4500-Cl G-00,

section 4500-Cl H-00, section 4500-Cl I-00. Residual disinfectant concentrations may also be measured by Hach method 10260 (DPD colorimetric method) for free, total or combined chlorine. Hach method 10260, "Determination of Chlorinated Oxidants (Free and Total) in Water Using Disposable Planar Reagent-filled Cuvettes and Mesofluidic Channel Colorimetry," April 2013 is available from "Hach Company, 5600 Lindbergh Drive, P.O. Box 389, Loveland CO 80539" or at <http://www.hach.com>. Residual disinfectant concentrations for free chlorine and combined chlorine may also be measured by using DPD colorimetric test kits. A DPD colorimetric test kit acceptable to the director is one that uses electronic measurement of the color development. It shall also have a digital display of the result. DPD colorimetric test kits with an analog display are not acceptable for use. An acceptable DPD colorimetric test kit shall have a method detection limit of 0.1 mg/L. A written protocol for quantitative dilution of samples shall be kept on file. This protocol shall be approved by the director before a colorimeter is approved for use for determining compliance with the MRDL for total chlorine. Free or total chlorine must be measured for demonstrating compliance with the chlorine MRDL and combined chlorine, or total chlorine must be measured for demonstrating compliance with the chloramine MRDL.

- (b) Residual disinfectant concentrations for free and total chlorine may be measured by EPA method 334.0, "Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer," August 2009 (EPA 815-B-09-013). A copy of this method can be accessed and downloaded on-line at [http://epa.gov/safewater/methods/analyticalmethods\\_ogwdw.html](http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html). Residual disinfectant concentrations may also be measured by, "ChloroSense, Measurement of Free and Total Chlorine in Drinking Water," September 2009. A copy of this method can be downloaded from NEMI at <http://www.nemi.gov> or from "Palintest Ltd, 21 Kenton Lands Road, PO Box 18395, Erlanger, KY 41018."
- (c) Residual disinfectant concentrations for chlorine dioxide shall be measured by persons acceptable to the director and using a method in section 4500-ClO<sub>2</sub> C (nineteenth, twentieth, twenty-first) (amperometric method I) or section 4500-ClO<sub>2</sub> D (nineteenth, twentieth) (DPD method) or section 4500-ClO<sub>2</sub> E (nineteenth, twentieth, twenty-first)(amperometric method II), or "Standard Methods Online" section 4500-ClO<sub>2</sub> C-00 or 4500-ClO<sub>2</sub> E-00, or EPA Method 327.0 Rev. 1.1, or "ChlordioX Plus, Chlorine Dioxide and Chlorite in Drinking Water by Amperometry using Disposable Sensors," November 2013. "Available from Palintest Ltd., 1455 Jamiike Avenue (Suite 100), Erlanger, KY 41014." An acceptable DPD colorimetric test kit may be used for determining chlorine dioxide by "Standard Methods" 4500-ClO<sub>2</sub>.

- (d) Residual disinfectant concentrations for ozone shall be measured by the method in section 4500-O<sub>3</sub> B (indigo colorimetric method) (twenty-first), or "Standard Methods Online" section 4500-O<sub>3</sub> B-97, or automated methods which are calibrated in reference to the results obtained by the indigo method on a regular basis, if approved by the director.
- (2) Measurements of the plant control tests shall be conducted by a person designated on a valid laboratory certificate of approval as required under rule 3745-89-03 of the Administrative Code and using the following methods:
  - (a) Alkalinity: "Standard Methods" section 2320 (eighteenth, nineteenth, twentieth, twenty-first) or "Standard Methods Online" section 2320 B-97 (alkalinity).
  - (b) Alkalinity Stability: "Standard Methods" section 2330 (eighteenth, nineteenth, twentieth) (Langelier's Index).
  - (c) pH: "Standard Methods" section 4500-H<sup>+</sup> B (eighteenth, nineteenth, twentieth, twenty-first), or "Standard Methods Online" section 4500-H<sup>+</sup> B-00 (pH value), or EPA method 150.1 (electrometric) or 150.2 (continuous monitoring electrometric).
  - (d) Total dissolved solids: "Standard Methods" section 2540 C (eighteenth, nineteenth, twentieth, twenty-first) or "Standard Methods Online" section 2540 C-97 (total dissolved solids dried at one hundred eighty degrees Celsius).
- (3) Turbidity shall be measured by a person designated on a valid certificate of approval as required under rule 3745-89-03 of the Administrative Code and using "Standard Methods" section 2130 B (eighteenth, nineteenth, twentieth, twenty-first) or "Standard Methods Online" section 2130 B-01 (nephelometric method); USEPA method 180.1 Rev. 2.0 (nephelometric) as described in "Methods for the Determination of Inorganic Substances in Environmental Samples, EPA-600/R-93-100, August 1993," which is available from the "National Technical Information Service (NTIS)" as PB94-120821; or "Great Lakes Instruments Method 2," November 2, 1992, with information available from "GLI International, Inc., P.O. Box 389, Loveland, Colorado 80539-0389, telephone number 800-227-4224." "Thermo Scientific's Orion Method AQ4500 (May 8, 2009)" can be downloaded from "National Environmental Methods Index (NEMI)" at <http://www.nemi.gov> or obtained from "Thermo Scientific, 166 Cummings Center, Beverly, MA 01915," 800-225-1480. "Mitchell Method M5271 and Mitchell Method M5331 (March 5, 2009)" can be downloaded from NEMI at <http://www.nemi.gov> or obtained from "Leck Mitchell, PHD, PE, 656 Independence Valley Dr., Grand Junction, CO 81507." "Hach" FilterTrak 10133 Rev 2.0, "Determination of Turbidity by Laser Nephelometry." Copies may be obtained from "Hach Co., P.O. Box 389, Loveland, CO 80539-0389, 800-227-4224." "AMI Turbiwell Method (SWAN Analytische Instrumente)," August 2009. A copy of the "AMI Turbiwell

Method" can be downloaded from NEMI at <http://www.nemi.gov> or obtained by contacting "Markus Bernasconi, SWAN Analytische Instrumente AG, Studbachstrasse 13, CH-8340 Hinwil, Switzerland." Some additional calibration information is given in "Technical Notes." Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin.

- (4) Analysis to determine compliance with rule 3745-81-77 of the Administrative Code shall be conducted by a person designated on a valid laboratory certificate of approval as required under rule 3745-89-03 of the Administrative Code and using the following methods:
  - (a) Alkalinity: "Standard Methods" section 2320 B or U.S. geological survey method I-1030-85.
  - (b) Magnesium: "Standard Methods" section 3111 B (eighteenth, nineteenth, twenty-first) or 3120 B (eighteenth, nineteenth, twentieth, twenty-first) or 3500 Mg B (twenty-first) or 3500-Mg E (eighteenth, nineteenth, twentieth, twenty-first) or "Standard Methods Online" section 3111 B-99 or 3120 B-99 or 3500-Mg E-97 or EMSL 94 method 200.7 Rev. 4.4 (1994) or EPA method 200.5 Rev. 4.2 (2003).
  - (c) Total organic carbon (TOC) or dissolved organic carbon (DOC): supplement to "Standard Methods" section 5310 B (nineteenth, twentieth, twenty-first) (high-temperature combustion method) or 5310 C (nineteenth, twentieth, twenty-first) (persulfate-ultraviolet or heated-persulfate oxidation method) or 5310 D (nineteenth, twentieth, twenty-first) (wet-oxidation method), or "Standard Methods Online" section 5310 B-00 or 5310 C-00 or 5310 D-00, or EPA method 415.3 Rev. 1.2, "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," August 2009 (EPA/600/R-09/122) can be accessed and downloaded on-line at <http://epa.gov/nerlcww/ordmeth.htm>. TOC samples must not be filtered prior to any analysis. Inorganic carbon must be removed from the samples prior to analysis. TOC samples must be acidified at the time of sample collection to achieve pH less than or equal to two with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified TOC samples must be analyzed within twenty-eight days. DOC samples must be filtered through the 0.45 micrometer pore-diameter filter as soon as practical after sampling, not to exceed forty-eight hours. After filtration, DOC samples must be acidified to achieve pH less than or equal to two with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified DOC samples must be analyzed within twenty-eight days of sample collection. Water passed through the filter prior to filtration of the sample must serve as the filtered blank. This filtered blank must be analyzed using the procedures identical to those used for analysis of the samples and must meet the following criteria: DOC is less than 0.5 milligrams per

liter.

- (d) Ultraviolet absorption at two hundred fifty-four nanometers (UV<sub>254</sub>). "Standard Methods" 5910 B (nineteenth, twentieth, twenty-first) or "Standard Methods Online" section 5910 B-11 (ultraviolet absorption method), or EPA method 415.3 Rev. 1.2, "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water (USEPA 2009f), can be accessed and downloaded on-line at <http://www.epa.gov/nerlcww/ordmeth.htm>. UV absorption must be measured at 253.7 nanometers, which may be rounded off to two hundred fifty-four nanometers. Prior to analysis, UV<sub>254</sub> samples must be filtered through a 0.45 micrometer pore-diameter filter. The pH of the UV<sub>254</sub> sample may not be adjusted. Samples must be analyzed as soon as practical after sampling, not to exceed forty-eight hours.
  - (e) pH: "Standard Methods" section 4500-H<sup>+</sup> B (nineteenth, twentieth, twenty-first) or "Standard Methods Online" section 4500-H<sup>+</sup> B-00 (pH value).
- (D) Analyses conducted to determine compliance with rules 3745-81-14, 3745-81-21, 3745-81-42, 3745-81-43, and 3745-81-50 to 3745-81-55 of the Administrative Code shall be conducted by a person designated on a valid laboratory certificate of approval as required under rule 3745-89-03 of the Administrative Code. The laboratory used by the system shall be certified for each method (and any associated contaminant) used for compliance monitoring analyses under rules 3745-81-50 to 3745-81-55 of the Administrative Code.

Unless otherwise noted, the following approved analytical methods are in the twenty-first or twenty-second edition of "Standard Methods for the Examination of Water and Wastewater, by the American Public Health Association, American Water Works Association, and Water Environment Control Federation, 2012," referred to as "Standard Methods":

- (1) The standard sample volume required for a total coliform analysis is one hundred milliliters. The time from sample collection to initiation of test medium incubation shall not exceed thirty hours.
  - (a) Systems are encouraged but not required to hold samples below ten degrees Celsius during transit.
  - (b) Systems need only determine the presence or absence of total coliform and *E. coli*; a determination of density is not required.
- (2) If water having residual chlorine (measured as free, combined or total chlorine) is to be analyzed, sufficient sodium thiosulfate must be added to the sample bottle before sterilization to neutralize any residual chlorine in the water sample. Dechlorination procedures are addressed in section 9060A.2 of "Standard Methods."

- (3) Total coliform analyses shall be conducted in accordance with one of the following methods:
- (a) Membrane filter (MF) technique, as set forth in "Standard Methods" section 9222 B (twenty-first edition).
  - (b) Enzyme substrate coliform test (MMO-MUG), as partially described set forth in "Standard Methods" section 9223 B and further explained in the twentieth (1998) edition of "Standard Methods" section 9223 or "Standard Methods Online" 9223 B-04. Colilert-18 is referenced as 9223 B Colilert-18 for certification purposes. Colilert-18 is available from "IDEXX Laboratories by phone at 1-800-321-0207 or online at <https://www.idexx.com/corporate/home.html>."
  - (c) Colitag, "Colitag<sup>TM</sup> Test Method for Simultaneous Detection of E.coli and other Total Coliforms in Water (ATP D-05-0035)," August 28, 2009. A copy of this method can be downloaded from NEMI at <http://www.nemi.gov> or obtained by contacting, "CPI International, 580 Skyline Boulevard, Santa Rosa, CA 95403."
  - (d) EPA method 1604, EPA 821-R-02-024, "EPA Method 1604: Total Coliforms and Escherichia coli in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium)," September 2002. A copy of this method can be downloaded from U.S. EPA at <http://www.epa.gov/microbes/documents/1604sp02.pdf>.
  - (e) "Tecta EC/TC, Presence/Absence Method for Simultaneous Detection of Total Coliforms and E. coli in Drinking Water," April 2014. Available from "Veolia Water Solutions and Technologies, Suite 4697, Biosciences Complex, 116 Barrie Street, Kinston, Ontario, Canada K7L 3N6."
  - (f) Total coliform fermentation technique, as set forth in "Standard Methods" section 9221 A, B, C (twenty-first and twenty-second editions) or "Standard Methods Online" 9221 A, B, C-06.
- (4) Until March 31, 2016, fecal coliform analysis, for cases in which membrane filter analysis gives total coliform-positive results, shall use EC medium. Nutrient EC medium preparation as set forth in "Standard Methods" section 9221 E or "Standard Methods Online" 9221 E-06.

The total coliform-positive culture is transferred by the following method:

- (a) Swab the entire membrane filter surface with a sterile swab and transfer the inoculum to EC medium (do not leave the swab in the EC medium).
- (b) Gently shake the inoculated tubes of EC medium to ensure adequate mixing and incubate in a waterbath at  $44.5 \pm 0.2$  degrees Celsius for twenty-four plus or minus two hours. Gas production of any amount in the inner fermentation tube of the EC medium indicates a positive fecal

coliform test. Public water systems need only determine the presence or absence of fecal coliforms; a determination of fecal coliform density is not required.

- (5) *Escherichia coli* (*E. coli*) analysis shall be conducted by a method identified in this paragraph. The methods identified in paragraphs (D)(5)(b) and (D)(5)(c) of this rule are the same as those identified in paragraphs (D)(3)(b) and (D)(3)(c) of this rule for total coliform analysis and allow simultaneous determination of the presence or absence of total coliforms and *E. coli* when applied to drinking water samples, but they are not approved for determining whether bacteria samples resulting from membrane filter tests contain *E. coli*.
- (a) When membrane filter analysis conducted in accordance with paragraph (D)(3)(a) of this rule results in total coliform-positive results, *E. coli* analysis shall be conducted using either a nutrient EC-MUG or NA-MUG preparation as set forth in "Standard Methods" sections 9222 G.1c(2) or 9222 G.1c(1), respectively.
- (b) Enzyme substrate coliform test (MMO-MUG), as set forth in "Standard Methods" section 9223-B. Colilert-18 is referenced as 9223-B Colilert-18 for certification purposes. Colilert-18 is available from "IDEXX Laboratories by phone at 1-800-321-0207 or online at <https://www.idexx.com/corporate/home.html>."
- (c) Colitag, "Colitag™ Test Method for Simultaneous Detection of *E. coli* and other Total Coliforms in Water (ATP D-05-0035)," August 28, 2009. A copy of this method can be downloaded from NEMI at <http://www.nemi.gov> or obtained by contacting, "CPI International, 580 Skyland Boulevard, Santa Rosa, CA 95403."
- (d) EPA method 1604, EPA 821-R-02-024, "EPA Method 1604: Total Coliforms and *Escherichia coli* in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium)," September 2002. A copy of this method can be downloaded from U.S. EPA at <http://www.epa.gov/microbes/documents/1604sp02.pdf>.
- (E) The methods listed in Table A shall be used to determine compliance with rules 3745-81-15 and 3745-81-26 of the Administrative Code (radioactivity) except in cases where alternative approaches have been approved by the United States environmental protection agency and the director.

<b>Table A. Radionuclide analytical methods.</b>						
Contaminant	Methodology	Reference (method or page number)				
		EPA <sup>1</sup>	EPA <sup>2</sup>	EPA <sup>3</sup>	EPA <sup>4</sup>	SM <sup>5</sup>
Gross alpha <sup>6</sup>	Evaporation	900.0	p 1	00-01	p 1	302, 7110

and beta.						B, 7110 B-00
Gross alpha <sup>6</sup>	Co-precipitation			00-02		7110 C, 7110 C-00
Radium 226	Radon emanation	903.1	p 16	Ra-04	p 19	7500-Ra C, 305
	Radio chemical	903.0	p 13	Ra-03		304, 7500-Ra B
Radium 228	Radio chemical	904.0	p 24	Ra-05	p 19	7500-Ra D, 7500_Ra D-01
Uranium <sup>7</sup>	Radio chemical	908.0				7500-U B, 7500-U B-00
	Fluorometric	908.1				7500-U C
	Alpha spectrometry			00-07	p 33	7500-U C, 7500-U C-00
Radioactive cesium	Radio chemical	901.0	p 4			7500-Cs B, 7500-Cs B-00
	Gamma ray spectrometry	901.1			p 92	7120, 7120-97
Radioactive iodine	Radio chemical	902.0	p 6 p 9			7500-I B, 7500-I C, 7500 I-D, 7500-I D-00
	Gamma ray spectrometry	901.1			p 92	7120, 7120-97
Radioactive Strontium 89, 90	Radio chemical	905.0	p 29	Sr-04	p 65	303, 7500-Sr BH B-00
Tritium	Liquid scintillation	906.0	p 34	H-02	p 87	306, 7500- <sup>3</sup> H B, 7500- <sup>3</sup> H B-00
Gamma emitters	Gamma ray Spectrometry	901.1			p 92	7120,7120-97
		902.0 901.0				7500-Cs B, 7500-I B



- <sup>1</sup> "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA 600/4-80-032, August 1980. Available at "U.S. Department of Commerce, National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 (Telephone 800-553-6847), PB 80-224744."
  - <sup>2</sup> "Interim Radiochemical Methodology for Drinking Water," EPA 600/4-75-008 (revised), March 1976. Available at NTIS, *ibid.* PB 253258.
  - <sup>3</sup> "Radiochemistry Procedures Manual," EPA 520/5-84-006, December 1987. Available at NTIS, *ibid.* PB 84-215581.
  - <sup>4</sup> "Radiochemical Analytical Procedures for Analysis of Environmental Samples," March 1979. Available at NTIS, *ibid.* EMSL LV 053917.
  - <sup>5</sup> "Standard Methods for the Examination of Water and Wastewater," thirteenth, seventeenth, eighteenth, nineteenth, twentieth, twenty-first and twenty-second editions, 1971, 1989, 1992, 1995, 1998, 2006 and 2012. Available at "American Public Health Association, 1015 Fifteenth Street N.W., Washington, D.C. 20005." Online versions of "Standard Methods for the Examination of Water and Wastewater" are available at <http://www.standardmethods.org/>. The approval year assigned by the "Standard Methods Committee" is designated by the last two digits of the method number. All methods are in the seventeenth, eighteenth, nineteenth and twentieth editions except 7500-U C Fluorometric Uranium was discontinued after the seventeenth edition, 7120 Gamma Emitters is only in the nineteenth and twentieth editions, and 302, 303, 304, 305 and 306 are only in the thirteenth edition.
  - <sup>6</sup> Natural uranium and thorium-230 are approved as gross alpha calibration standards for gross alpha with co-precipitation and evaporation methods; americium-241 is approved with co-precipitation methods.
  - <sup>7</sup> If uranium (U) is determined by mass, a 0.67 pCi/μg of uranium conversion factor must be used. This conversion factor is based on the 1:1 activity ratio of U-234 to U-238 that is characteristic of naturally occurring uranium.
- (F) Analyses for water quality parameters required by rule 3745-81-87 of the Administrative Code shall be made in accordance with methods listed in paragraph (A) of this rule for calcium, orthophosphate, and silica and shall be made in accordance with methods listed in paragraph (C) of this rule for alkalinity, conductivity, pH, and temperature. As long as the methods are properly followed, these analyses do not have to be performed in a laboratory approved by the director nor does the person performing these analyses have to be designated on a valid laboratory certificate of approval.
- (G) Analytical techniques alternative to those of this rule may be used only with the written approval of the director, concurred in by the administrator of the United States environmental protection agency. An alternative technique shall be acceptable only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any

maximum contaminant level or monitoring requirements. The use of an alternative analytic technique shall not decrease the frequency of monitoring required by this chapter.

- (H) *Cryptosporidium*. The following requirements apply to source water monitoring conducted in accordance with rules 3745-81-64 to 3745-81-69 of the Administrative Code.

Systems shall analyze for *Cryptosporidium* using method 1623: "Cryptosporidium and Giardia in Water by Filtration/IMS/FA," 2005, United States environmental protection agency, EPA-815-R-05-002, method 1623.1: "Cryptosporidium and Giardia in Water by Filtration/IMS/FA," 2012, United States environmental protection agency, EPA 816-R-12-001, or method 1622, "Cryptosporidium in Water by Filtration/IMS/FA," 2005, United States environmental protection agency, EPA-815-R-05-001, which are incorporated by reference. The director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 C.F.R. part 51. A copy of these methods may be obtained online from <http://www.epa.gov/safewater/disinfection/lt2> or from the United States environmental protection agency, office of ground water and drinking water, 1201 Constitution Ave., NW, Washington, DC 20460 (Telephone: 800-426-4791). A copy may be inspected at the "Water Docket in the EPA Docket Center, 1301 Constitution Ave., NW, Washington, DC, (Telephone: 202-566-2426)" or at the "National Archives and Records Administration (NARA)." For information on the availability of this material at NARA, call 202-741-6030, or go to: [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html).

- (1) Systems shall analyze at least a ten liter sample or a packed pellet volume of at least two milliliters as generated by the methods listed in paragraph (H) of this rule. Systems unable to process a ten liter sample must analyze as much sample volume as can be filtered by two filters approved by EPA for the methods listed in paragraph (H) of this rule, up to a packed pellet volume of at least two milliliters.
- (2) Matrix spike (MS) samples, as required by the methods in paragraph (H) of this rule, shall be spiked and filtered by a laboratory approved for *Cryptosporidium* analysis in accordance with rule 3745-89-11 of the Administrative Code.
- (3) If the volume of the MS sample is greater than ten liters, the system may filter all but ten liters of the MS sample in the field, and ship the filtered sample and the remaining ten liters of source water to the laboratory. In this case, the laboratory shall spike the remaining ten liters of water and filter it through the filter used to collect the balance of the sample in the field.
- (4) Flow cytometer-counted spiking suspensions shall be used for MS samples and ongoing precision and recovery (OPR) samples.

- (I) E. coli. The following requirements apply to source water monitoring conducted in accordance with rules 3745-81-64 to 3745-81-69 of the Administrative Code:

Systems shall use methods for enumeration of E. coli in source water as approved in 40 C.F.R. 136.3(a).

- (1) The time from sample collection to initiation of analysis shall not exceed eight hours unless the system meets the condition of paragraph (I)(2) of this rule.
  - (2) The director may accept on a case-by-case basis the holding of an E. coli sample for up to forty-eight hours between sample collection and initiation of analysis if the director determines that analyzing an E. coli sample within thirty hours is not feasible. E. coli samples held between thirty to forty-eight hours shall be analyzed by the Colilert reagent version of standard method 9223 B as listed in 40 C.F.R. 136.3(a).
  - (3) Systems shall maintain samples between zero degrees Celsius and ten degrees Celsius during storage and transit to the laboratory.
- (J) Turbidity. Source water monitoring conducted in accordance with rules 3745-81-64 to 3745-81-69 of the Administrative Code, shall use methods for turbidity measurement approved in paragraph (C)(3) of this rule.
- (K) Ground water rule, assessment source water monitoring. The methods listed in Table B shall be used to determine compliance with rule 3745-81-42 of the Administrative Code (ground water source microbial monitoring and analytical methods).

**Table B. Analytical methods for assessment source water monitoring.**

Fecal Indicator <sup>1</sup>	Methodology	Method Citation
E.coli	Colilert <sup>3</sup>	9223 B <sup>2</sup>
	Colisure <sup>3</sup>	9223 B <sup>2</sup>
	Membrane Filter Method with MI Agar	EPA Method 1604 <sup>4</sup>
	m-ColiBlue24 Test <sup>6</sup>	
	E*Colite Test <sup>6</sup>	
	EC-MUG <sup>7</sup>	9221 F <sup>2</sup>
	NA-MUG <sup>7</sup>	9222 G <sup>2</sup>
	Readycult <sup>12</sup>	
	Colitag <sup>TM, 13</sup>	
	Chromocult <sup>14</sup>	
	Tecta EC/TC <sup>15</sup>	

**Table B. Analytical methods for assessment source water monitoring.**

Enterococci	Multiple-Tube Technique	9230 B <sup>2</sup>
	Membrane Filter Technique	9230 C <sup>2</sup>
	Membrane Filter Technique	EPA Method 1600 <sup>8</sup>
	Enterolert <sup>9</sup>	
Coliphage	Two-Step Enrichment Presence-Absence Procedure	EPA Method 1601 <sup>10</sup>
	Single Agar Layer Procedure	EPA Method 1602 <sup>11</sup>

(Analyses using methods in Table B shall be conducted in accordance with the documents listed below.)

- <sup>1</sup> The time from sample collection to initiation of analysis may not exceed thirty hours. The ground water system is encouraged but is not required to hold samples below ten degrees Celsius during transit.
- <sup>2</sup> Methods are described in "Standard Methods for the Examination of Water and Wastewater," twentieth, twenty-first and twenty-second editions, published 1998, 2006 and 2012, respectively. Copies may be obtained from the "American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005-2605." Online versions of "Standard Methods" are available at <http://www.standardmethods.org/>.
- <sup>3</sup> Medium is available through "IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092."
- <sup>4</sup> EPA method 1604: "Total Coliforms and Escherichia coli in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium); September 2002, EPA 821-R-02-024." Method is available at <http://www.epa.gov/microbes/documents/1604sp02.pdf> or from "EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW, Washington DC 20460."
- <sup>5</sup> A description of the m-ColiBlue24 Test, "Total Coliforms and E. coli Membrane Filtration Method with m-ColiBlue24 Broth," method number 10029 Rev.2, August 17, 1999, is available from "Hach Company, 100 Dayton Ave., Ames, IA 50010" or from "EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460."
- <sup>6</sup> A description of the E\*Colite Test, "Charm E\*Colite Presence/Absence Test for Detection and Identification of Coliform Bacteria and Escherichia coli in Drinking

Water," January 9, 1998 is available from "Charm Sciences, Inc., 659 Andover St., Lawrence, MA 01843-1032 or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460."

- <sup>7</sup> EC-MUG (method 9221 F) or NA-MUG (method 9222 G) can be used for E. coli testing steps as described in 40 C.F.R 141.21 (f)(6)(i) and 40 C.F.R. 141.21 (f)(6)(ii) after use of standard methods 9221 B, 9221 D, 9222 B, or 9222 C.
- <sup>8</sup> EPA method 1600: "Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl-beta-D-Glucoside Agar (mEI) EPA 821-R-02-022 (September 2002)" is an approved variation of standard method 9230 C. The method is available at <http://www.epa.gov/nerlcwww/1600sp02.pdf> or from "EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460." The holding time and temperature for ground water samples are specified in footnote 1 above, rather than as specified in Section 8 of EPA Method 1600.
- <sup>9</sup> Medium is available through "IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092." Preparation and use of the medium is set forth in the article "Evaluation of Enterolert for Enumeration of Enterococci in Recreational Waters," by Budnick, G.E., Howard, R.T., and Mayo, D.R., 1996 "Applied and Environmental Microbiology, 62:3881-2884."
- <sup>10</sup> EPA method 1601: "Male-specific (F+) and Somatic Coliphage in Water by Two-step Enrichment Procedure; April 2001, EPA 821-R-01-030." Method is available at <http://www.epa.gov/nerlcwww/1601ap01.pdf> or from "EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460."
- <sup>11</sup> EPA method 1602: "Male-specific (F+) and Somatic Coliphage in Water by Single Agar Layer (SAL) Procedure; April 2001, EPA 821-R-01-029." Method is available at <http://www.epa.gov/nerlcwww/1602ap01.pdf> or from "EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460."
- <sup>12</sup> Readycult method, "Readycult Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and Escherichia coli in Finished Waters," January, 2007. Version 1.1. Available from "EMD Chemicals (affiliate of Merck KGaA, Darmstadt, Germany), 480 S Democrat road, Gibbstown, NJ 08027-1297."
- <sup>13</sup> Colitag<sup>TM</sup>; method, "Colitag<sup>TM</sup> Test Method for the Simultaneous Detection of E. coli and other Total Coliforms in Water (ATP D05-0035)," August 28, 2009. Available at <http://www.nemi.gov> or from "CPI international, 5580 Skylane Boulevard, Santa Rosa, CA 95403."
- <sup>14</sup> Chromocult method, "Chromocult Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and Escherichia coli in Finished Waters," November, 2000. Version 1.0. "EMD chemicals (affiliate of Merck KGaA, Darmstadt, Germany), 480 S. Democrat

road, Gibbstown, NJ 08027-1297."

- <sup>15</sup> "Tecta EC/TC, Presence/Absence Method for Simultaneous Detection of Total Coliforms and E. coli in Drinking Water," April 2014. Available from "Veolia Water Solutions and Technologies, Suite 4697, Biosciences Complex, 116 Barrie Street, Kingston, Ontario, Canada K7L 3N6."

[Comment: The inorganic chemical analysis methods are described in books and manuals referred to in this rule as "Standard Methods," "Technical Notes," EMSL94, and EMSL93. The United States environmental protection agency books and manuals are available from the "National Technical Information Service (or NTIS), United States Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161," with telephone number 800-553-6847. A copy of the eighteenth, nineteenth, twentieth, twenty-first or twenty-second edition of standard methods may be obtained from "AWWA Bookstore, 6666 W Quincy Avenue, Denver, CO, 80235-3098," telephone number 303-795-7711. These documents are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215-3425." USEPA books and manuals are also available from the "National Service Center for Environmental Publications (or NSCEP), P.O. Box 42419, Cincinnati, Ohio 45242-0419," or <http://www.epa.gov/nscep>.]

[Comment: The organic chemical analysis methods referred to in this rule are included in manuals prepared by the "United States Environmental Protection Agency (USEPA) National Exposure Research Laboratory (NERL) - Cincinnati." These manuals may be purchased from the "National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161," with telephone number 800-553-6847. They are also available to government agencies from "ORD Publications, 26 West MLK Drive, Cincinnati, Ohio 45268-1072," with telephone number 513-569-7562 or 800-490-9198. These documents are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215-3425." USEPA books and manuals are also available from the "National Service Center for Environmental Publications (or NSCEP), P.O. Box 42419, Cincinnati, Ohio 45242-0419," or <http://www.epa.gov/nscep>.]

[Comment: Except as otherwise noted in this rule, the approved microbiological analytical methods referred to in this rule are the eighteenth, nineteenth, twentieth, twenty-first or twenty-second edition of "Standard Methods for the Examination of Water and Wastewater, by the American Public Health Association, American Water Works Association, and Water Pollution Control Federation," dated 1992, 1995 and 1998 respectively. A copy of the eighteenth, nineteenth, twentieth, twenty-first or twenty-second edition of Standard Methods may be obtained from "AWWA Bookstore, 6666 W Quincy Avenue, Denver, CO, 80235-3098," (303) 795-2114. These documents are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215-3425." A copy of the colisure test may be obtained from "Millipore Corporation, Technical Services Department, 80 Ashby Road, P.O. Box 9125, Bedford, Massachusetts 01730-9125," 800-645-5476. This document is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215-3425."]

Effective: 05/04/2015

R.C. 106.03 review dates: 01/05/2015 and 05/04/2020

Promulgated Under: 119.03

Statutory Authority: 6109.03, 6109.04

Rule Amplifies: 6109.04

Prior Effective Dates: 12/27/78, 5/22/89, 12/31/90, 9/13/93, 4/1/96, 1/1/02, 6/28/03, 10/13/08, 1/8/10, 10/31/10

**3745-81-28 Acceptability of analytical results.**

Analytical results for the purpose of determining compliance with this chapter may be considered only if they have been determined and reported by a laboratory certified by or otherwise acceptable to the director under Chapter 3745-89 of the Administrative Code, except that measurements for free, total, or combined chlorine residual may be performed by any person acceptable to the director and reported to the director by the public water system.

Effective date: November 1, 2004

RC 119.032 review dates: 08/03/2014 and 04/24/2019

Promulgated under: RC Chapter 119

Rule authorized by: RC Section 6109.04

Rule amplifies: RC Section 6109.04

Prior effective dates: 12/27/78, 5/22/89, 04/01/99



**3745-81-29. Monitoring of consecutive public water systems.**

When a public water system supplies water to one or more other public water systems, the director may modify the monitoring requirements imposed by this chapter to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the director and concurred in by the administrator of the U.S. environmental protection agency.

Effective: December 27, 1978

Promulgated under: Section 3, Am. Sub. S.B. 445 112th General Assembly  
Rule amplifies: RC Section 6109.04

**Reporting requirements for public water systems.**

- (A) Except where a different reporting period is specified in this chapter, the public water system is responsible for ensuring that the results of a test, measurement, or analysis required to be made by this chapter are reported to the director within the first ten days following the month in which the result is received for that test, measurement, or analysis or within the first ten days following the end of the required monitoring period as specified by the director, whichever occurs first.
- (B) The director may invalidate sample results that do not contain complete and accurate sample location information, as well as results of obvious sampling or analytical error.
- (C) The public water system shall report to the director within forty-eight hours the failure to comply with any requirement of state primary drinking water rules, unless otherwise stated in this chapter that the director will determine compliance.

Effective: 01/01/2010

R.C. 119.032 review dates: 01/01/2015 and 01/29/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.04

Prior Effective Dates: 12/27/78, 9/13/93, 4/1/1999

3745-81-32      **Public notification.**

(A) General requirements for public notification by public water systems.

- (1) The owner or operator of a public water system shall provide public notice to persons served by that public water system in accordance with this rule. Public water systems that sell or otherwise provide drinking water to other public water systems (i.e., to consecutive systems) are required to give public notice in accordance with this rule to the owner or operator of the consecutive system; the consecutive system is responsible for providing public notice in accordance with this rule to the persons it serves.
- (2) If a community public water system has a violation in a portion of the distribution system that is physically or hydraulically isolated from other parts of the distribution system as described in the emergency contingency plan required by Chapter 3745-85 of the Administrative Code, the director may allow the system to limit distribution of the public notice to only persons served by that portion of the system which is out of compliance. Permission for limited distribution shall be granted in writing by the director.
- (3) The public water system, within ten days of completing the public notification requirements under this rule for the initial public notice and any repeat notices, shall submit to the director a completed verification form indicating that the system has fully complied with the public notification regulations. The public water system shall include with this certification a representative copy of each type of notice distributed, published, posted and made available to the persons served by the system and to the media.

(B) Tier 1 public notification requirements.

- (1) The owner or operator of a public water system with any of the following violations or situations that may pose an acute risk to human health, shall notify the persons served by the public water system in accordance with paragraph (B)(3) of this rule:
  - (a) Any violation or situation specified by the director as posing an acute risk to human health including, but not limited to, situations revealed through a level one assessment or level two assessment conducted pursuant to rule 3745-81-53 of the Administrative Code.
  - (b) Violation of the maximum contaminant level (MCL) for nitrate and nitrite as established in rule 3745-81-11 of the Administrative Code and determined according to rule 3745-81-23 of the Administrative Code.
  - (c) Until March 31, 2016, violation of the maximum contaminant level for total coliforms, as specified in paragraph (C) of rule 3745-81-14 of the Administrative Code.
  - (d) Until March 31, 2016, violation of monitoring and reporting repeat samples for total coliforms, as specified in paragraph (B) of rule 3745-81-21 of the

Administrative Code.

- (e) Beginning April 1, 2016, violation of the maximum contaminant level for *Escherichia coli* (*E. coli*), as specified in paragraph (D) of rule 3745-81-14 of the Administrative Code.
  - (f) Occurrence of a waterborne disease outbreak in a public water system, as defined in rule 3745-81-01 of the Administrative Code, or waterborne emergency as specified by the director.
  - (g) Violation of the maximum residual disinfectant level (MRDL) for chlorine dioxide as defined in rule 3745-81-10 of the Administrative Code and determined according to rule 3745-81-70 of the Administrative Code.
  - (h) Exceedance of the turbidity level in representative samples of filtered water as specified in paragraph (E) of rule 3745-81-75 of the Administrative Code and one or more of the following occurs:
    - (i) The public water system fails to consult with the director within twenty-four hours after learning of the violation.
    - (ii) Any failure in an individual treatment process where the treatment process does not operate as designed and approved.
    - (iii) The director determines after consultation that a Tier 1 notice is required.
  - (i) Public water systems with a fecal indicator-positive ground water source sample collected under paragraph (A) or (B) of rule 3745-81-42 of the Administrative Code. This requirement also applies to consecutive systems supplied by the ground water source.
- (2) The owner or operator of a public water system with a physical or operational disruption shall notify the persons served in the affected area of the public water system in accordance with paragraph (B)(3) of this rule when any sample (including special purpose samples) taken after minimum pressure falls below twenty pounds per square inch gauge at ground level and within the affected area of disruption is determined to be *E. coli* positive or fecal coliform positive.
- (a) Tier 1 notice is not required if the system issued a precautionary notice as approved by the director through the public water system's contingency plan required by Chapter 3745-85 of the Administrative Code and a follow-up notice identifying the *E. coli* or fecal coliform results is issued to persons who received the preliminary notice.
  - (b) The Tier 1 notice shall remain in effect until total coliforms are not detected in consecutive samples collected twenty-four hours apart. The number of samples to be collected each day must be representative of the affected area, but shall not be less than two samples per day.
- (3) Public water systems shall do all of the following:

- (a) Provide a public notice as soon as practical but no later than twenty-four hours after the system learns of the violation or situation, using one or more of the following forms of delivery in order to reach all persons served.
    - (i) Appropriate broadcast media (such as radio and television).
    - (ii) Posting of the notice in conspicuous locations throughout the area served by the water system.
    - (iii) Hand delivery of the notice to persons served by the water system.
    - (iv) Another delivery method approved in writing by the director.
  - (b) Initiate consultation with the director as soon as practical, but no later than twenty-four hours after the public water system learns of the violation or situation, to determine additional public notice requirements.
  - (c) Comply with any additional public notification requirements (including any repeat notices or direction on the duration of the posted notices) that are established as a result of the consultation with the director. Such requirements may include the timing, form, manner, frequency, and content of repeat notices (if any) and other actions designed to reach all persons served.
- (C) Tier 2 public notification requirements.
- (1) The owner or operator of a public water system with any of the following violations or situations shall notify the persons served by the public water system in accordance with paragraph (C)(2) of this rule:
    - (a) All violations of the MCL, MRDL, and treatment technique requirements pursuant to this chapter, except those specified in paragraph (B)(1) of this rule.
    - (b) Failure to collect any three samples of source water monitoring as specified in paragraph (C) of rule 3745-81-65 of the Administrative Code for the "Long Term 2 Enhanced Surface Water Treatment Rule."
    - (c) Failure to determine and report bin classification or mean *Cryptosporidium* level required by paragraphs (A) to (D) of rule 3745-81-65 of the Administrative Code for the "Long Term 2 Enhanced Surface Water Treatment Rule."
    - (d) Any other violation or situation specified by the director.
  - (2) Public water systems shall do all of the following:
    - (a) Provide a public notice as soon as practical, but no later than thirty days after the system learns of the violation or situation.
      - (i) Community public water systems shall provide notice using the following forms of delivery in order to reach all persons served:
        - (A) At least, mail or other direct delivery to each customer receiving a bill and

to other service connections to which water is delivered by the public water system.

- (B) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in paragraph (C)(2)(a)(i)(a) of this rule. Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places served by the system or on the Internet; or delivery to community organizations. If the public notice is posted, the notice shall remain in place for as long as the violation or situation persists, but in no case for less than seven days, even if the violation or situation is resolved.
- (ii) Noncommunity public water systems shall provide notice using the following forms of delivery in order to reach all persons served:
- (A) At least, posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known). If the public notice is posted, the notice shall remain in place for as long as the violation or situation persists, but in no case for less than seven days, even if the violation or situation is resolved.
  - (B) Any other method reasonably calculated to reach other persons served by the system if they would not normally be reached by the notice required in paragraph (C)(2)(a)(ii)(a) of this rule. Such persons may include those served who may not see a posted notice because the posted notice is not in a location they routinely pass by. When the persons served are children, such as in schools, their parents or legal guardians shall be notified. Other methods may include: publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students and parents or legal guardians; or delivery of multiple copies in central locations (e.g., community centers).
- (b) The public water system shall repeat the notice every three months as long as the violation or situation persists, unless the director determines that appropriate circumstances warrant a different repeat notice frequency. In no circumstances may the repeat notice be given less frequently than once per year. Less frequent repeat public notices shall not be allowed for an MCL or treatment technique violation under rule 3745-81-14 or 3745-81-54 of the Administrative Code or a treatment technique violation under rules 3745-81-64 to 3745-81-74 of the Administrative Code. Permission to issue repeat notices less frequently than once every three months must be granted in writing by the director.

- (c) For turbidity violations specified in paragraph (E) of rule 3745-81-75 of the Administrative Code, public water systems shall consult with the director as soon as practical but no later than twenty-four hours after the public water system learns of the violation. When the director determines after consultation that a Tier 1 notice is required, or when consultation does not take place within the twenty-four hour period, the water system shall distribute notice of the violation within the next twenty-four hours (i.e., no later than forty-eight hours after the system learns of the violation) in accordance with paragraph (B) of this rule.

(D) Tier 3 public notification requirements.

- (1) The owner or operator of a public water system with any of the following violations or situations shall notify the persons served by the public water system in accordance with paragraphs (D)(2) and (D)(3) of this rule:
  - (a) Violations of the monitoring and testing procedure requirements pursuant to this chapter.
  - (b) Exceedance of the fluoride secondary maximum contaminant level (SMCL) as specified in Chapter 3745-82 of the Administrative Code.
  - (c) Availability of unregulated contaminant monitoring results, as required by 40 C.F.R. Section 141.207 (May 4, 2000).
  - (d) Reporting and recordkeeping violations under rules 3745-81-50 to 3745-81-55 of the Administrative Code.
  - (e) Any other violation or situation specified by the director.
- (2) Community public water systems shall provide notice as soon as practical, but no later than one year after the public water system learns of the violation or situation. The following forms of delivery shall be used in order to reach all persons served:
  - (a) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system.
  - (b) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in paragraph (D)(2)(a) of this rule. Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places or on the Internet; or delivery to community organizations. If the public notice is posted, the notice shall remain in place for as long as the violation or other situation persists, but in no case less than seven days (even if the violation or situation is resolved).

- (c) The consumer confidence report (CCR) required under Chapter 3745-96 of the Administrative Code may be used as a vehicle for the initial public notice and all required repeat notices, as long as all of the following is met:
    - (i) The CCR is provided to persons served within the time frames specified in paragraph (D)(2) of this rule.
    - (ii) The notice contained in the CCR follows the content requirements under this rule.
    - (iii) The CCR is distributed following the delivery requirements in this rule.
  - (3) Noncommunity water systems shall provide notice as soon as practical, but no later than thirty days after the public water system learns of the violation or situation. The following forms of delivery shall be used in order to reach all persons served:
    - (a) Posting the notice in conspicuous locations through the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known). If the public notice is posted, the notice shall remain in place for as long as the violation or other situation persists, but in no case less than seven days (even if the violation or situation is resolved).
    - (b) Any other method reasonably calculated to reach other persons served by the system, if they would not normally be reached by the notice required in paragraph (D)(3)(a) of this rule. Such persons may include those who may not see a posted notice because the notice is not in a location they routinely pass by. When the persons served are children, such as in schools, their parents or legal guardians shall be notified. Other methods may include: publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students and parents or legal guardians; or, delivery of multiple copies in central locations (e.g., community centers).
  - (4) For methods other than posting, the public water system shall repeat the notice annually for as long as the violation or other situation persists.
  - (5) For violations of the fluoride SMCL, the public water system shall send a copy of the notice to the local health department and the "Ohio Department of Health, Bureau of Oral Health Services."
- (E) Content of public notices.
- (1) Each public notice, except the public notice required in paragraphs (C)(1)(b) and (C)(1)(c) of this rule, shall include all of the following elements:
    - (a) A description of the violation or situation, including the of concern, the MCL, and (as applicable) the contaminant level.
    - (b) When the violation or situation occurred.



- (c) Any potential adverse health effects from the violation or situation, including one or both of the following:
    - (i) Standard health effects language specified in table 1 of this rule, including the language necessary to fill in the blanks, for MCL, MRDL, treatment technique or fluoride SMCL exceedances.
    - (ii) Standard language for monitoring and testing procedure violations, including the language necessary to fill in the blanks: "We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not your drinking water meets health standards. During [compliance period], we "did not monitor or test" or "did not complete all monitoring or testing" for [contaminant(s)], and therefore cannot be sure of the quality of your drinking water during that time."
  - (d) The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water.
  - (e) Whether alternative water supplies should be used.
  - (f) What actions consumers should take, including when they should seek medical help, if known.
  - (g) What the system is doing to correct the violation or situation.
  - (h) When the water system expects to return to compliance or resolve the situation.
  - (i) The name, business address, and phone number of the water system owner, operator, or designee of the public water system as a source of additional information concerning the notice.
  - (j) A statement to encourage the notice recipient to distribute the public notice to other persons served, using the following standard language: "Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail."
- (2) Each public notice required by paragraphs (C)(1)(b) and (C)(1)(c) of this rule shall include all of the following elements:
- (a) The public notice for repeated failure to conduct monitoring as specified in paragraph (C)(1)(b) of this rule shall contain the following language:

"We are required to monitor the source of your drinking water for *Cryptosporidium*. Results of the monitoring are to be used to determine whether water treatment at the [treatment plant name] is sufficient to adequately remove *Cryptosporidium* from your drinking water. We are required to complete this monitoring and make this determination by [required bin determination date]. We

did not monitor or test or did not complete all monitoring or testing on schedule and, therefore, we may not be able to determine by the required date what treatment modifications, if any, must be made to ensure adequate Cryptosporidium removal. Missing this deadline may, in turn jeopardize our ability to have the required treatment modifications, if any, completed by the deadline required, [date]."

"For more information, please call [contact name] of [public water system name] at [phone number]."

- (b) The public notice for failure to determine bin classification or mean Cryptosporidium level as specified in paragraph (C)(1)(c) of this rule shall contain the following language:

"We are required to monitor the source of your drinking water for Cryptosporidium in order to determine by [date] whether water treatment at the [public water system name] is sufficient to adequately remove Cryptosporidium from your drinking water. We have not made this determination by the required date. Our failure to do this may jeopardize our ability to have the required treatment modifications, if any, completed by the required deadline of [date]. For more information, please call [contact name] of [public water system name] at [phone number]."

- (c) Each public notice must also include a description of what the system is doing to correct the violation and when the system expects to return to compliance or resolve the situation.

(3) Presentation of the public notice.

- (a) Each public notice required by this section shall meet all of the following:

- (i) Shall be displayed in a conspicuous way when printed or posted.
- (ii) Shall not contain overly technical language or very small print.
- (iii) Shall not be formatted in a way that defeats the purpose of the notice.
- (iv) Shall not contain language which nullifies the purpose of the notice.

- (b) For public water systems serving a large proportion of non-English speaking consumers, defined as ten per cent or more of the residents speaking the same non-English language, the public notice shall contain information in the appropriate language regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the notice or to request assistance in the appropriate language.

(4) Notice to new billing units or new customers.

- (a) Community water systems shall give a copy of the most recent public notice for any

continuing violation, or other ongoing situations requiring a public notice to all new billing units or new customers prior to or at the time service begins.

- (b) Noncommunity water systems shall continuously post the public notice in conspicuous locations in order to inform new consumers of any continuing violation or other situation requiring a public notice for as long as the violation or other situation persists.

- (F) The director may give the notice required by this rule when the owner or operator of a public water system fails or refuses to comply with this rule. However, the owner or operator of a public water system remains responsible for ensuring that this rule is satisfied.

Table 1: Standard Health Effects Language for Public Notification	
Contaminant	Standard Health Effects Language for Public Notification
A. Microbiological Contaminants	
1a. Total coliform †	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
1b. Fecal coliform/E. coli †	Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
1c. Fecal indicators Ground Water Rule (GWR): E. coli, enterococci, or coliphage	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
1d. GWR, Treatment Technique Violations	Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms can cause symptoms such as diarrhea, nausea, cramps, and associated headaches.

1e. Revised Total Coliform Rule (RTCR), Coliform Assessment and Corrective Action Violations ‡	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessments to identify problems and to correct any problems that were found. [The system shall use the following applicable sentences.] We failed to conduct the required assessment. We failed to correct all identified significant deficiencies that were found during the assessment.
1f. RTCR, E. coli Assessment and/or Corrective Action Violations ‡	E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We violated the standard for E. coli, indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct a detailed assessment to identify problems and to correct any problems that are found. [The system shall use the following applicable sentences.] We failed to conduct the required assessment. We failed to correct all identified significant deficiencies that were found during the assessment that we conducted.
1g. E. coli ‡	E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems.
1h. RTCR, Seasonal System TT Violations ‡	When this violation includes the failure to monitor for total coliforms or E. coli prior to serving water to the public, the standard language found in paragraph (E)(1)(c)(ii) of this rule shall be used. When this violation includes failure to complete other actions, the appropriate elements found in paragraph (E)(1) of this rule to describe the violation shall be used.
2. Turbidity	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for

	microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
B. Surface Water Treatment Rule <sup>1</sup> , Interim Enhanced Surface Water Treatment Rule <sup>2</sup> , Long Term 1 Enhanced Surface Water Treatment Rule <sup>3</sup> , and Filter Backwash Recycling Rule <sup>4</sup> Violations.	
3. Giardia lamblia <sup>5</sup>	Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.
4. Viruses <sup>5</sup>	
5. Heterotrophic plate count (HPC) bacteria <sup>6</sup>	
6. Legionella <sup>5</sup>	
7. Cryptosporidium <sup>5</sup>	
C. Inorganic Chemicals (IOCs)	
8. Antimony	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
9. Arsenic	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
10. Asbestos (>10 em)	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
11. Barium	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
12. Beryllium	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
13. Cadmium	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
14. Chromium (total)	Some people who use water containing chromium well in excess of the MCL over many years could experience

	allergic dermatitis.
15. Cyanide (as free cyanide)	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.
16a. Fluoride (MCL)	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining or pitting of the teeth, and occurs only in developing teeth, before they erupt from the gums.
16b. Fluoride (Secondary MCL)	This is an alert about your drinking water and a cosmetic dental problem that might affect children under nine years of age. At low levels, fluoride can help prevent cavities, but children drinking water containing more than 2 milligrams per liter (mg/L) of fluoride may develop cosmetic discoloration of their permanent teeth (dental fluorosis). The drinking water provided by your public water system [name] has a fluoride concentration of [insert value] mg/L. Dental fluorosis, in its moderate or severe forms, may result in a brown staining and/or pitting of the permanent teeth. This problem occurs only in developing teeth, before they erupt from the gums. Children under nine should be provided with alternative sources of drinking water or water that has been treated to remove the fluoride to avoid the possibility of staining and pitting of their permanent teeth. You may also want to contact your dentist about proper use by young children of fluoride-containing products. Older children and adults may safely drink the water. Drinking water containing more than 4 mg/L of fluoride (the U.S. Environmental Protection Agency's drinking water standard) can increase your risk of developing bone disease. Your drinking water does not contain more than 4 mg/L of fluoride, but we're required to notify you when we discover that the fluoride levels in your drinking water exceed 2 mg/L because of this cosmetic dental problem. For more information,

	please call [name of water system contact] of [name of water system] at [phone number]. Some home water treatment units are also available to remove fluoride from drinking water. To learn more about available home water treatment units, you may call NSF International at 1-877-8-NSF-HELP.
17. Mercury (inorganic)	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
18. Nitrate	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
19. Nitrite	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
20. Total Nitrate and Nitrite	Infants below the age of six months who drink water containing nitrate and nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
21. Selenium	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
22. Thallium	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.
<b>D. Lead and Copper</b>	
23. Lead	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
24. Copper	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level

	over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
E. Synthetic Organic Chemicals (SOCs)	
25. 2,4-D	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
26. 2,4,5-TP (Silvex)	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
27. Alachlor	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
28. Atrazine	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
29. Benzo(a)pyrene (PAHs)	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
30. Carbofuran	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
31. Chlordane	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver, or nervous system, and may have an increased risk of getting cancer.
32. Dalapon	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
33. Di (2-ethylhexyl) adipate	Some people who drink water containing di (2-ethylhexyl) adipate well in excess of the MCL over many years could experience general toxic effects or



	reproductive difficulties.
34. Di (2-ethylhexyl) phthalate	Some people who drink water containing di (2-ethylhexyl) phthalate in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
35. Dibromochloropropane (DBCP)	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
36. Dinoseb	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
37. Dioxin (2,3,7,8-TCDD)	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
38. Diquat	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
39. Endothall	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
40. Endrin	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
41. Ethylene dibromide	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
42. Glyphosate	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
43. Heptachlor	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
44. Heptachlor epoxide	Some people who drink water containing heptachlor

	epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.
45. Hexachlorobenzene	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
46. Hexachlorocyclopentadiene	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
47. Lindane	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
48. Methoxychlor	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
49. Oxamyl (Vydate)	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
50. Pentachlorophenol	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
51. Picloram	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
52. Polychlorinated biphenyls (PCBs)	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
53. Simazine	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
54. Toxaphene	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems

	with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.
F. Volatile Organic Chemicals (VOCs)	
55. Benzene	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
56. Carbon tetrachloride	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
57. Chlorobenzene (monochlorobenzene)	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.
58. o-Dichlorobenzene	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.
59. p-Dichlorobenzene	Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
60. 1,2-Dichloroethane	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
61. 1,1-Dichloroethylene	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
62. cis-1,2-Dichloroethylene	Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
63. trans-1,2-Dichloroethylene	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
64. Dichloromethane	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk

	of getting cancer.
65. 1,2-Dichloropropane	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
66. Ethylbenzene	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
67. Styrene	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
68. Tetrachloroethylene	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
69. Toluene	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
70. 1,2,4-Trichlorobenzene	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
71. 1,1,1-Trichloroethane	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
72. 1,1,2-Trichloroethane	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
73. Trichloroethylene	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
74. Vinyl chloride	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
75. Xylenes (total)	Some people who drink water containing xylenes in excess of the MCL over many years could experience

	damage to their nervous system.
<b>G. Radioactive Contaminants</b>	
76. Beta/photon emitters	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
77. Alpha emitters (Gross alpha)	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
78. Combined radium (226 & 228)	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
79. Uranium	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
<b>H. Disinfection Byproducts (DBPs), Byproduct Precursors, and Disinfectant Residuals:</b> Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs).	
80. Total trihalomethanes (TTHMs)	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.
81. Haloacetic Acids (HAA)	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
82. Bromate	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
83. Chlorite	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.

84. Chlorine	Some people who use drinking water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
85. Chloramines	Some people who use drinking water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.
86a. Chlorine dioxide, where any 2 consecutive daily samples taken at the entrance to the distribution system are above the MRDL	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. The chlorine dioxide violations reported today are the result of exceedances at the treatment facility only, not within the distribution system which delivers water to consumers. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to consumers.
86b. Chlorine dioxide, where one or more distribution system samples are above the MRDL	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. The chlorine dioxide violations reported today include exceedances of the EPA standard within the distribution system which delivers water to consumers. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including fetuses, infants, and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure.
87. Control of DBP precursors (TOC)	Total organic carbon (TOC) has not health effects. However, total organic carbon provides a medium for the

	formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.
I. Other Treatment Techniques	
88. Acrylamide	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
89. Epichlorohydrin	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.
† Until March 31, 2016.	
‡ Until April 1, 2016.	
<sup>1</sup> U.S. EPA Surface Water Treatment Rule (SWTR), 54 Fed Reg 27486 (June 29, 1989).	
<sup>2</sup> U.S. EPA Interim Enhanced Surface Water Treatment Rule (IESWTR), 63 Fed Reg 69478 (December 16, 1998).	
<sup>3</sup> U.S. EPA Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR), 67 Fed Reg 1812 (January 14, 2002).	
<sup>4</sup> U.S. EPA Filter Backwash Recycling Rule (FBRR), 66 Fed Reg 31103 (June 8, 2001).	
<sup>5</sup> SWTR, IESWTR, LT1ESWTR and FBRR treatment technique violations that involve turbidity exceedances may use the health effects language for turbidity instead.	
<sup>6</sup> The bacteria detected by heterotrophic plate count (HPC) are not necessarily harmful.	
HPC is simply an alternative method of determining disinfectant residual levels. The numbers of such bacteria is an indicator of whether there is enough disinfectant in the distribution system.	

[Comment: The 40 C.F.R. 141.207 refers to the "Code of Federal Regulations" published on May 4, 2000. A copy of this code may be obtained from the "U.S. Government Bookstore" toll-free at (866) 512-1800 or <https://www.gpo.gov/fdsys>, or from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752. The code is available for review at, "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."

Effective: 04/01/2016

Five Year Review (FYR) Dates: 01/15/2016 and 04/01/2021

Promulgated Under: 119.03

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Rule Amplifies: 6109.03, 6109.04, 6109.06

Prior Effective Dates: 12/27/78, 5/22/89, 12/31/90, 9/13/93, 4/1/96, 1/1/02,  
1/1/03, 11/1/04, 1/1/08, 1/8/10, 10/31/10



### 3745-81-33 **Record maintenance.**

Any owner or operator of a public water system subject to the provisions of this chapter shall retain on its premises or at a convenient location near its premises the following records:

- (A) Records of microbiological and turbidity analyses made pursuant to this chapter shall be kept for not less than five years unless otherwise specified. Records of chemical analyses made pursuant to this chapter shall be kept for not less than ten years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:
  - (1) The date, place, and time of sampling, and the name of the person who collected the sample.
  - (2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample.
  - (3) Date of analysis.
  - (4) Laboratory and person responsible for performing analysis.
  - (5) The analytical technique/method used.
  - (6) The results of the analysis.
- (B) Records of action taken by the system to correct violations of state primary drinking water rules shall be kept for a period not less than three years after the last action taken with respect to the particular violation involved.
- (C) Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, state or federal agency, shall be kept for a period not less than ten years after completion of the sanitary survey involved.
- (D) Copies of public notices issued pursuant to rule 3745-81-32 of the Administrative Code and certifications submitted to the director pursuant to paragraph (A)(3) of rule 3745-81-32 of the Administrative Code must be kept for a minimum of three years after issuance.
- (E) Copies of any decisions, reports, monitoring plans or certifications developed by the system or an agent of the system shall be kept for a minimum of five years for microbiological and turbidity records and a minimum of ten years for chemical records.

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R.C. 106.32 review dates: 11/17/2015 and 11/17/2019

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Rule Amplifies: 6109.04

Prior Effective Dates: 12/27/78, 01/01/04, 11/01/04, 01/01/10

**3745-81-41      Ground water rule - general requirements and applicability.**

Applicability. This rule applies to all public water systems that use ground water except those that combine all of their ground water with surface water or with ground water under the direct influence of surface water prior to treatment under rule 3745-81-71 of the Administrative Code. For the purpose of rules 3745-81-41 to 3745-81-45 of the Administrative Code, "ground water system" is defined as any public water system meeting this applicability statement, including consecutive systems receiving finished ground water.

(A) Systems subject to this rule shall comply with the following:

- (1) Inspection and response requirements for all ground water systems as described in rule 3745-81-60 of the Administrative Code.
- (2) Microbial source water monitoring requirements for ground water systems that do not treat all of their ground water to at least 99.99 per cent (4-log) treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer as described in rule 3745-81-42 of the Administrative Code.
- (3) Treatment technique requirements, described in rule 3745-81-61 of the Administrative Code, that apply to ground water systems that have fecally contaminated source waters as determined by source water monitoring conducted under rule 3745-81-42 of the Administrative Code, or that have significant deficiencies that are identified by the director through the sanitary survey process, or through a level one or level two assessment conducted in accordance with rule 3745-81-53 of the Administrative Code. A ground water system with fecally contaminated source water or with significant deficiencies subject to the treatment technique requirements of this rule shall implement one or more of the following corrective action options: correct all significant deficiencies; provide an alternate source of water; eliminate the source of contamination; or provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer.
- (4) Ground water systems that provide at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer are required to conduct compliance monitoring to demonstrate treatment effectiveness, as described in rule 3745-81-43 of the Administrative Code.
- (5) If requested by the director, ground water systems shall provide any existing information that will enable the director to perform a hydrogeologic sensitivity assessment.

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Five Year Review (FYR) Dates: 01/15/2016 and 04/01/2021

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Statutory Authority: 6109.04  
Rule Amplifies: 6109.03, 6109.04  
Prior Effective Dates: 10/31/10

**3745-81-42      Ground water rule - ground water source microbial monitoring and analytical methods.**

**(A) Triggered source water monitoring.**

- (1) A ground water system shall conduct triggered source water monitoring if the conditions identified in paragraph (A)(1)(a) and either paragraph (A)(1)(b) or (A)(1)(c) of this rule exist.
  - (a) The system does not provide at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for each ground water source.
  - (b) Until March 31, 2016, the system is notified that a sample collected under paragraph (A) of rule 3745-81-21 of the Administrative Code is total coliform-positive and the sample is not invalidated in accordance with paragraph (B)(9) of rule 3745-81-21 of the Administrative Code.
  - (c) Beginning April 1, 2016, the system is notified that a sample collected under rule 3745-81-51 of the Administrative Code is total coliform-positive and the sample is not invalidated in accordance with paragraph (C) of rule 3745-81-50 of the Administrative Code.
- (2) A ground water system shall collect, within twenty-four hours of notification of the total coliform-positive sample, at least one ground water source sample from each ground water source in use at the time the total coliform-positive sample was collected under paragraph (A) of rule 3745-81-21 of the Administrative Code until March 31, 2016, or collected under rule 3745-81-51 of the Administrative Code beginning April 1, 2016, except as provided in paragraph (A)(2)(b) of this rule. The ground water source sample shall be analyzed for fecal indicators as described in paragraph (C) of this rule.
  - (a) Upon a request from a public water system, the director may extend the twenty-four hour time limit on a case-by-case basis if the system logistically cannot collect the ground water source samples within twenty-four hours due to circumstances beyond the system's control. When an extension is granted, the director shall specify how much time the system has to collect the ground water source samples.
  - (b) If acceptable to the director, public water systems with more than one ground water source may meet the requirements of paragraph (A)(2) of this rule by collecting a representative sample from a location acceptable to the director. If required, public water systems shall submit a triggered source water monitoring plan acceptable to the director that identifies one or more sampling locations that are representative of each monitoring site in the system's sample siting plan under paragraph (A) of rule 3745-81-21 of the Administrative Code until March 31, 2016, or under rule 3745-81-50 of the Administrative Code beginning April 1, 2016, and that the system intends to use for representative sampling under this

paragraph.

- (c) Until March 31, 2016, a noncommunity ground water system serving one thousand people or fewer that has minimal treatment, as defined in rule 3745-81-01 of the Administrative Code, may use a repeat sample to meet both the requirements of paragraph (B) of rule 3745-81-21 of the Administrative Code and to satisfy the monitoring requirements of paragraph (A)(2) of this rule. If any repeat sample collected from distribution is *E. coli* positive, the system shall comply with paragraph (A)(3) of this rule.
  - (d) Beginning April 1, 2016, a noncommunity ground water system serving one thousand people or fewer that has minimal treatment for a single ground water source, as defined in rule 3745-81-01 of the Administrative Code, may use a repeat sample taken in accordance with rule 3745-81-52 of the Administrative Code to also satisfy the monitoring requirements of paragraph (A)(2) of this rule for that ground water source. If any repeat sample collected from the ground water source is *E. coli*-positive, the system shall comply with paragraph (A)(3) of this rule.
- (3) If the director does not require corrective action in accordance with rule 3745-81-61 of the Administrative Code for a fecal indicator-positive source water sample collected under paragraph (A)(2) of this rule that is not invalidated under paragraph (D) of this rule, a system shall collect a minimum of five additional source water samples within twenty-four hours of being notified of a fecal indicator-positive sample. At least one sample shall be collected from each well that was in operation at the time of the first positive routine sample. If the system does not have records that indicate which wells were in operation at the time of the first positive routine sample, then samples shall be collected from all active wells in the system. If there are less than five wells in the system, additional samples shall be distributed as evenly as possible between sampled wells to assure that at least five samples are collected.
- (4) Consecutive and wholesale systems.
- (a) In addition to the other requirements of paragraph (A) of this rule, a consecutive ground water system that has a total coliform-positive sample collected under paragraph (A) of rule 3745-81-21 of the Administrative Code until March 31, 2016, or under rule 3745-81-51 of the Administrative Code beginning April 1, 2016, shall notify the wholesale system within twenty-four hours of being notified of the total coliform-positive sample.
  - (b) In addition to the other requirements of paragraph (A) of this rule, a wholesale ground water system shall comply with the following:
    - (i) A wholesale ground water system that receives notice from a consecutive system it serves that a sample collected under paragraph (A) of rule 3745-81-21 of the Administrative Code until March 31, 2016, or collected under rule 3745-81-51 of the Administrative Code beginning April 1, 2016, is total coliform-positive shall, within twenty-four hours of being notified,

collect a sample from its ground water sources under paragraph (A)(2) of this rule and analyze it for a fecal indicator under paragraph (C) of this rule.

- (ii) If the sample collected under paragraph (A)(4)(b)(i) of this rule is fecal indicator-positive, the wholesale ground water system shall notify all consecutive systems served by that ground water source of the fecal indicator source water positive within twenty-four hours of being notified of the ground water source sample monitoring result and shall comply with paragraph (A)(3) of this rule.

(5) A ground water system is not required to comply with the source water monitoring requirements of paragraph (A) of this rule if either of the following conditions exists:

- (a) The director determines, and documents in writing, that the total coliform-positive sample collected under paragraph (A) of rule 3745-81-21 of the Administrative Code until March 31, 2016, or collected under rule 3745-81-51 of the Administrative Code beginning April 1, 2016, is caused by a distribution system deficiency.
- (b) The total coliform-positive sample collected under paragraph (A) of rule 3745-81-21 of the Administrative Code until March 31, 2016, or collected under rule 3745-81-51 of the Administrative Code beginning April 1, 2016, is collected at a location that meets the director's criteria for distribution system conditions that will cause total coliform-positive samples.

(B) Assessment source water monitoring.

If directed, ground water systems shall conduct assessment source water monitoring that meets director-determined requirements for such monitoring. A ground water system conducting assessment source water monitoring may use a triggered source water sample collected under paragraph (A)(2) of this rule to meet paragraph (B) of this rule. Director-determined assessment source water monitoring requirements may include the following:

- (1) A hydrogeologic sensitivity assessment in accordance with paragraph (A)(5) of rule 3745-81-41 of the Administrative Code.
- (2) Collection of a standard sample volume of at least one hundred milliliters for fecal indicator listed in rule 3745-81-27 of the Administrative Code for the presence of E. coli, enterococci or coliphage.
- (3) Collection of ground water source samples in accordance with a sampling schedule determined by the director.
- (4) Analysis of all ground water source samples, using one of the analytical methods listed in rule 3745-81-27 of the Administrative Code or as determined by the director, for the presence of fecal indicators.
- (5) Collection of ground water source samples at a location prior to any treatment of the

ground water source unless the director accepts a sampling location after treatment.

- (6) Collection of ground water source samples at the well itself unless the system's configuration does not allow for sampling at the well itself and the director accepts an alternate sampling location that is representative of the water quality of that well.

(C) Analytical methods.

- (1) A ground water system subject to the source water monitoring requirements of paragraph (A) of this rule shall collect a standard sample volume of at least one hundred milliliters for fecal indicator analysis regardless of the fecal indicator or analytical method used.
- (2) A ground water system shall analyze all ground water source samples collected in accordance with paragraph (A) of this rule, using one of the analytical methods listed in rule 3745-81-27 of the Administrative Code or as determined by the director, for the presence of *E. coli*, enterococci or coliphage.

(D) Invalidation of a fecal indicator-positive ground water source sample.

- (1) A ground water system may obtain director invalidation of a fecal indicator-positive ground water source sample collected under paragraph (A) of this rule only under either of the following conditions:
  - (a) The system provides the director with written notice from the laboratory that improper sample analysis occurred.
  - (b) The director determines, and documents in writing, that there is substantial evidence that a fecal indicator-positive ground water source sample is not related to source water quality.
- (2) If the director invalidates a fecal indicator-positive ground water source sample, the ground water system shall collect another source water sample under paragraph (A) of this rule within twenty-four hours of being notified of the sample invalidation and have the source water sample analyzed for the same fecal indicator using the analytical methods in paragraph (C) of this rule. The director may extend the twenty-four hour time limit on a case-by-case basis if the system cannot collect the source water sample within twenty-four hours due to circumstances beyond the system's control. In the case of an extension, the director shall specify how much time the system has to collect the sample.

(E) Sampling location.

- (1) Any ground water source sample required under paragraph (A) of this rule shall be collected at a location prior to any treatment of the ground water source unless the director accepts a sampling location after treatment.
- (2) If the system's configuration does not allow for sampling at the well itself, the system may collect a sample at a director-accepted location to meet paragraph (A) of this rule if the sample is representative of the water quality of that well.



- (3) A ground water system with minimal treatment, as defined in rule 3745-81-01 of the Administrative Code, may collect a sample at a location acceptable to the director.
- (F) If required by the director, a ground water system that places a new ground water source into service, shall conduct assessment source water monitoring under paragraph (B) of this rule. If required by the director, the system shall begin monitoring before the ground water source is used to provide water to the public.
- (G) A ground water system with a ground water source sample collected under paragraph (A) or (B) of this rule that is fecal indicator-positive and that is not invalidated under paragraph (D) of this rule, including consecutive systems served by the ground water source, shall conduct public notification in accordance with paragraph (B)(1)(i) of rule 3745-81-32 of the Administrative Code.
- (H) Failure to meet paragraphs (A) to (F) of this rule is a monitoring violation and requires the ground water system to provide public notification under paragraph (D)(1)(a) of rule 3745-81-32 of the Administrative Code. A ground water system providing 4-log inactivation of viruses and required to conduct assessment source water monitoring in accordance with this rule, and if acceptable to the director, will not be required to issue public notification.

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**3745-81-43      Ground water rule - compliance monitoring requirements for ground water systems.**

**(A) Compliance monitoring.**

- (1) A ground water system that is not required to meet the source water monitoring requirements of rule 3745-81-42 of the Administrative Code because the system provides at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source shall comply with the following requirements:
  - (a) The system shall notify the director in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source. Notification to the director shall include engineering, operational, or other information that the director requests to evaluate the submission. The notification may also require a complete plan approval application in accordance with Chapter 3745-91 of the Administrative Code.
  - (b) The system shall obtain acceptance or approval from the director for 4-log treatment of viruses.
  - (c) The system shall conduct compliance monitoring as required in paragraph (A)(2) of this rule within thirty days of placing the source in service or receiving director approval for 4-log treatment of viruses.
  - (d) The system shall conduct ground water source monitoring in accordance with rule 3745-81-42 of the Administrative Code if the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.
- (2) Monitoring requirements. A ground water system subject to the requirements of paragraph (A)(1) of this rule or requirements in rule 3745-81-61 of the Administrative Code, shall monitor the effectiveness and reliability of treatment for that ground water source before or at the first customer as follows:
  - (a) Chemical disinfection.
    - (i) For a system providing disinfection treatment only, the disinfection treatment shall be considered sufficient if the total treatment processes of that public water system would consistently and reliably achieve at least 99.99 per cent (4-log) inactivation of viruses, as determined from tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code.
    - (ii) Treatment technique requirements are used to ensure control of viruses in drinking water. Tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the

Administrative Code shall be used to determine the sufficiency of disinfection for this rule.

- (iii) The level of disinfection being provided by the system is determined by measuring actual CT values. Actual CT values are obtained by multiplying the residual disinfectant, C, by the disinfection contact time, T, giving the resultant, CT. The value of C in milligrams per liter is determined at a point before or at the first customer. The value of T in minutes is based on the time available for the disinfectant to work from the point at which it is added to the water until the point at which C is measured. Values of T are determined based on the approved effective volume factor of the clearwell or contact tank including T for the conduit before the first customer. It may be appropriate to determine the value of C at more than one point of the water treatment flow, with the T associated with each C being estimated from the previous measurement point or the previous addition of disinfectant, whichever is closer. If more than one disinfectant concentration point is used, the products of each C and its associated T are added and the sum of these products is the actual CT value to compare with the appropriate value of the required minimum CT values for specified conditions and levels of inactivation. Note that any disinfection after the last determination of C is not included in the actual CT value. Minimum required CT values for inactivation of viruses by disinfection in relation to the disinfectant, the extent of inactivation, the lowest disinfectant concentration, the pH, and the water temperature are found in tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code.
- (iv) In tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code, the required CT between the indicated temperatures, pH or residual disinfectant concentrations may be determined by linear interpolation. If no interpolation is used, then the required CT shall be determined at the lower temperature, and at the higher pH. If no interpolation is used, for virus inactivation at a pH greater than nine, the required CT shall be the same as the required CT at a pH equal to ten.
- (v) On each day when the actual CT value meets or exceeds the required minimum CT value in or linearly interpolated from tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code, then the water treatment plant is considered to be satisfying this rule's treatment technique requirements for disinfection of ground water sources. On each day when the actual CT value does not meet or exceed the required minimum CT value from tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code, then the water treatment plant is in violation of paragraph (A)(2)(a)(i) of this rule if the CT value is not restored within four hours.
- (vi) For each clearwell, or contact tank, the approved effective volume factor shall be determined by the director based upon its design characteristics including: the average flow path length to channel width ratio; baffling; and the proximity of the outlet to the inlet using figures B-1 and B-2 of rule

3745-81-72 of the Administrative Code. The approved effective volume factor shall be the preliminary effective volume factor obtained from figure B-1 multiplied by the reduction factor obtained from figure B-2, rounded down to the nearest 0.05. A public water system may request that the director approve an effective volume factor that was determined by tracer studies, hydraulic analysis or modeling, or an equivalent demonstration. For a tracer study to be acceptable, the net advection of the tracer shall be within ten per cent of the change in the tracer chemical storage within the clearwell system. Net advection means the amount of tracer convected out of the clearwell system minus the amount of tracer convected into the clearwell system over the duration of the tracer study.

- (vii) Public water systems serving greater than three thousand three hundred people shall continuously monitor the residual disinfectant concentration of the water at a location approved by the director and the lowest value shall be recorded each day. If there is a failure in the continuous disinfectant monitoring equipment, the public water system shall conduct grab sampling every four hours in lieu of continuous monitoring until the continuous monitoring equipment is repaired and returned to service. A public water system has no more than five days after failure of the equipment to repair the continuous monitoring equipment and return it to service.
  - (viii) Public water systems serving three thousand three hundred or fewer people shall monitor the residual disinfectant concentration at a location approved by the director, and record the residual disinfection concentration each day that water from the ground water source is served to the public. The public water system shall take a daily grab sample during the hour of peak flow or at another time specified by the director. If the actual residual disinfectant concentration value falls below the required minimum specified by the director, the ground water system shall take follow-up samples every four hours until the actual disinfectant residual is restored to the director-determined minimum value. Alternatively, a ground water system that serves three thousand three hundred or fewer people may monitor continuously and meet the requirements of paragraph (A)(2)(a)(vii) of this rule.
  - (ix) Other parameters necessary to determine the sufficiency of disinfection prior to the first customer shall be measured and recorded.
- (b) Membrane filtration. A ground water system that uses membrane filtration to meet the requirements of this subpart shall monitor the membrane filtration process in accordance with all director-specified monitoring requirements and shall operate the membrane filtration in accordance with all director-specified compliance requirements. A ground water system that uses membrane filtration is in compliance with the requirement to achieve at least 4-log removal of viruses when the following conditions exist:
- (i) The membrane has an absolute molecular weight cut-off or an alternate

parameter that describes the exclusion characteristics of the membrane, that can reliably achieve at least 4-log removal of viruses.

(ii) The membrane process is operated in accordance with director-specified compliance requirements.

(iii) The integrity of the test is intact.

(c) Alternative treatment. A ground water system that uses a director-approved alternative treatment to meet the requirements of this rule by providing at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer shall comply with the following:

(i) Monitor the alternative treatment in accordance with all director-specified monitoring requirements.

(ii) Operate the alternative treatment in accordance with all compliance requirements that the director determines to be necessary to achieve at least 4-log treatment of viruses.

(B) Discontinuing treatment. A ground water system may discontinue 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source if the director determines and documents in writing that 4-log treatment of viruses is no longer necessary for that ground water source. A system that discontinues 4-log treatment of viruses is subject to the source water monitoring and analytical methods requirements in rule 3745-81-42 of the Administrative Code.

(C) Failure to meet the monitoring requirements of paragraph (A) of this rule is a monitoring violation and requires the ground water system to provide public notification in accordance with rule 3745-81-32 of the Administrative Code.

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**3745-81-44      Ground water rule - treatment technique violations for ground water systems.**

- (A) A ground water system with a significant deficiency is in violation of the treatment technique requirement if the system does not comply with the corrective action requirements and schedule established under rule 3745-81-61 of the Administrative Code.
- (B) Unless the director invalidates a fecal indicator-positive ground water source sample in accordance with paragraph (D) of rule 3745-81-42 of the Administrative Code, a ground water system is in violation of the treatment technique requirement if the system does not comply with the corrective action requirements and schedule established under rule 3745-81-61 of the Administrative Code.
- (C) A ground water system subject to paragraph (A)(2) of rule 3745-81-43 of the Administrative Code that fails to maintain at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source is in violation of the treatment technique requirement if the failure is not corrected within four hours of determining the system is not maintaining at least 4-log treatment of viruses before or at the first customer.
- (D) A ground water system must give public notification in accordance with paragraph (C)(1)(a) of rule 3745-81-32 of the Administrative Code for the treatment technique violations specified in paragraphs (A) to (C) of this rule.



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**3745-81-45      Ground water rule - reporting and recordkeeping for ground water systems.**

(A) Reporting. In addition to the requirements in rule 3745-81-31 of the Administrative Code, a ground water system regulated under rules 3745-81-41 to 3745-81-45 and rule 3745-81-60 or 3745-81-61 of the Administrative Code shall provide the following information to the director:

- (1) A ground water system conducting compliance monitoring in paragraph (A) of rule 3745-81-43 of the Administrative Code shall report monthly to the director the information specified in rule 3745-83-01 of the Administrative Code. These ground water systems shall also notify the director any time the system fails to meet any director-specified requirements including, but not limited to, minimum residual disinfectant concentration, membrane operating criteria or membrane integrity, and alternative treatment operating criteria, if operation in accordance with the criteria or requirements is not restored within four hours. The ground water system shall notify the director as soon as possible, but in no case later than the end of the next business day.
  - (2) After completing any corrective action under rule 3745-81-61 of the Administrative Code, a ground water system shall notify the director within thirty days of completion of the corrective action.
  - (3) If a ground water system subject to paragraph (A) of rule 3745-81-42 of the Administrative Code does not conduct source water monitoring in accordance with paragraph (A)(5)(b) of rule 3745-81-42 of the Administrative Code, the system shall provide documentation within thirty days of the total coliform positive sample that the system met appropriate criteria as acceptable to the director.
- (B) Recordkeeping. In addition to rule 3745-81-33 of the Administrative Code, a ground water system regulated under this rule shall maintain the following records:
- (1) Documentation of corrective actions. Documentation shall be kept for a period of not less than ten years.
  - (2) Documentation of notice to the public as required in paragraph (E) of rule 3745-81-61 of the Administrative Code. Documentation shall be kept for a period of not less than three years.
  - (3) Records of decisions in paragraph (A)(5)(b) of rule 3745-81-42 of the Administrative Code and records of invalidation of fecal indicator-positive ground water source samples in paragraph (D) of rule 3745-81-42 of the Administrative Code. Documentation shall be kept for a period of not less than five years.
  - (4) For consecutive systems, documentation of notification to the wholesale system of total coliform positive samples that are not invalidated under rule 3745-81-21 of the Administrative Code until March 31, 2016, or under rule 3745-81-50 of the Administrative Code beginning April 1, 2016. Documentation shall be kept for a period of not less than five years.

- (5) The following apply to systems, including wholesale systems, that are required to perform compliance monitoring in paragraph (A) of rule 3745-81-43 of the Administrative Code:
- (a) Records of the director-specified minimum disinfectant residual. Documentation shall be kept for a period of not less than ten years.
  - (b) Records of the lowest daily residual disinfectant concentration and records of the date and duration of any failure to maintain the director-prescribed minimum residual disinfectant concentration for a period of more than four hours. Documentation shall be kept for a period of not less than five years.
  - (c) Records of compliance requirements for membrane filtration and of parameters specified by the director for appropriate approved alternative treatment and records of the date and duration of any failure to meet the membrane operating, membrane integrity, or alternative treatment operating requirements for more than four hours. Documentation shall be kept for a period of not less than five years.
- (C) Each public water system, upon discovering that a waterborne disease outbreak potentially attributable to that public water system has occurred, shall report that occurrence to the director as soon as possible, but no later than by the end of the next business day.

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**3745-81-50      Revised total coliform rule - general monitoring requirements.**

(A) Transition from total coliform monitoring under rule 3745-81-21 of the Administrative Code. Public water systems shall continue to conduct routine monitoring according to the total coliform monitoring schedules issued under rule 3745-81-21 of the Administrative Code that were in effect on March 31, 2016, unless any of the conditions for increased monitoring in paragraph (B)(3) of rule 3745-81-51 of the Administrative Code is triggered on or after April 1, 2016, or the director modifies the routine monitoring schedule.

**(B) Sample siting plans:**

- (1) Each public water system shall develop a written sample siting plan by March 31, 2016, that identifies a sample collection schedule and sampling sites that are representative of water throughout the distribution system. Such plans are subject to review and revision by the director. A public water system shall collect total coliform samples according to the written sample siting plan. Monitoring required in rules 3745-81-51 and 3745-81-52 of the Administrative Code shall take place at a designated compliance sampling location. Routine and repeat sample sites and any sampling points necessary to meet rules 3745-81-41 to 3745-81-45 of the Administrative Code shall be included in the sample siting plan. Seasonal systems monitoring on a quarterly schedule shall designate the time period for monitoring based on site-specific considerations, such as periods of highest demand or highest vulnerability to contamination.
- (2) Each public water system shall monitor with routine samples taken at regular time intervals throughout the month in accordance with the system's sample siting plan, except that systems using only ground water and serving four thousand nine hundred or fewer people may collect all required samples on a single day if taken from different sites.
- (3) Every public water system shall take at least the minimum number of required samples even if the system has had an *Escherichia coli* (E. coli) maximum contaminant level violation (MCL) as set forth in rule 3745-81-54 of the Administrative Code or has exceeded the coliform treatment technique triggers as set forth in rule 3745-81-53 of the Administrative Code.
- (4) A public water system may conduct more compliance monitoring than is required by this rule and rules 3745-81-51 to 3745-81-53 of the Administrative Code to investigate and discover potential problems in the distribution system. If the additional routine samples are taken in accordance with the existing sample siting plan and are representative of the water throughout the distribution system, the results of the samples must be included in calculating whether the coliform treatment technique trigger in paragraph (A)(1)(a) or (A)(1)(b) of rule 3745-81-53 of the Administrative Code has been exceeded.
- (5) Each public water system shall identify repeat monitoring locations in the sample siting plan. Unless the provisions of the following paragraphs are met, the system shall monitor with at least one repeat sample from the sampling tap where the original total

coliform-positive sample was taken, and at least one repeat sample at a tap within five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or one service connection away from the end of the distribution system, the system shall still take all required repeat samples; however, the director may allow an alternative sampling location in lieu of the requirement to monitor with at least one repeat sample upstream or downstream of the original sampling site. Except as provided for in paragraph (B)(5)(b) of this rule, each public water system required to conduct triggered source water monitoring as set forth in paragraph (A) of rule 3745-81-42 of the Administrative Code shall take a ground water source sample in addition to repeat samples required in this rule and rules 3745-81-51 to 3745-81-53 of the Administrative Code.

- (a) A system may propose repeat monitoring locations to the director that the system considers to be representative of a pathway for contamination of the distribution system. A system may elect to specify either alternative fixed locations or criteria for selecting repeat sampling sites on a situational basis in a standard operating procedure (SOP) in the system's sample siting plan. The system shall design the SOP to focus the repeat samples at locations that best verify and determine the extent of potential contamination of the distribution system area based on specific situations. The director may modify the SOP or require alternative monitoring locations as needed.
- (b) Ground water systems serving one thousand people or fewer may propose repeat sampling locations to the director that differentiate potential source water and distribution system contamination (e.g., by sampling at entry points to the distribution system). If acceptable to the director, a ground water system with a single well required to conduct triggered source water monitoring may take one of the repeat samples at the monitoring location required for triggered source water monitoring as set forth in paragraph (A) of rule 3745-81-42 of the Administrative Code if the system demonstrates to the director that the sample siting plan remains representative of water quality in the distribution system.
  - (i) If a repeat sample taken at the monitoring location required for triggered source water monitoring is *E. coli*-positive, the public water system is in violation of the MCL for *E. coli* and shall conduct additional source water monitoring in accordance with paragraph (A)(3) of rule 3745-81-42 of the Administrative Code. If the system takes more than one repeat sample at the monitoring location required for triggered source water monitoring, the system may reduce the number of additional source water samples required in paragraph (A)(3) of rule 3745-81-42 of the Administrative Code by the number of repeat samples taken at that location that were not *E. coli*-positive.
  - (ii) If the system takes more than one repeat sample at the monitoring location for triggered source water monitoring in paragraph (A) of rule 3745-81-42 of the Administrative Code, and more than one repeat sample is *E. coli*-positive, the system has violated the MCL for *E. coli* and shall comply with rule 3745-81-61 of the Administrative Code.

- (iii) If all repeat samples taken at the monitoring location required for triggered source water monitoring are E. coli-negative and a repeat sample taken at a monitoring location other than the one required for triggered source water monitoring is E. coli-positive, the system has violated the MCL for E. coli, but is not required to conduct additional source water monitoring in accordance with paragraph (A)(3) of rule 3745-81-42 of the Administrative Code.
- (6) The director may review, revise and accept, as appropriate, repeat sampling proposed by public water systems under paragraphs (B)(5)(a) and (B)(5)(b) of this rule. The system shall demonstrate that the sample siting plan remains representative of the water quality in the distribution system. The director may determine that monitoring at the entry point to the distribution system (especially for ground water systems having minimal treatment as defined in rule 3745-81-01 of the Administrative Code) is effective to differentiate between potential source water and distribution system problems.
- (C) Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement or repair, shall not be used to determine whether the coliform treatment technique trigger has been exceeded. Repeat samples taken in accordance with rule 3745-81-52 of the Administrative Code are not considered special purpose samples, and shall be used to determine whether the coliform treatment technique trigger has been exceeded.
- (D) A routine or repeat total coliform sample must be invalidated (unless total coliforms are detected) if the sample exhibits confluent growth or produces colonies too numerous to count with an analytical method using a membrane filtration technique in accordance with the "Ohio EPA Laboratory Manual for the Microbiological Analyses of Public Drinking Water 2014," Chapter 3745-89 of the Administrative Code and rule 3745-81-27 of the Administrative Code. A public water system shall monitor with a replacement sample within twenty-four hours of being notified of the invalid sample. Upon a request from a public water system, the director may extend the twenty-four hour limit on a case-by-case basis when the public water system has a logistical problem collecting the repeat samples within twenty-four hours which is beyond the control of the public water system. When an extension is granted, the time the public water system has to monitor with repeat samples shall be specified by the director.
- (E) The director will invalidate a total coliform result if the total coliform analysis performed by a certified laboratory does not conform to the "Ohio EPA Laboratory Manual for the Microbiological Analyses of Public Drinking Water 2014."

[Comment: This rule incorporates the "Ohio EPA Laboratory manual for the Microbiological Analyses of Drinking Water 2014" by reference. Copies are available at [epa.ohio.gov/ddagw/labcert.aspx](http://epa.ohio.gov/ddagw/labcert.aspx) and at the "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215." Copies can also be obtained by contacting the laboratory certification office at (614) 644-4245.]

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**3745-81-51      Revised total coliform rule - routine monitoring requirements.**

- (A) Subject to the provisions of paragraph (A) of rule 3745-81-50 of the Administrative Code, all public water systems shall conduct routine total coliform monitoring in accordance with this rule beginning April 1, 2016.
  - (1) Following any total coliform-positive sample collected in accordance with paragraph (B), (C), (D) or (E) of this rule, public water systems shall comply with the repeat monitoring requirements and *Escherichia coli* (*E. coli*) analytical requirements in rule 3745-81-52 of the Administrative Code.
  - (2) Once all monitoring required by paragraph (B), (C), (D) or (E) of this rule and rule 3745-81-52 of the Administrative Code for a calendar month has been completed, public water systems shall determine whether any coliform treatment technique triggers have been exceeded in accordance with rule 3745-81-53 of the Administrative Code. If any triggers have been exceeded, public water systems shall complete the assessments as required in rule 3745-81-53 of the Administrative Code.
- (B) Noncommunity public water systems using only source water designated as ground water in accordance with rule 3745-81-76 of the Administrative Code and serving not more than one thousand persons shall conduct routine total coliform monitoring as follows:
  - (1) Monitoring for total coliforms shall be conducted at a minimum frequency of one sample each calendar quarter that the system provides water to the public, except as required by paragraphs (B)(3) to (B)(6) of this rule.
  - (2) Beginning April 1, 2016, the director shall perform a detailed monitoring evaluation during each sanitary survey to determine whether the system is on an appropriate routine total coliform monitoring schedule. The director shall consider system factors such as pertinent water quality and compliance history, the establishment and maintenance of contamination barriers, and other appropriate protections. Based on the findings of each monitoring evaluation, the director may modify the public water system's routine total coliform monitoring schedule.
  - (3) Triggered increased routine monitoring. A public water system on quarterly monitoring that experiences any of the events identified in this paragraph shall begin monthly monitoring during the month following the event. The system shall continue monthly monitoring until the director reduces the monitoring frequency after the requirements of paragraph (B)(4) of this rule are met. A system on monthly monitoring for reasons other than those identified as follows, including seasonal systems, is not considered to be on increased monitoring for the purposes of paragraph (B)(4) of this rule.
    - (a) The system triggers a level two assessment or two level one assessments in a consecutive twelve-month period in accordance with rule 3745-81-53 of the Administrative Code.
    - (b) The system has an *E. coli* maximum contaminant level violation in accordance with paragraph (A) of rule 3745-81-54 of the Administrative Code.

- (c) The system has a coliform treatment technique violation in accordance with paragraph (B) of rule 3745-81-54 of the Administrative Code.
  - (d) The system has two monitoring violations in accordance with paragraph (C) of rule 3745-81-54 of the Administrative Code, or has one monitoring violation in accordance with paragraph (C) of rule 3745-81-54 of the Administrative Code and one level one assessment in a consecutive twelve-month period.
- (4) The director may reduce the monitoring frequency for a public water system on monthly monitoring triggered under paragraph (B)(3) of this rule to quarterly monitoring if the system meets all of the following:
- (a) Had a sanitary survey, site visit or level two assessment conducted by a person approved by the director within the previous twelve months.
  - (b) Had a clean compliance history for a minimum of the previous twelve months.
  - (c) Is free of significant deficiencies.
  - (d) Has a protected water source.
  - (e) Holds a valid license to operate, unless the system is exempt from being required to obtain a license to operate under section 6109.21 of the Revised Code.
  - (f) Has no outstanding violations of any of the following:
    - (i) Nitrate or nitrite MCL or monitoring requirements under rule 3745-81-11 or rule 3745-81-23 of the Administrative Code, respectively.
    - (ii) Source water monitoring requirements under rule 3745-81-42 of the Administrative Code.
    - (iii) Treatment technique requirements under rule 3745-81-44 of the Administrative Code.
    - (iv) Operational requirements under 3745-83-01 of the Administrative Code with respect to disinfection and monthly operating reports.
- (5) Seasonal system requirements.
- (a) Beginning April 1, 2016, all seasonal public water systems, except as provided by paragraph (B)(5)(d) of this rule, shall demonstrate completion of the start-up procedure in the appendix to this rule, which shall include start-up total coliform sampling prior to serving water to the public.
  - (b) A seasonal system shall monitor for total coliforms with a minimum of one sample per month during the system's operating season if, after the director performs a detailed monitoring evaluation during a sanitary survey or limited scope site visit, it is determined the system does not meet any of the exceptions as provided in paragraph (B)(5)(c) or (B)(5)(d) of this rule.

- (c) A seasonal system that operates a portion of the system for maintenance or caretaker staff on a year round basis shall monitor for total coliforms with a minimum of one sample per month during the system's operating season and a minimum of one sample per quarter during the system's closed season.
  - (d) A seasonal system that maintains a fully pressurized system throughout the year, other than depressurizations resulting from maintenance or line breaks, shall monitor for total coliforms with a minimum of one sample per calendar quarter. These systems shall adjust the monitoring frequency or complete elements of the start-up procedure in the appendix to this rule as required in writing by the director based on the findings of a sanitary survey or detailed monitoring evaluation. A simplified start-up procedure may be appropriate for these systems due to the potential for deteriorated water quality during extended periods of non-use.
- (6) Public water systems collecting samples on a quarterly frequency shall monitor with at least three routine samples during the month following one or more total coliform-positive samples (with or without a level one treatment technique trigger). Systems may either collect samples at regular time intervals throughout the month or may collect all required routine samples on a single day if samples are taken from different sites. Systems shall use the results of additional routine samples in coliform treatment technique trigger calculations under paragraph (A) of rule 3745-81-53 of the Administrative Code.
- (7) The director may postpone the requirement in paragraph (B)(6) of this rule for a system to monitor with at least three routine samples during the month following one or more total coliform positive samples if all of the following criteria are met:
- (a) The system collected all required repeat samples.
  - (b) The director conducts a site visit of the system and has determined the source of the bacterial contamination within two weeks of receiving notification that the routine total coliform positive sample was collected.
  - (c) The system has submitted an approvable plan to eliminate the cause of the bacterial contamination, including all of the following:
    - (i) Details on how the source of bacterial contamination will be eliminated.
    - (ii) Who will perform the work.
    - (iii) A schedule for completing the work no later than ninety days from the date of the total coliform routine sample.
  - (d) An approvable plan for corrective action required by rule 3745-81-61 of the Administrative Code may also fulfill the requirements of paragraph (B)(7)(c) of this rule for a plan to eliminate the cause of the bacterial contamination.
- (8) If the director approves a postponement of the requirements of paragraph (B)(6) of this

rule, the public water system shall collect at least three routine total coliform samples during the month after the work to eliminate the source of the bacterial contamination has been completed.

(C) Routine monitoring requirements for community water systems using only source water designated as ground water in accordance with rule 3745-81-76 of the Administrative Code and serving not more than one thousand persons.

(1) Monitoring for total coliforms shall be conducted at a minimum frequency of one sample each month that the system provides water to the public.

(2) Transition from the requirements of rule 3745-81-21 of the Administrative Code:

(a) All systems subject to this paragraph shall continue to monitor according to the total coliform monitoring schedules established under rule 3745-81-21 of the Administrative Code that were in effect on March 31, 2016, unless otherwise specified by the director.

(b) Beginning April 1, 2016, the director shall perform a detailed monitoring evaluation during each sanitary survey to determine whether the system is on an appropriate routine total coliform monitoring schedule. The director shall consider system factors such as pertinent water quality and compliance history, the establishment and maintenance of contamination barriers, and other appropriate protections. Based on the findings of each monitoring evaluation, the director may modify the public water system's routine total coliform monitoring schedule.

(D) Routine monitoring requirements for public water systems using a surface water source, in whole or in part, and serving not more than four thousand one hundred persons.

(1) Monitoring for total coliforms shall be conducted at a minimum frequency of four samples, taken at regular intervals, during each month the system provides water to the public. Consecutive surface water systems serving not more than one thousand persons shall monitor at a minimum frequency of one sample per month that the system serves water to the public.

(2) Seasonal system start-up requirements.

(a) Beginning April 1, 2016, seasonal public water systems subject to this paragraph, except those that maintain a fully pressurized system throughout the year, shall demonstrate completion of the start-up procedure in the appendix to this rule, which shall include start-up total coliform sampling prior to serving water to the public.

(b) A seasonal system that maintains a fully pressurized system throughout the year shall complete elements of the start-up procedure in the appendix to this rule as required in writing by the director based on the findings of a sanitary survey.

(E) Routine monitoring requirements for all other public water systems serving more than one

thousand persons.

(1) Seasonal system start-up requirements.

(a) Beginning April 1, 2016, seasonal public water systems subject to this paragraph, except those that maintain a fully pressurized system throughout the year, shall demonstrate completion of the start-up procedure in the appendix to this rule, which shall include start-up total coliform sampling prior to serving water to the public.

(b) A seasonal system that maintains a fully pressurized system throughout the year shall complete elements of the start-up procedure in the appendix to this rule as required in writing by the director based on the findings of a sanitary survey.

(2) The monitoring frequency for total coliforms for ground water systems and consecutive surface water systems serving more than one thousand persons and surface water systems serving more than four thousand one hundred persons is based on the population served by the system, as follows:

Population served	Minimum number of samples per month
1,001 to 2,500 (ground water systems and consecutive surface water systems)	2
2,501 to 3,300 (ground water systems and consecutive surface water systems)	3
3,301 to 4,100 (ground water systems and consecutive surface water systems)	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70

70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,001 or more	480

- (3) Public water systems may not reduce monitoring, except for noncommunity public water systems using only ground water (and not ground water under the direct influence of surface water) and serving more than one thousand persons in any month. In months when more than one thousand persons are served, the systems shall monitor at the frequency specified in paragraph (E) of this rule. In months when no more than one thousand persons are served, the director may reduce the monitoring frequency, in writing, to a frequency allowed under paragraph (B) of this rule.

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### **Start-up Procedure Requirements for Seasonal Public Water Systems**

Instructions: Beginning April 1, 2016, seasonal noncommunity public water systems are required to complete the start-up requirements specified by Ohio Administrative Code (OAC) rule 3745-81-51. Those requirements are listed in this appendix. Prior to serving water to the public each season, complete the following:

1. All seasonal systems must complete and keep a copy of the Seasonal Public Water System Start-up Requirements and Checklist on site for at least 5 years.
2. Complete an annual start-up certification and submit the form to the appropriate Ohio EPA District Office.

Most of the requirements listed below apply to all seasonal systems. Each applicable element shall be completed.

The director shall provide an appropriate Seasonal Public Water System Start-up Requirements and Checklist form and annual start-up certification form to each seasonal system.

1. Pre-Inspection Activities.
  - 1.1 Review Ohio EPA Sampling Schedule. Update Sample Siting Plan as necessary.
  - 1.2 Make arrangements for sample analysis by a certified laboratory.
  - 1.3 Establish an account for electronic reporting with Ohio EPA if the system is required to submit monthly operating reports.
2. Initial Inspection.
  - 2.1 Well and pumphouse.
    - 2.1.1 Well cap is tight and secure.
    - 2.1.2 Pump house, if present, is locked and secure.
    - 2.1.3 Well casing is structurally sound.
    - 2.1.4 The well vent is turned downward and the screen is intact.
    - 2.1.5 Chemicals (e.g., pesticides, fuels, solvents) are stored outside of isolation radius or at least 100 feet from the well.
    - 2.1.6 Backup generator and fuel are stored to capture any leaks in a secondary (backup) containment area.
    - 2.1.7 The sample tap does not leak and flows freely when opened.
  - 2.2 Storage tanks.
    - 2.2.1 Tanks were visually inspected for corrosion and physical damage.
    - 2.2.2 The water level controls are functioning properly.
    - 2.2.3 The access hatches are locked and the hatch areas and lids are protected from insects.
    - 2.2.4 The tank overflow pipes are screened, the screens are intact and the discharge is at least 12 inches above grade.



- 2.2.5 The tank vents are turned downward and properly screened.
    - 2.2.6 Necessary repairs were completed.
  - 2.3 Pressure tanks.
    - 2.3.1 Tanks were visually inspected for corrosion and physical damage.
    - 2.3.2 All valves, gauges and controls are functioning properly.
    - 2.3.3 Necessary repairs were completed.
  - 2.4 Distribution lines and valves.
    - 2.4.1 All accessible lines and equipment were visually inspected for signs of damage or corrosion.
    - 2.4.2 All valves were opened and closed.
    - 2.4.3 All outdoor hose bibs have vacuum breakers.
    - 2.4.4 All yard hydrants are of an acceptable design and do not have weep holes.
    - 2.4.5 All backflow prevention devices have had thorough inspections and operational tests performed by a certified Ohio Department of Commerce tester within the past 12 months.
    - 2.4.6 All RV dump stations have an approved backflow prevention device provided in accordance with Ohio Department of Health regulations.
    - 2.4.7 Necessary repairs were completed.
  - 2.5 Treatment systems.
    - 2.5.1 All components have been visually inspected for damage.
    - 2.5.2 Chemical injection points have been cleaned.
    - 2.5.3 Associated pumps and valves are working properly.
    - 2.5.4 Necessary NSF-approved chemicals are on-site and not expired.
    - 2.5.5 Necessary repairs were completed.
- 3. Activate and pressurize.
  - 3.1 Well pumps operate properly.
  - 3.2 System is fully pressurized.
  - 3.3 System is not leaking.
  - 3.4 Chlorinator and any other treatment systems are operating properly.
- 4. Disinfect and flush.
  - 4.1 Fresh chlorine was added and pumped throughout all tanks and distribution lines with sufficient concentration and retention time to disinfect the system. 10 mg/L free chlorine held in lines overnight is recommended. Additional guidance may be found in the Seasonal Public Water System Start-up Requirements and Checklist.
  - 4.2 Entire system was flushed. Non-chlorinating systems must remove free chlorine to nondetectable level. Chlorinated water that is being flushed from the system must be dechlorinated prior to discharge. The chlorinated water must not be discharged into any water body, wetland or drainage ditch.
- 5. Collect total coliform (TC) samples.
  - 5.1 Check chlorine levels before sampling.

- 5.1.1 In nonchlorinated systems (do not have continuous chlorine treatment) – chlorine is nondetectable.
    - 5.1.2 In chlorinated systems (do provide continuous chlorination treatment) – chlorine is at least 0.2 mg/L free chlorine or 1.0 mg/L total chlorine and less than 4.0 mg/L total chlorine.
  - 5.2 Collect special purpose total coliform samples.
    - 5.2.1 Collect at least one special purpose sample at the service connection considered to be most susceptible to contamination for total coliform analysis. The service connection farthest from the entry point is often the appropriate location. If the special purpose sample is TC-negative, you may proceed to Step 6. If the special purpose sample is TC-positive, the disinfection and flushing procedure must be repeated. Following thorough flushing, at least two special purpose samples collected at least 24 hours apart must be TC-negative prior to proceeding to Step 6.
- 6. Complete Annual Start-up Certification Form.
  - 6.1 Submit the completed Annual Start-up Certification Form to the appropriate Ohio EPA District Office a minimum of five days before serving water to the public in accordance with OAC rule 3745-81-55.
  - 6.2 Keep a copy of the completed Seasonal Public Water System Start-up Requirements and Checklist with your water system records and have it available for review by Ohio EPA.

**3745-81-52      Revised total coliform rule - repeat monitoring and E. coli requirements.**

**(A) Repeat monitoring.**

- (1) When a sample collected in accordance with rule 3745-81-51 of the Administrative Code is total coliform-positive, the public water system shall monitor with a set of three repeat samples within twenty-four hours of being notified of the positive result. The system must collect no fewer than three repeat samples for each total coliform-positive sample.
  - (a) The director shall not waive the requirement for a system to collect repeat samples in accordance with paragraphs (A)(1) to (A)(3) of this rule.
  - (b) The twenty-four hour time limit to collect repeat samples may be extended up to an additional seventy-two hours when one or more of the following conditions beyond the control of the public water system prevent it from complying:
    - (i) The certified laboratory that performs sample collection for the system is not available on a weekend or holiday.
    - (ii) Collection of samples within twenty-four hours would result in the holding time being exceeded before analysis is started due to limited delivery service or a laboratory not being open.
    - (iii) Sample bottles could not be obtained due to certified laboratories being closed on a weekend or holiday.
    - (iv) Extreme weather conditions create unsafe travel or on-site conditions for the person collecting the samples.
  - (c) A public water system using the time extension provisions of this paragraph shall record the reasons for the delay in collecting repeat samples on the sample submission form.
  - (d) Upon a request from a public water system, the director may extend the twenty-four-hour limit on a case-by-case basis when the public water system has a logistical problem collecting the repeat samples within twenty-four hours other than those specified in this paragraph or when one or more of the conditions in paragraph (A)(1)(b) of this rule create an unavoidable delay longer than an additional seventy-two hours. When an extension is granted by the director, the director shall specify how much time the public water system has to monitor with repeat samples.
- (2) Public water systems shall collect all total coliform repeat samples on the same day.
- (3) When one or more repeat sample in the current set is total coliform-positive, the public water system shall continue to monitor with an additional set of repeat samples in the manner specified in paragraphs (A)(1) to (A)(3) of this rule until total coliforms are not detected in one complete set of repeat samples or the system determines that a coliform treatment technique trigger as set forth in paragraph (A) of rule 3745-81-53

of the Administrative Code has been exceeded as a result of a repeat sample being total coliform-positive and notifies the director no later than the end of the next business day after the public water system learns of the total coliform-positive result.

- (4) When a trigger identified in rule 3745-81-53 of the Administrative Code is exceeded as a result of a routine sample being total coliform-positive, public water systems are required to monitor with only one set of repeat samples for each total coliform-positive routine sample.
  - (5) After a public water system monitors with a routine sample and before the public water system learns the results of the analysis of that sample, when the public water system collects one or more other routine sample from within five adjacent service connections of the initial sample, and the initial sample, after analysis, is found to contain total coliforms, then the public water system may consider the subsequent samples as repeat samples instead of as routine samples.
  - (6) Results of all routine and repeat samples taken under rule 3745-81-51 and this rule of the Administrative Code not invalidated by the director shall be used to determine whether a coliform treatment technique trigger specified in rule 3745-81-53 of the Administrative Code has been exceeded.
- (B) When any routine or repeat sample is total coliform-positive, the public water system shall have that total coliform-positive culture further analyzed to determine if *Escherichia coli* (*E. coli*) are present. When *E. coli* are present, the public water system shall notify the director by the end of the day when the system is notified of the test result, unless the system is notified of the result after the director's office is closed, in which case the system shall notify the director before the end of the next business day. All repeat sample results shall be submitted no later than the end of the next business day following analysis.

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3745-81-53      **Revised total coliform rule - coliform treatment technique triggers and assessment requirements.**

(A) Public water systems shall conduct assessments in accordance with paragraph (B) of this rule after exceeding any of the following treatment technique triggers:

(1) Level one treatment technique triggers.

- (a) For a public water system which monitors with at least forty samples per month, the number of total coliform-positive samples exceeds 5.0 per cent of the total number of samples during a month.
- (b) For a public water system which monitors with fewer than forty samples per month, the system has two or more total coliform-positive samples during the same month.
- (c) The public water system fails to monitor with all required repeat samples following a total coliform-positive sample.

(2) Level two treatment technique triggers.

- (a) An *Escherichia coli* (*E. coli*) maximum contaminant level violation (MCL) in accordance with paragraph (A) of rule 3745-81-54 of the Administrative Code.
- (b) A second level one treatment technique trigger as defined in paragraph (A)(1) of this rule, within a consecutive twelve-month period, unless the director has determined that the public water system has corrected the likely cause of the total coliform-positive samples that triggered the first assessment.

(B) Assessments.

- (1) Public water systems shall ensure that level one and level two assessments are conducted in order to identify the possible presence of significant deficiencies and deficiencies in distribution system coliform monitoring practices. Level two assessments shall be conducted by a person acceptable by the director.
- (2) When conducting assessments, public water systems shall ensure that the assessor evaluates minimum elements that include review and identification of inadequacies in sample sites; sampling protocol; sample processing; atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., small ground water systems); and existing water quality monitoring data. The system shall conduct the assessment consistent with any directives of the director that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.
- (3) Level one assessments. A public water system shall conduct a level one assessment

consistent with requirements set forth by the director if the system exceeds one of the treatment technique triggers in paragraph (A)(1) of this rule.

- (a) The public water system shall complete a level one assessment as soon as practical after any trigger in paragraph (A)(1) of this rule. In the completed assessment form, the public water system shall describe significant deficiencies detected, corrective actions completed, and a proposed timetable in accordance with rule 3745-81-61 of the Administrative Code for any corrective actions not already completed. The assessment form may also note that no significant deficiencies were identified. The public water system shall submit the completed level one assessment form to the director within thirty days after the system learns that it exceeded a treatment technique trigger.
  - (b) The director shall review the completed level one assessment and determine whether the assessment is sufficient (including any proposed timetable for any corrective actions not already completed). The director shall consult with the public water system in accordance with rule 3745-81-61 of the Administrative Code. If the director requires revisions after consultation, the public water system shall submit a revised assessment form to the director on an agreed upon schedule not to exceed thirty days from the date of the consultation.
  - (c) Upon completion and submission of the assessment form by the public water system, the director shall determine if the system has identified a likely cause for the level one trigger and, if so, establish that the system has corrected the problem or has included a schedule acceptable to the director for correcting the problem.
- (4) Level two assessments. A public water system shall ensure that a level two assessment is conducted if the system exceeds one of the treatment technique triggers in paragraph (A)(2) of this rule. The public water system shall comply with any expedited actions or additional actions required by the director in the case of an E. coli MCL.
- (a) The public water system shall ensure that a level two assessment is completed as soon as practical after exceeding any treatment technique trigger in paragraph (A)(2) of this rule. The public water system shall submit a completed level two assessment form to the director within thirty days after the system learns that it has exceeded a trigger. The assessment form shall describe significant deficiencies detected, corrective actions completed, and a proposed timetable in accordance with rule 3745-81-61 of the Administrative Code for any corrective actions not already completed. The assessment form may also note that no significant deficiencies were identified.
  - (b) The director shall review the completed level two assessment and determine whether the assessment is sufficient (including any proposed timetable for any corrective actions not already completed). If the director finds that the assessment is not sufficient, the director shall consult with the public water system in accordance with rule 3745-81-61 of the Administrative Code. If the director requires revisions after consultation, the public water system shall submit a

revised assessment form to the director on an agreed upon schedule not to exceed thirty days.

- (c) Upon completion and submission of the assessment form by the public water system, the director shall determine if the system has identified a likely cause for the level two trigger and determine whether the system has corrected the problem or has included a schedule acceptable to the director for correcting the problem.
- (C) Significant deficiencies found through either level one or level two assessments conducted in accordance with paragraph (B) of this rule shall be corrected by the public water system in accordance with rule 3745-81-61 of the Administrative Code.



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3745-81-54      **Revised total coliform rule - violations.**

- (A) Maximum contaminant level (MCL) for *Escherichia coli* (*E. coli*). A public water system in violation of the MCL for *E. coli* as a result of any of the following conditions shall notify the public using tier 1 notification requirements in accordance with rule 3745-81-32 of the Administrative Code:
  - (1) A public water system that has an *E. coli*-positive repeat sample following a total coliform-positive routine sample is in violation of the MCL for *E. coli*.
  - (2) A public water system that has a total coliform-positive repeat sample following an *E. coli*-positive routine sample is in violation of the MCL for *E. coli*.
  - (3) A system that fails to collect all required repeat samples following an *E. coli*-positive routine sample is in violation of the MCL for *E. coli*.
  - (4) A system that fails to test for *E. coli* when any repeat sample is total coliform-positive is in violation of the MCL for *E. coli*.
- (B) Treatment technique violation. A public water system incurring either of the following treatment technique violations shall notify the public using tier 2 notification requirements in accordance with rule 3745-81-32 of the Administrative Code:
  - (1) A treatment technique violation occurs when a public water system exceeds a treatment technique trigger in accordance with paragraph (A) of rule 3745-81-53 of the Administrative Code and fails to conduct the required assessment within the time frame specified in paragraphs (B) and (C) of rule 3745-81-53 of the Administrative Code or fails to perform corrective actions in accordance with rule 3745-81-61 of the Administrative Code.
  - (2) A treatment technique violation occurs when a seasonal public water system fails to complete a start-up procedure, in accordance with rule 3745-81-51 of the Administrative Code, prior to serving water to the public.
- (C) Monitoring violations. A public water system incurring either of the following monitoring violations shall notify the public using tier 3 notification requirements in accordance with rule 3745-81-32 of the Administrative Code:
  - (1) Failure to take required routine or additional routine samples in a compliance period is a monitoring violation.
  - (2) Failure to analyze for *E. coli* following a total coliform-positive routine sample is a monitoring violation.
- (D) Reporting violations. A public water system incurring any of the following reporting violations shall notify the public using tier 3 notification requirements in accordance with rule 3745-81-32 of the Administrative Code:
  - (1) Failure to submit a monitoring report after a public water system properly conducts monitoring in accordance with rules 3745-81-50 to 3745-81-52 of the Administrative

Code is a reporting violation.

- (2) Failure to submit a completed assessment form after a system properly conducts an assessment in accordance with rule 3745-81-53 of the Administrative Code is a reporting violation.
- (3) Failure to notify the director following an E. coli-positive sample in accordance with paragraph (B) of rule 3745-81-52 of the Administrative Code is a reporting violation.
- (4) For a seasonal public water system, failure to submit certification of completion of a start-up procedure in accordance with rule 3745-81-51 of the Administrative Code is a reporting violation.

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**3745-81-55 Revised total coliform rule - reporting and recordkeeping.**

**(A) Reporting.**

**(1) Escherichia coli (E. coli).**

(a) A public water system shall notify the director by the end of the day when the system learns of an E. coli maximum contaminant level violation, unless the system learns of the violation after the director's office is closed, in which case the system shall notify the director before the end of the next business day and notify the public in accordance with rule 3745-81-32 of the Administrative Code.

(b) A public water system shall notify the director by the end of the day when the system is notified of an E. coli-positive routine sample, unless the system is notified of the result after the director's office is closed, in which case the system shall notify the director before the end of the next business day.

(2) A public water system that has violated the treatment technique for coliforms in accordance with rule 3745-81-53 of the Administrative Code shall report the violation to the director no later than the end of the next business day after it learns of the violations and notify the public in accordance with rule 3745-81-32 of the Administrative Code.

(3) A public water system required to conduct an assessment in accordance with rule 3745-81-53 of the Administrative Code shall submit the assessment report within thirty days. The public water system shall notify the director, in accordance with paragraph (C)(3) of rule 3745-81-61 of the Administrative Code, when each scheduled corrective action is completed subsequent to submission of the assessment form.

(4) A public water system that has failed to comply with a coliform monitoring requirement in accordance with rules 3745-81-50 to 3745-81-52 of the Administrative Code shall report the monitoring violation to the director within ten days after the system discovers the violation and notify the public in accordance with rule 3745-81-32 of the Administrative Code.

(5) A seasonal public water system shall certify, a minimum of five days prior to serving water to the public, that the system has complied with the start-up procedure acceptable to the director.

**(B) Recordkeeping.**

(1) The public water system shall maintain any assessment form, regardless of who conducts the assessment, and documentation of corrective actions completed as a result of those assessments, or other available summary documentation of the significant deficiencies and corrective actions conducted in accordance with rules 3745-81-53 and 3745-81-61 of the Administrative Code for review by the director. This record shall be maintained by the public water system for a period not less than five years after completion of the assessment or corrective action.

- (2) The public water system shall maintain a record of any repeat sample taken that meets the director's criteria for an extension of the twenty-four hour period for collecting repeat samples in accordance with paragraph (A)(1) of rule 3745-81-52 of the Administrative Code.

Effective: 04/01/2016

Five Year Review (FYR) Dates: 04/01/2021

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.03, 6109.04

3745-81-60      **Inspections and response requirements.**

- (A) Community water systems must undergo a sanitary survey at least every three years. Noncommunity water systems must undergo a sanitary survey at least every five years. The director shall review the results of each sanitary survey to determine whether the existing monitoring frequency is adequate and what additional measures, if any, the public water system needs to undertake to improve drinking water quality.
- (B) In conducting a sanitary survey at a public water system using ground water and having a wellhead protection program approved by the director, information on sources of contamination within the delineated wellhead protection area that was collected in the course of developing and implementing the program should be considered instead of collecting new information, if the information was collected since the last time the public water system was subject to a sanitary survey.
- (C) Public water systems are responsible for ensuring that the required sanitary surveys are performed. If requested, public water systems shall provide any existing information that will enable a sanitary survey to be conducted. Sanitary surveys shall be performed in accordance with procedures approved by the director and will include, but not be limited to an evaluation of public water system components including the source; treatment; distribution system; finished water storage; pump, pump facilities, and controls; monitoring, reporting, and data verification; system management and operation; and operator compliance.
- (D) A public water system shall respond to the director in writing, within thirty days following receipt of a sanitary survey letter, limited scope site visit report or any other inquiry from the director, unless a different response time frame is noted. The response shall indicate how and on what schedule the public water system will address any significant deficiencies and violations noted in the correspondence.
- (E) A public water system shall correct significant deficiencies specified in the sanitary survey report, through source water monitoring or a system assessment and according to the schedule accepted by the director as described in rule 3745-81-61 of the Administrative Code. A public water system shall also correct violations specified in the sanitary survey or limited scope site visit report according to the schedule accepted by the director. Failure to correct significant deficiencies in accordance with the schedule accepted by the director is a treatment technique violation.



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**3745-81-61 Treatment technique requirements for significant deficiencies.**

A significant deficiency, as defined in rule 3745-81-01 of the Administrative Code, may be identified any time a qualifying condition exists at a public water system. The primary means for identifying significant deficiencies are a sanitary survey conducted in accordance with rule 3745-81-60 of the Administrative Code, source water monitoring conducted in accordance with rule 3745-81-42 of the Administrative Code and a level one or level two assessment conducted in accordance with rule 3745-81-53 of the Administrative Code. A public water system shall respond to a significant deficiency as required by this rule to ensure it is corrected in a timely manner and the public is appropriately notified. The director may require specific corrective action to correct an identified significant deficiency. The requirements of this rule are treatment technique requirements.

- (A) Whenever feasible, a public water system shall correct a significant deficiency within thirty days of becoming aware of or being notified of the deficiency. Notification may occur through, but is not limited to, the following methods:
  - (1) Notification to a system using a ground water source in accordance with rule 3745-81-42 of the Administrative Code, including notification by a certified laboratory of fecal contamination in a ground water source sample.
  - (2) Notification in accordance with rule 3745-81-60 or 3745-81-64 of the Administrative Code for significant deficiencies identified during a sanitary survey or limited scope site visit.
  - (3) Identification by the public water system as a result of conducting a level one assessment in accordance with rule 3745-81-53 of the Administrative Code, or notification of significant deficiencies identified during a level one or level two assessment conducted in accordance with rule 3745-81-53 of the Administrative Code.
- (B) When a public water system is not able to complete a corrective action for a significant deficiency within thirty days of becoming aware of or being notified of the deficiency, the system shall comply with the following to establish an approved schedule for completing corrective actions:
  - (1) The public water system shall submit a plan with a schedule for completing corrective actions, which may be part of a level one or level two assessment report, within thirty days of becoming aware of or being notified of the deficiency. Consultation with the director prior to submitting a plan is encouraged.
  - (2) The director shall review the corrective action plan. If the director finds that the proposed corrective actions or schedule are not acceptable, the director shall notify the public water system in writing and may consult with the system regarding necessary modifications. The director may specify interim measures for protection of public health. The director shall consider appropriate interim measures whenever the corrective actions cannot be completed within one hundred twenty days of the system becoming aware of or being notified of the significant deficiency. After consultation with the director, the public water system shall submit a modified plan for corrective

actions and schedule that are acceptable to the director.

(C) Corrective actions.

- (1) Ground water systems that have a significant deficiency identified under rule 3745-81-42 of the Administrative Code shall implement one or more of the following corrective action alternatives in accordance with paragraph (A) or (B) of this rule:
  - (a) Correct all significant deficiencies.
  - (b) Provide an alternate source of water.
  - (c) Eliminate the source of contamination.
  - (d) Provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.
- (2) The public water system shall complete all corrective actions in accordance with paragraph (A) or (B) of this rule and in compliance with all applicable plan review processes.
- (3) The public water system shall notify the director when each scheduled corrective action is completed.

(D) At any time during the assessment, plan review or corrective action phase, either the public water system or the director may request a consultation with the other party to determine the appropriate actions to be taken. The system may consult with the director on all relevant information that may impact the system's ability to comply with rules 3745-81-41 to 3745-81-45, 3745-81-50 to 3745-81-55, 3745-81-60 or 3745-81-64, including the method of accomplishment, an appropriate time frame and other relevant information.

(E) Special notice to the public of significant deficiencies or source water fecal contamination.

- (1) In addition to the applicable public notification requirements in paragraph (B)(1)(i) of rule 3745-81-32 of the Administrative Code, a community ground water system that receives notice from the director of a significant deficiency or notification of a fecal indicator-positive ground water source sample that is not invalidated by the director under paragraph (D) of rule 3745-81-42 of the Administrative Code shall, in accordance with paragraph (F)(8) of rule 3745-96-02 of the Administrative Code, inform the public served by the water system of the fecal indicator-positive source sample or of any significant deficiency that has not been corrected. The system shall continue to inform the public annually until the significant deficiency is corrected or the fecal contamination in the ground water source is determined by the director to be corrected in accordance with paragraphs (A) and (B) of this rule.
- (2) In addition to the applicable public notification requirements in paragraph (B)(1)(i) of rule 3745-81-32 of the Administrative Code, a noncommunity ground water system that receives notice from the director of a significant deficiency shall inform the

public served by the water system in a manner acceptable to the director of any significant deficiency that has not been corrected within twelve months of being notified, or earlier if required by the director. The system shall continue to inform the public annually until the significant deficiency is corrected. The information shall include all of the following:

- (a) The nature of the significant deficiency and the date the significant deficiency was identified.
  - (b) The director-approved plan and schedule for correction of the significant deficiency, including interim measures, progress to date and any interim measures completed.
  - (c) For systems with a large proportion of non-English speaking consumers, defined as ten per cent or more of the residents speaking the same non-English language, information in the appropriate language regarding the importance of the notice or a telephone number or address where consumers may contact the system to obtain a translated copy of the notice or assistance in the appropriate language.
- (3) If required by the director, a noncommunity water system with significant deficiencies that have been corrected shall inform its customers of the significant deficiencies, how the deficiencies were corrected and the dates of correction in accordance with paragraph (E)(2) of this rule.

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**3745-81-64      General requirements of the “Long Term 2 Enhanced Surface Water Treatment (LT2) Rule.”**

- (A) The requirements of rules 3745-81-64 to 3745-81-69 of the Administrative Code are derived from national primary drinking water regulations. This rule establishes or extends treatment technique requirements in lieu of maximum contaminant levels for *Cryptosporidium* and are in addition to requirements for filtration and disinfection in rules 3745-81-71 to 3745-81-75 of the Administrative Code. These rule requirements apply to each public water system using a surface water source, in whole or in part. Wholesale systems must comply with the requirements of these rules based on the population of the largest system in the combined distribution system.

Consecutive systems are not exempt from the requirements of the LT2 rule. However, consecutive systems may receive water that a wholesale system has monitored and treated, if required, to comply with the LT2 rule. In this case, the consecutive system is not required to conduct additional monitoring or install additional treatment on that water under the requirements of the LT2 rule.

- (B) Systems subject to this rule shall comply with the following requirements:

- (1) Systems shall conduct an initial and a second round of source water monitoring for each plant that treats a surface water source, in whole or in part. This monitoring may include sampling for *Cryptosporidium*, *E. coli*, and turbidity as described in rule 3745-81-65 and paragraph (A) of rule 3745-81-66 of the Administrative Code, to determine what level, if any, of additional *Cryptosporidium* treatment that shall be provided.
- (2) Systems that plan to make a significant change to their disinfection practice shall develop disinfection profiles and calculate disinfection benchmarks, as described in paragraph (E) of rule 3745-81-72 of the Administrative Code.
- (3) Systems shall determine the appropriate *Cryptosporidium* treatment bin classification as described in paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code and provide additional treatment for *Cryptosporidium*, if required, as described in paragraph (E) of rule 3745-81-67 of the Administrative Code. Systems shall implement *Cryptosporidium* treatment in accordance with the schedule in paragraph (F) of rule 3745-81-67 of the Administrative Code.
- (4) Systems required to provide additional treatment for *Cryptosporidium* shall implement microbial toolbox options that are designed and operated as described in rule 3745-81-68 of the Administrative Code.

- (5) Systems shall comply with the applicable recordkeeping and reporting requirements described in rule 3745-81-69 of the Administrative Code.
- (6) Systems shall address significant deficiencies identified in sanitary surveys performed by the Ohio environmental protection agency as required by rule 3745-81-60 of the Administrative Code.

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Rule Amplifies: 6109.03, 6109.04

**3745-81-65 Source monitoring requirements.**

**(A) Initial round of source water monitoring.**

Systems shall conduct the following monitoring on the schedule in paragraph (C) of this rule unless they meet the monitoring exemption criteria in paragraph (D) of this rule.

- (1) Systems serving at least ten thousand people shall sample their source water for *Cryptosporidium*, *E. coli*, and turbidity at least monthly for twenty-four months.
- (2) Systems serving less than ten thousand people shall sample their source water for *E. coli* at least once every two weeks for twelve months.
- (3) Systems serving less than ten thousand people may avoid *E. coli* monitoring if the system notifies the director that it will monitor for *Cryptosporidium* as described in paragraph (A)(4) of this rule. The system shall notify the primacy agency at the time of this requirement, no later than three months prior to the date the system is otherwise required to start *E. coli* monitoring under paragraph (C) of this rule.
- (4) Systems serving less than ten thousand people shall sample their source water for *Cryptosporidium* at least twice per month for twelve months or at least monthly for twenty-four months if they meet one of the following, based on monitoring conducted under paragraph (A)(2) of this rule:
  - (a) For systems using lake/reservoir sources, the annual mean *E. coli* concentration is greater than ten *E. coli* per one hundred milliliters.
  - (b) For systems using flowing stream sources, the annual mean *E. coli* concentration is greater than fifty *E. coli* per one hundred milliliters.
  - (c) The system does not conduct *E. coli* monitoring as described in paragraph (A)(2) of this rule.
  - (d) Systems using a well designated as surface water in accordance with rule 3745-81-76 of the Administrative Code shall comply with the requirements of paragraph (A)(4) of this rule based on the *E. coli* level that applies to the nearest surface water body. If no surface water body is nearby, the system shall comply based on the requirements that apply to systems using lake/reservoir sources.
- (5) For systems serving less than ten thousand people, the primacy agency at the time of this requirement may accept monitoring for an indicator other than *E. coli* under paragraph (A)(2) of this rule. The primacy agency also may accept an alternative to the *E. coli* concentration in paragraph (A)(4) of this rule to trigger *Cryptosporidium* monitoring. This acceptance by the primacy agency shall be provided to the system in writing and shall include the basis



for the primacy agency's determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a system will exceed the Bin 1 *Cryptosporidium* level in paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code.

- (6) Systems may sample more frequently than required under this paragraph if the sampling frequency is evenly spaced throughout the monitoring period.

(B) Second round of source water monitoring.

Systems shall conduct a second round of source water monitoring that meets the requirements for monitoring parameters, frequency, and duration described in paragraph (A) of this rule, unless they meet the monitoring exemption criteria in paragraph (D) of this rule. Systems shall conduct this monitoring in accordance with the schedule in paragraph (C) of this rule.

(C) Monitoring schedule.

Systems shall begin the monitoring required in paragraphs (A) and (B) of this rule no later than the month beginning with the date listed in this table:

Source Water Monitoring Starting Date Tables

Systems that serve...	Shall begin the first round of source water monitoring no later than the month beginning...	And shall begin the second round of source water monitoring no later than the month beginning...
(1) At least 100,000 people.	(i) October 1, 2006.	(ii) April 1, 2015.
(2) From 50,000 to 99,999 people.	(i) April 1, 2007.	(ii) October 1, 2015.
(3) From 10,000 to 49,999 people.	(i) April 1, 2008.	(ii) October 1, 2016.
(4) Less than 10,000 and monitor for <i>E. Coli</i> .	(i) October 1, 2008.	(ii) October 1, 2017.
(5) Less than 10,000 and monitor for <i>Cryptosporidium</i> .*	(i) April 1, 2010.	(ii) April 1, 2019.

\* Applies to systems that meet the conditions of paragraph (A)(4) of this rule.

(D) Monitoring avoidance.

- (1) Systems are not required to conduct source water monitoring under this rule if the system will provide a total of at least 5.5-log of treatment for *Cryptosporidium*, equivalent to meeting the treatment requirements of Bin 4 in paragraph (E) of rule 3745-81-67 of the Administrative Code.
- (2) If a system chooses to provide the level of treatment in paragraph (D)(1) of

this rule, as applicable, rather than start source water monitoring, the system shall notify the primacy agency at the time of this requirement, in writing no later than the date the system is otherwise required to submit a sampling schedule for monitoring in accordance with paragraph (I) of this rule.

Alternatively, a system may choose to stop sampling at any point after it has initiated monitoring if it notifies the primacy agency in writing that it will provide this level of treatment. Systems shall install and operate technologies to provide this level of treatment by the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code. The system shall obtain plan approval of the treatment process scheme which provides at least 5.5 log of treatment. The primacy agency may require additional performance monitoring and reporting.

(E) Plants operating only part of the year.

Systems that operate for only part of the year shall conduct source water monitoring in accordance with this rule with the following modifications:

- (1) Systems shall sample their source water only during the months that the plant operates unless the director specifies another monitoring period based on plant operating practices.
- (2) Systems with plants that operate less than six months per year and that monitor for *Cryptosporidium* shall collect at least six *Cryptosporidium* samples per year during each of two years of monitoring. Samples shall be evenly spaced throughout the period the plant operates.

(F) New sources.

Source water monitoring of new sources shall meet the requirements of this rule unless the system meets the monitoring avoidance requirements of paragraph (D) of this rule. The system shall also meet the bin classification and *Cryptosporidium* treatment requirements of paragraphs (A) to (E) of rule 3745-81-67 of the Administrative Code, as applicable, for the new source on a schedule the director approves.

- (1) An existing system that begins using a new source of surface water after the system is required to begin monitoring in accordance with paragraph (C) of this rule, shall monitor the new source on a schedule the director approves.
- (2) A new system that begins operation using a new source after the monitoring date applicable to the system's size in accordance with paragraph (C) of this rule shall monitor the new source on a schedule the director approves.
- (3) The system shall begin a second round of source water monitoring no later than six years following initial bin classification in accordance with paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code.

(G) Failure to collect any source water sample required under this rule in accordance

with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements of paragraphs (I) to (K) of this rule, paragraphs (H) to (J) of rule 3745-81-27, rule 3745-89-11, and paragraph (A) of rule 3745-81-66 of the Administrative Code, is a monitoring violation.

(H) Grandfathering monitoring data.

Systems may use (grandfather) monitoring data collection prior to the applicable monitoring start date in paragraph (C) of this rule to meet the initial source water monitoring requirements in paragraph (A) of this rule. Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under this paragraph shall meet the requirements in paragraph (B) of rule 3745-81-66 of the Administrative Code.

(I) Sampling schedules.

- (1) Systems required to conduct source water monitoring in accordance with paragraphs (A) to (H) of this rule shall submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.
  - (a) Systems shall submit sampling schedules no later than three months prior to the applicable date listed in paragraph (C) of this rule for each round of required monitoring.
  - (b) Systems serving at least ten thousand people shall submit their sampling schedule for the initial round of source water monitoring in accordance with paragraph (A) of this rule to the primacy agency at the time of this requirement electronically. If a system is unable to submit the sampling schedule electronically, the system may use an alternative approach for submitting the sampling schedule that the primacy agency approves.
  - (c) Systems serving less than ten thousand people shall submit their sampling schedules for the initial round of source water monitoring required by paragraph (A) of this rule to the primacy agency at the time of this requirement.
  - (d) Systems shall submit sampling schedules for the second round of source water monitoring required by paragraph (B) of this rule to the director.
  - (e) If the primacy agency at the time of this requirement does not respond to a system regarding its sampling schedule, the system shall sample at the reported schedule.
- (2) Systems shall collect samples within two days before or two days after the dates indicated in their sampling schedule (e.g., within a five day period around the schedule date) unless one of the following conditions applies:

- (a) If an extreme condition or situation exists that may pose danger to the sample collector, or that cannot be avoided and causes the system to be unable to sample in the scheduled five day period, the system shall sample as close to the scheduled date as is feasible unless the primacy agency at the time of this requirement accepts an alternative sampling date. The system shall submit an explanation for the delayed sampling date to the primacy agency concurrent with the shipment of the sample to the laboratory.
- (b) If a system is unable to report a valid analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical method requirements, including the quality control requirements in paragraphs (H) to (J) of rule 3745-81-27 of the Administrative Code, or the failure of an approved laboratory to analyze the sample, then the system shall collect a replacement sample. The system shall collect the replacement sample not later than twenty-one days after receiving information that an analytical result cannot be reported for the scheduled date unless the system demonstrates that collecting a replacement sample within this time frame is not feasible or the director accepts an alternative resampling date. The system shall submit an explanation for the delayed sampling date to the primacy agency at the time of this requirement, concurrent with the shipment of the sample to the laboratory.
- (3) Systems that fail to meet the criteria of paragraphs (I)(2)(a) and (I)(2)(b) of this rule for any source water sample required by paragraphs (A) to (H) of this rule shall revise their sampling schedules to add dates for collecting all missed samples. Systems shall submit the revised schedule to the primacy agency at the time of this requirement, for acceptance prior to when the system begins collecting the missed samples.

(J) Sampling locations.

Systems required to conduct source water monitoring by paragraphs (A) to (H) of this rule shall collect samples for each plant that treats a surface water source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the primacy agency at the time of this requirement, may accept one set of monitoring results to be used to satisfy the requirements of paragraphs (A) to (H) of this rule for all plants.

- (1) Systems shall collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants, unless the system meets the condition of paragraph (J)(2) of this rule.
- (2) The primacy agency at the time of this requirement may accept a system to collect a source water sample after chemical treatment. To grant this acceptance, the primacy agency shall determine that collecting a sample prior to chemical treatment is not feasible for the system and that the chemical

treatment is unlikely to have a significant adverse effect on the analysis of the sample.

- (3) Systems that recycle filter backwash water shall collect source water samples prior to the point of filter backwash water addition.
- (4) Bank filtration.
  - (a) Systems that receive Cryptosporidium treatment credit for bank filtration in accordance with paragraph (C) of rule 3745-81-73 of the Administrative Code, as applicable, shall collect source water samples in the surface water prior to bank filtration.
  - (b) Systems that do not receive Cryptosporidium treatment credit for bank filtration in accordance with paragraph (C) of rule 3745-81-73 of the Administrative Code and that use bank filtration as pretreatment to a filtration plant and do not intend to receive Cryptosporidium treatment credit for bank filtration under paragraph (F) of rule 3745-81-68 of the Administrative Code shall collect source water samples from the well (e.g., after bank filtration). Use of bank filtration during monitoring shall be consistent with routine operational practice.
- (5) Multiple sources.

Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and ground water sources, shall collect samples as specified in paragraph (J)(5)(a) or (J)(5)(b) of this rule. The use of multiple sources during monitoring shall be consistent with routine operational practice.

- (a) If a sampling tap is available where the sources are combined prior to treatment, systems shall collect samples from the tap.
- (b) If a sampling tap where the sources are combined prior to treatment is not available, systems shall collect samples at each source near the intake on the same day and shall do either of the following:
  - (i) Systems may composite samples from each source into one sample prior to analysis. The volume of sample from each source shall be weighted according to the proportion of the source in the total plant flow at the time the sample is collected.
  - (ii) Systems may analyze samples from each source separately and calculate a weighted average of the analysis results for each sampling date. The weighted average shall be calculated by multiplying the analysis result for each source by the fraction the source contributed to total plant flow at the time the sample was collected and then summing these values.

(K) Additional requirements.

Systems shall submit a description of their sampling location to the primacy agency at the time of this requirement, at the same time as the sampling schedule required by paragraph (I) of this rule. This description shall address the position of the sampling location in relation to the system's water source and treatment processes, including pretreatment, points of chemical treatment, and filter backwash recycle. If the primacy agency does not respond to a system regarding sampling location, the system shall sample at the reported location.

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Prior Effective Dates: 01/08/10

**3745-81-66 Source monitoring results and grandfathered data.**

**(A) Reporting source water monitoring results.**

- (1) Systems shall report results from the source water monitoring required by paragraphs (A) to (H) of rule 3745-81-65 of the Administrative Code no later than ten days after the end of the first month following the month when the sample is collected.
- (2) All systems serving at least ten thousand people shall report the results from the initial source water monitoring required by paragraph (A) of rule 3745-81-65 of the Administrative Code to the primacy agency at the time of this requirement electronically. If a system is unable to report monitoring results electronically, the system may use an alternative approach for reporting monitoring results that the primacy agency approves.
- (3) Systems serving less than ten thousand people shall report results from the initial source water monitoring required by paragraph (A) of rule 3745-81-65 of the Administrative Code to the primacy agency at the time of this requirement.
- (4) All systems shall report results from the second round of source water monitoring required by paragraph (B) of rule 3745-81-65 of the Administrative Code to the director.
- (5) Systems shall report the following applicable information for the source water monitoring required by paragraphs (A) to (H) of rule 3745-81-65 of the Administrative Code:

- (a) Systems shall report the following information for each *Cryptosporidium* analysis:

Public water system (PWS) ID;

Source treatment unit (STU) ID;

Sample collection date;

Sample type (field or matrix spike);

Sample volume filtered (L), to nearest 0.25 L;

Was one hundred per cent of filtered volume examined; and

Number of oocysts counted.

For matrix spike samples, systems shall also report the sample volume spiked and estimated number of oocysts spiked. These data are not required for field samples.

For samples in which less than ten liters is filtered or less than one

hundred per cent of the sample volume is examined, systems shall also report the number of filters used and the packed pellet volume.

For samples in which less than one hundred per cent of sample volume is examined, systems shall also report the volume of re-suspended concentrate and volume of this re-suspension processed through immunomagnetic separation.

- (b) Systems shall report the following information for each E. coli analysis:

PWS ID;

STU ID;

Sample collection date;

Analytical method number;

Method type;

Source type (e.g., flowing stream, lake/reservoir, well designated as surface water);

E. coli/one hundred milliliters;

Turbidity. (Systems serving less than ten thousand people that are not required to monitor for turbidity in accordance with paragraphs (A) to (H) of rule 3745-81-65 of the Administrative Code are not required to report turbidity with their E. coli results.)

- (B) Grandfathering previously collected data.

Systems may comply with the initial source water monitoring requirements of paragraph (A) of rule 3745-81-65 of the Administrative Code by grandfathering sample results collected before the system is required to begin monitoring (i.e., previously collected data). To be grandfathered, the sample results and analysis shall meet the following criteria and shall be accepted by the primacy agency at the time of this requirement:

- (1) A system may grandfather Cryptosporidium samples to meet the requirements of paragraph (A) of rule 3745-81-65 of the Administrative Code when the system does not have corresponding E. coli and turbidity samples. A system that grandfathers Cryptosporidium samples without E. coli and turbidity samples is not required to collect E. coli and turbidity samples when the system completes the requirements for Cryptosporidium monitoring in accordance with paragraph (A) of rule 3745-81-65 of the Administrative Code.
- (2) E. coli sample analysis. The analysis of E. coli samples shall meet the analytical method and approved laboratory requirements of paragraphs (H) to (J) of rule 3745-81-27 and rule 3745-89-11 of the Administrative Code.



- (3) Cryptosporidium sample analysis. The analysis of Cryptosporidium samples shall meet the following criteria:
  - (a) Laboratories analyzed Cryptosporidium samples using one of the following analytical methods:
    - (i) USEPA method 1623, "Cryptosporidium and Giardia in Water by Filtration/IMS/FA" United States environmental protection agency, 2005, EPA-815-R-05-002.
    - (ii) USEPA method 1622, "Cryptosporidium in Water by Filtration/IMS/FA" United States environmental protection agency, 2005, EPA-815-R-05-001.
    - (iii) USEPA method 1623, "Cryptosporidium and Giardia in Water by Filtration/IMS/FA" United States environmental protection agency, 2001, EPA-821-R-01-025.
    - (iv) USEPA method 1622, "Cryptosporidium in Water by Filtration/IMS/FA" United States environmental protection agency, 2001, EPA-821-R-01-026.
    - (v) USEPA method 1623, "Cryptosporidium and Giardia in Water by Filtration/IMS/FA" United States environmental protection agency, 1999, EPA-821-R-99-006.
    - (vi) USEPA method 1622, "Cryptosporidium in Water by Filtration/IMS/FA" United States environmental protection agency, 1999, EPA-821-R-99-001.
  - (b) For each Cryptosporidium sample, the laboratory analyzed at least ten liters of sample or at least two milliliters of packed pellet or as much volume as could be filtered by two filters that U.S. EPA approved for the methods listed in paragraph (B)(3)(a) of this rule.
- (4) Sampling location. The sampling location shall meet the conditions of paragraph (J) of rule 3745-81-65 of the Administrative Code.
- (5) Sampling frequency. Cryptosporidium samples were collected no less frequently than each calendar month on a regular schedule, beginning no earlier than January 1999. Sample collection intervals may vary for the conditions specified in paragraphs (I)(2)(a) and (I)(2)(b) of rule 3745-81-65 of the Administrative Code if the system provides documentation of the condition when reporting monitoring results.
  - (a) The primacy agency at the time of this requirement may accept grandfathering of previously collected data where there are time gaps in the sampling frequency if the system conducts additional monitoring the primacy agency specifies to ensure that the data used to comply with the

initial source water monitoring requirements of paragraph (A) of rule 3745-81-65 of the Administrative Code are seasonally representative and unbiased.

- (b) Systems may grandfather previously collected data where the sampling frequency within each month varied. If the *Cryptosporidium* sampling frequency varied, systems shall follow the monthly averaging procedure in paragraph (A)(5) of rule 3745-81-67 of the Administrative Code, as applicable, when calculating the bin classification for systems.
- (6) Reporting monitoring results for grandfathering. Systems that request to grandfather previously collected monitoring results shall report the following information by the applicable dates listed in this paragraph. Systems shall report this information to the primacy agency at the time of this requirement.
- (a) Systems shall report that they intend to submit previously collected monitoring results for grandfathering. This report shall specify the number of previously collected results the system will submit, the dates of the first and last sample, and whether a system will conduct additional source water monitoring to meet the requirements of paragraph (A) of rule 3745-81-65 of the Administrative Code. Systems shall report this information no later than the date the sampling schedule is required by paragraph (I) of rule 3745-81-65 of the Administrative Code.
  - (b) No later than two months after the applicable date listed in paragraph (C) of rule 3745-81-65 of the Administrative Code, systems shall report previously collected monitoring results for grandfathering, along with the following associated documentation:
    - (i) For each sample result, systems shall report the applicable information in paragraph (A) of this rule.
    - (ii) Systems shall certify that the reported monitoring results include all results the system generated during the time period beginning with the first report result and ending with the final reported result. This applies to samples that were collected from the sampling location specified for source water monitoring in rule 3745-81-65 of the Administrative Code, not spiked, and analyzed using the laboratory's routine process for the analytical methods listed in paragraph (B)(3)(a) of this rule.
    - (iii) Systems shall certify that the samples were representative of a plant's source water and the source water have not changed. Systems shall report a description of the sampling locations, which shall address the position of the sampling location in relation to the systems water source and treatment processes, including points of chemical addition and filter backwash recycle.
    - (iv) For *Cryptosporidium* samples, the laboratory or laboratories that

analyzed the samples shall provide a letter certifying that the quality control criteria specified in the methods listed in paragraph (B)(3)(a) of this rule were met for each sample batch associated with the reported results. Alternatively, the laboratory may provide bench sheets and sample examination report forms for each field, matrix spike, "Initial Precision and Recovery (IPR)", "Ongoing Precision and Recovery (OPR)," and method blank sample associated with the reported results.

- (7) If the director determines that a previously collected data set submitted for grandfathering was generated during source water conditions that were not normal for the system, such as a drought, the director may determine not to accept the data. Alternatively, the primacy agency may accept the previously collected data if the system reports additional source water monitoring data, as determined by the primacy agency, to ensure that the data set used under paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code represents average source water conditions for the system.
- (8) If a system submits previously collected data that fully meet the number of samples required for initial source water monitoring in accordance with paragraph (A) of rule 3745-81-65 of the Administrative Code and some of the data are rejected due to not meeting the requirements of this rule, systems shall conduct additional monitoring to replace rejected data on a schedule the primacy agency at the time of this requirement accepts. Systems are not required to begin this additional monitoring until two months after notification that data have been rejected and additional monitoring is necessary.

[The director of the Federal Register approves incorporation by reference in paragraphs (B)(3)(a)(i) to (B)(3)(a)(vi) of this rule in accordance with 5 U.S.C. 552(a) and 1 C.F.R. part 51. You may obtain a copy of these methods on-line from the United States environmental protection agency, office of ground water and drinking water, 1301 Constitution Avenue, NW Washington, DC 20460 (telephone: 800-426-4791). You may inspect a copy at the "Water Docket in the EPA Docket Center, 101 Constitution Ave. NW, Washington, D.C.," (telephone: 202-566-2426) or at the National archives and records administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html).]

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**3745-81-67     LT2 bin classification and treatment technique requirements.**

- (A) Following completion of the initial round of source water monitoring required by paragraph (A) of rule 3745-81-65 of the Administrative Code, systems shall calculate an initial *Cryptosporidium* bin concentration for each plant for which monitoring was required. Calculation of the bin concentration shall use the *Cryptosporidium* results reported under paragraph (A) of rule 3745-81-65 of the Administrative Code and shall use the following procedures.
- (1) For systems that collect a total of at least forty-eight samples, the bin concentration is equal to the arithmetic mean of all sample concentrations.
  - (2) For systems that collect a total of at least twenty-four samples, but not more than 47 samples, the bin concentration is equal to the highest arithmetic mean of all sample concentrations in any twelve consecutive months during which *Cryptosporidium* samples were collected.
  - (3) For systems that serve less than ten thousand people and monitor for *Cryptosporidium* for only one year (i.e., collect twenty-four samples in twelve months), the bin concentration is equal to the arithmetic mean of all sample concentrations.
  - (4) For systems with plants operating only part of the year that monitor less than twelve months per year in accordance with paragraph (E) of rule 3745-81-65 of the Administrative Code, the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.
  - (5) If the monthly *Cryptosporidium* sampling frequency varies, systems shall first calculate a monthly average for each month of monitoring. Systems shall then use these monthly average concentrations, rather than individual sample concentrations, in the applicable calculation for bin classification in paragraphs (A)(1) to (A)(4) of this rule.
- (B) Systems shall determine their initial bin classification from the following table and using the *Cryptosporidium* bin concentration calculated under paragraphs (A)(1) to (A)(5) of this rule:

**Bin Classification Table for Systems**

For systems that are:	With a <i>Cryptosporidium</i> bin concentration of... <sup>1</sup>	The bin classification is
...required to monitor for [ <i>Cryptosporidium</i> ] as specified in paragraphs (A) to (H) of rule 3745-81-65 of the Administrative Code.	<i>Cryptosporidium</i> < 0.075 oocyst/L...	Bin 1.
	$0.075 \text{ oocysts/L} \leq \textit{Cryptosporidium} < 1.0 \text{ oocysts/L}$	Bin 2.
	$1.0 \text{ oocysts/L} \leq \textit{Cryptosporidium} < 3.0 \text{ oocysts/L}$ ...	Bin 3.
	<i>Cryptosporidium</i> $\geq 3.0 \text{ oocysts/L}$ ...	Bin 4.
...serving less than 10,000 people and NOT required to monitor for <i>Cryptosporidium</i> under paragraph (A)(4) of rule 3745-81-65 of the Administrative Code.	Not applicable...	Bin 1.

<sup>1</sup> Based on calculations in paragraph (A) or (C) of this rule, as applicable.

Systems shall report their initial bin classification to the director for approval no later than six months after the system is required to complete initial source water monitoring based on the schedule in paragraph (C) of rule 3745-81-65 of the Administrative Code. The bin classification report to the director shall include a summary of source water monitoring data and the calculation procedure used to determine bin classification.

For systems serving less than one hundred thousand within twelve months after the system is required to complete initial source water monitoring, the system shall submit a general plan to the director indicating the system's plan for complying with any additional *Cryptosporidium* inactivation and/or removal requirements. Systems serving at least one hundred thousand people shall submit a general plan by March 1, 2010. The general plan shall include at a minimum, a description of each toolbox option which may be used, and a schedule for submitting any required detail plans and/or protocols/pilot study results for the proposed toolbox option. The general plan shall be prepared and submitted by a professional engineer.

- (C) Following completion of the second round of source water monitoring required in accordance with paragraph (B) of rule 3745-81-65 of the Administrative Code, systems shall recalculate their *Cryptosporidium* bin concentration using the *Cryptosporidium* results reported in accordance with paragraph (B) of rule 3745-81-65 of the Administrative Code and following

the procedures in paragraphs (A)(1) to (A)(4) of this rule. Systems shall then re-determine their bin classification using this bin concentration and the table in paragraph (B) of this rule. Systems shall report their bin classification to the director for approval no later than six months after the system is required to complete the second round of source water monitoring based on the schedule in paragraph (C) of rule 3745-81-65 of the Administrative Code. The bin classification report to the director shall include a summary of source water monitoring data and the calculation procedure used to determine bin classification.

Within six months of receiving the director's approval of the bin classification, the system shall submit a general plan to the director indicating the system's plan for complying with any additional *Cryptosporidium* inactivation and/or removal requirements. The general plan shall include at a minimum, a description of each toolbox option which may be used, and a schedule for submitting any required detail plans and/or protocols/pilot study results for the proposed toolbox option.

- (D) Failure to comply with the reporting requirements in paragraphs (B) and (C) of this rule is a violation of the treatment technique requirement.
- (E) Additional *Cryptosporidium* treatment requirements based on bin classification.
  - (1) Systems shall provide the level of additional treatment for *Cryptosporidium* specified in this paragraph based on their bin classification as determined in accordance with paragraphs (A) to (D) of this rule and according to the schedule in paragraph (F) of this rule.

**Additional *Cryptosporidium* treatment requirements based on bin classification.**

If the system bin classification is...	And the system uses the following filtration treatment in full compliance with rules 3745-81-71 to 3745-81-76 of the Administrative Code (as applicable), then the additional <i>Cryptosporidium</i> treatment requirements are...			
	Conventional filtration treatment (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
Bin 1...	No additional treatment...	No additional treatment...	No additional treatment...	No additional treatment...
Bin 2...	1-log treatment...	1.5-log treatment...	1-log treatment...	(1)
Bin 3...	2-log treatment...	2.5-log treatment...	2-log treatment...	(2)
Bin 4...	2.5-log treatment...	3-log treatment...	2.5-log treatment...	(3)

(1) As determined by the director such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.

(2) As determined by the director such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.

(3) As determined by the director such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

- (2) Systems shall use one or more of the treatment and management options listed in paragraph (A) of rule 3745-81-68 of the Administrative Code, termed the microbial toolbox, to comply with the additional *Cryptosporidium* treatment required in paragraph (E)(1) of this rule.
- (3) Systems classified in Bin 3 and Bin 4 shall achieve at least 1-log of the additional *Cryptosporidium* treatment required under paragraph (E)(1) of this rule using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in paragraphs (B) to (N) of rule 3745-81-68 of the Administrative Code.
- (4) Failure by a system in any month to achieve treatment credit by meeting criteria in paragraphs (B) to (N) of rule 3745-81-68 of the Administrative Code for microbial toolbox options that is at least equal to the level of treatment required in paragraph (E)(1) of this rule is a violation of the treatment technique requirement.
- (5) If the director determines during a sanitary survey or an equivalent source water assessment that after a system completed the monitoring conducted in accordance with paragraphs (A) or (B) of rule 3745-81-65 of the Administrative Code, significant changes occurred in the system's watershed that could lead to increased contamination of the source water by *Cryptosporidium*, the system shall take actions specified by the director to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox

options listed in paragraph (A) of rule 3745-81-68 of the Administrative Code.

(F) Schedule for compliance with *Cryptosporidium* treatment requirements.

- (1) After the initial bin classification is determined, systems shall provide the level of treatment for *Cryptosporidium* required by paragraph (E) of this rule in accordance with the following schedule:

***Cryptosporidium* Treatment Compliance Dates Table**

Systems that serve	Shall comply with <i>Cryptosporidium</i> treatment requirements no later than ...*
(1) At least 100,000 people.	(1) April 1, 2012
(2) From 50,000 to 99,999 people.	(1) October 1, 2012
(3) From 10,000 to 49,999 people.	(1) October 1, 2013
(4) Fewer than 10,000 people.	(1) October 1, 2014
* Systems with a bin classification of Bin 3 or Bin 4 shall have an additional two years for complying with the treatment requirement if capital improvements will be made. The director may allow up to an additional two years for complying with the treatment requirement for systems in Bin 2 if capital improvements will be made.	

- (2) If the bin classification for a system changes following the second round of source water monitoring, as determined in accordance with paragraph (C) of this rule, the system shall provide the level of treatment for *Cryptosporidium* required in accordance with paragraph (E) of this rule on a schedule the director approves.

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**3745-81-68 Microbial toolbox options for meeting Cryptosporidium treatment requirements.**

- (A) Water systems shall obtain plan approval by the director for each microbial toolbox option prior to receiving treatment credit for the toolbox option. Systems receive the treatment credits listed in the following table by meeting the conditions for microbial toolbox options described in paragraphs (B) to (N) of this rule. Systems shall apply these treatment credits to meet the treatment required by paragraph (E) of rule 3745-81-67 of the Administrative Code. The following table summarizes options in the microbial toolbox:

<b>MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA</b>	
Toolbox Option	Cryptosporidium treatment credit with design and implementation criteria
Source Protection and Management Toolbox Options	
(1) Watershed control program...	0.5-log credit for director-approved program comprising required elements, annual program status report to director, and regular watershed survey. Specific criteria are in paragraph (B) of this rule.
(2) Alternative source/intake management...	No prescribed credit. Systems may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake management strategies. Specific criteria are in paragraph (C) of this rule.

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA	
Toolbox Option	Cryptosporidium treatment credit with design and implementation criteria
Pre Filtration Toolbox Options	
(3) Presedimentation basin with coagulation...	0.5-log credit during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in turbidity or alternative director-approved performance criteria. To be eligible, basins shall be operated continuously with coagulant addition and all plant flow shall pass through basins. Specific criteria are in paragraph (D) of this rule.
(4) Two-stage lime softening...	0.5-log credit for two-stage softening where chemical additional and hardness precipitation occur in both stages. All plant flow shall pass through both stages. Single-stage softening is credited as equivalent to conventional treatment. Specific criteria are in paragraph (E) of this rule.
(5) Bank filtration...	0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback; aquifer shall be unconsolidated sand containing at least 10 per cent fines; average turbidity in wells shall be less than 1 NTU. Systems using wells followed by filtration when conducting source water monitoring shall sample the well to determine bin classification and are not eligible for additional credit. Specific criteria are in paragraph (F) of this rule.

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA	
Toolbox Option	Cryptosporidium treatment credit with design and implementation criteria
Treatment Performance Toolbox Options	
(6) Combined filter performance...	0.5-log credit for combined filter effluent turbidity less than or equal to 0.15 NTU in at least 95 per cent of measurements each month. Specific criteria are in paragraph (G) of this rule.
(7) Individual filter performance...	0.5-log credit (in addition to 0.5-log combined filter performance credit) if individual filter effluent turbidity is less than or equal to 0.15 NTU in at least 95 per cent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter. Specific criteria are in paragraph (H) of this rule.
(8) Demonstration of performance...	Credit awarded to unit process or treatment train based on a demonstration to the director with a director-accepted protocol. Specific criteria are in paragraph (I) of this rule.
Additional Filtration Toolbox Options	
(9) Bag or cartridge filters (individual filters)...	Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. Specific criteria are in paragraph (J) of this rule.
(10) Bag or cartridge filters (in series)...	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. Specific criteria in paragraph (J) of this rule.
(11) Membrane filtration...	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. Specific criteria are in paragraph (K) of this rule.
(12) Second stage filtration...	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. Specific criteria are in paragraph (L) of this rule.
(13) Slow sand filters....	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. Specific criteria are in paragraph (M) of this rule.

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA	
Toolbox Option	Cryptosporidium treatment credit with design and implementation criteria
Inactivation Toolbox Options	
(14) Chlorine dioxide...	Log credit based on measured CT in relation to CT table. Specific criteria in paragraph (N)(2) of this rule.
(15) Ozone...	Log credit based on measured CT in relation to CT table. Specific criteria in paragraph (N)(2) of this rule.
(16) UV...	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. Specific criteria in paragraph (N)(4) of this rule.

(B) Watershed control program.

Systems received 0.5-log Cryptosporidium treatment credit for implementing a watershed control program that meets the requirements of this paragraph.

- (1) Systems that intend to apply for the watershed control program credit shall notify the director of this intent no later than two years prior to the treatment compliance date applicable to the system in paragraph (F) of rule 3745-81-67 of the Administrative Code.
- (2) Systems shall submit to the director a proposed watershed control plan no later than one year before the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code. The director shall approve the watershed control plan for the system to receive watershed control program treatment credit. The watershed control plan shall include the following elements:
  - (a) Identification of an area of influence outside of which the likelihood of Cryptosporidium or fecal contamination affecting the treatment plant intake is not significant as approved by the director. This is the area to be evaluated in future watershed surveys in accordance with paragraph (B)(4)(b) of this rule. The area of influence shall include, at a minimum:
    - (i) For systems using inland streams, reservoirs, and lakes, the

drinking water source protection area with primary focus on the corridor management zone and any additional areas within the watershed that have been specifically identified by the public water system or the director as possible sources of *Cryptosporidium*.

- (ii) For systems using the Ohio river, the zone of critical concern.
    - (iii) For systems using lake Erie, the potential influence zone, where this zone has been delineated.
  - (b) Identification of both potential and actual sources of *Cryptosporidium* contamination and an assessment of the relative impact of these sources on the system's source water quality.
  - (c) An analysis of the effectiveness and feasibility of control measures that could reduce *Cryptosporidium* loading from sources of contamination to the system's source water.
  - (d) A statement of goals and specific actions the system will undertake to reduce source water *Cryptosporidium* levels. The plan shall explain how the actions are expected to contribute to specific goals, identify watershed partners and their roles, identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.
- (3) Systems with existing watershed control programs (i.e., programs in place on January 5, 2006) are eligible to seek this credit. Their watershed control plans shall meet the criteria in paragraph (B)(2) of this rule and shall specify ongoing and future actions that will reduce source water *Cryptosporidium* levels.
- (4) Systems shall complete the following actions to maintain the 0.5-log credit.
- (a) Submit an annual watershed control program status report to the director. The annual watershed control program status report shall describe the system's implementation of the approved plan and assess the adequacy of the plan to meet its goals. It shall explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the director or as the result of the watershed survey conducted under paragraph (B)(4)(b) of this rule. It shall also describe any significant changes

that have occurred in the watershed since the last watershed sanitary survey. If a system determines during implementation that making a significant change to its approved watershed control program is necessary, the system shall notify the director prior to making any such changes. If any change is likely to reduce the level of source water protection, the system shall also list in its notification the actions the system will take to mitigate this effect.

- (b) Undergo a watershed sanitary survey every three years for community water systems and every five years for non-community water systems and submit the survey report to the director. The survey shall be conducted according to Ohio environmental protection agency guidelines and by persons acceptable to the director.
    - (i) The watershed sanitary survey shall meet the following criteria: encompass the region identified in the director-approved watershed control plan as the area of influence; assess the implementation of actions to reduce source water *Cryptosporidium* levels; and identify any significant new sources of *Cryptosporidium*.
    - (ii) If the director determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, systems shall undergo another watershed sanitary survey by a date the director requires, which may be earlier than the regular date in paragraph (B)(4)(b) of this rule.
  - (c) The system shall make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public upon request. These documents shall be in a plain language style and include criteria by which to evaluate the success of the program in achieving plan goals. The director may accept systems to withhold from the public portions of the annual status report, watershed control plan, and watershed sanitary survey based on water supply security considerations.
- (5) If the director determines that a system is not carrying out the approved watershed control plan, or if conditions change from those approved, the watershed control plan may no longer be approvable. An approvable plan must be submitted to maintain the watershed control program treatment credit.

(C) Alternative source.

- (1) A system may conduct source water monitoring that reflects a different intake location (either in the same source or for an alternate source) or a different procedure for the timing or level of withdrawal from the source (alternative source monitoring). If the director approves, a system may determine its bin classification in accordance with paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code based on the alternative source monitoring results.
- (2) If systems conduct alternative source monitoring in accordance with paragraph (C)(1) of this rule, systems shall also monitor their current plant intake concurrently as described in paragraphs (A) to (H) of rule 3745-81-65 of the Administrative Code.
- (3) Alternative source monitoring under paragraph (C)(1) of this rule shall meet the requirements for source monitoring to determine bin classification, as described in rule 3745-81-65, paragraphs (H) to (J) of rule 3745-81-27, rule 3745-89-11, and paragraph (A) of rule 3745-81-66 of the Administrative Code. Systems shall report the alternative source monitoring results to the director, along with supporting information documenting the operating conditions under which the samples were collected.
- (4) If a system determines its bin classification in accordance with paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code using alternative source monitoring results that reflect a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system shall relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.

(D) Presedimentation.

Systems receive 0.5-log *Cryptosporidium* treatment credit for a presedimentation basin during any month the process meets the criteria in this paragraph.

- (1) The presedimentation basin shall be in continuous operation and shall treat the entire plant flow taken from a surface water source.
- (2) The system shall continuously add a coagulant to the presedimentation basin.
- (3) The presedimentation basin shall achieve the performance criteria in

paragraph (D)(3)(a) or (D)(3)(b) of this rule.

- (a) Demonstrates at least 0.5-log mean reduction of influent turbidity. This reduction shall be determined using daily turbidity measurements in the presedimentation process influent and effluent and shall be calculated as follows:

$\log_{10} (\text{monthly mean of daily influent turbidity}) - \log_{10} (\text{monthly mean of daily effluent turbidity})$ .

The daily turbidity measurements shall be taken under normal operating conditions for that day. Presedimentation operations shall not be altered for the sole purpose of influencing sample results.

- (b) Complies with director-approved performance criteria that demonstrate at least 0.5-log mean removal of micron sized particulate material through the presedimentation process.

(E) Two-stage lime softening.

Systems receive an additional 0.5-log *Cryptosporidium* treatment credit for a two-stage lime softening plant if chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration. Both softening stages shall treat the entire plant flow taken from a surface water source.

(F) Bank filtration.

Systems receive *Cryptosporidium* treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria in this paragraph. Systems using bank filtration when they begin source water monitoring in accordance with paragraph (A) of rule 3745-81-65 of the Administrative Code shall collect samples as described in paragraph (J)(4) of rule 3745-81-65 of the Administrative Code and are not eligible for this credit.

- (1) Wells with a ground water flow path of at least twenty-five feet receive 0.5-log treatment credit; wells with a ground water flow path of at least fifty feet receive 1.0-log treatment credit. The ground water flow path shall be determined as specified in paragraph (F)(4) of this rule.
- (2) Only wells in granular aquifers are eligible for treatment credit. Granular aquifers are those comprised of sand, clay, silt, rock fragments, pebbles or larger particles, and minor cement. A system shall characterize the aquifer at



the well site to determine aquifer properties. Systems shall extract a core from the aquifer and demonstrate that in at least ninety per cent of the core length, grains less than 1.0 millimeters in diameter constitute at least ten per cent of the core material.

- (3) Only horizontal and vertical wells are eligible for treatment credit.
- (4) For vertical wells, the ground water flow path is the measured distance from the edge of the surface water body under high flow conditions (determined by the one hundred year floodplain elevation boundary or by the floodway, as defined in Federal emergency management agency flood hazard maps) to the well screen. For horizontal wells, the ground water flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen.
- (5) Systems shall monitor each wellhead for turbidity at least once within the first and last hours of bank filtration operation and at least every four hours in between. If monthly average turbidity levels, based on daily maximum values in the well, exceed one NTU, the system shall report this result to the director and conduct an assessment within thirty days to determine the cause of the high turbidity levels in the well. If the director determines that microbial removal has been compromised, the bank filtration credit may no longer be approvable. To maintain the bank filtration treatment credit, the system shall implement corrective actions to remediate the problem and submit approvable plans.
- (6) Springs and infiltration galleries are not eligible for treatment credit under paragraph (F) of this rule, but are eligible for credit under paragraph (I) of this rule.
- (7) Bank filtration demonstration of performance. The director may approve Cryptosporidium treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the criteria in paragraphs (F)(1) to (F)(5) of this rule.
  - (a) The study shall follow a protocol acceptable to the director and shall involve the collection of data on the removal of Cryptosporidium or a surrogate for Cryptosporidium and related hydrogeologic and water quality parameters during the full range of operating conditions.
  - (b) The study shall include sampling both from the production well(s) and

from monitoring wells that are screened and located along the shortest flow path between the surface water source and the production well(s).

(G) Combined filter performance.

Systems using conventional filtration treatment or direct filtration treatment receive an additional 0.5-log Cryptosporidium treatment credit during any month the system meets the criteria in this paragraph. Combined filter effluent (CFE) turbidity shall be less than or equal to 0.15 NTU in at least ninety-five per cent of the measurements. Turbidity shall be measured as described in paragraph (C)(3) of rule 3745-81-27 and paragraph (A) of rule 3745-81-74 of the Administrative Code.

(H) Individual filter performance.

Systems using conventional filtration treatment or direct filtration treatment receive 0.5-log Cryptosporidium treatment credit, which can be in addition to the 0.5-log credit under paragraph (G) of this rule, during any month the system meets the criteria in this paragraph. Compliance with these criteria shall be based on individual filter turbidity monitoring as described in paragraphs (B) and (C) of rule 3745-81-74 of the Administrative Code, as applicable.

- (1) The filtered water turbidity for each individual filter shall be less than or equal to 0.15 NTU in at least ninety-five per cent of the measurements recorded each month.
- (2) No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken fifteen minutes apart.
- (3) Any system that has received treatment credit for individual filter performance and fails to meet the requirements of paragraph (H)(1) or (H)(2) of this rule during any month does not receive a treatment technique violation under paragraph (E)(4) of rule 3745-81-67 of the Administrative Code if the director determines the following:
  - (a) The failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation, and maintenance.
  - (b) The system has experienced no more than two such failures in any calendar year.

(I) Demonstration of performance.

The director may approve *Cryptosporidium* treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than or less than the prescribed treatment credits in paragraph (E) of rule 3745-81-67 of the Administrative Code or paragraphs (D) to (N) of this rule and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

- (1) Systems cannot receive the prescribed treatment credit for any toolbox option in paragraphs (D) to (N) of this rule if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this paragraph.
- (2) The demonstration of performance study shall follow a protocol acceptable to the director and shall demonstrate the level of *Cryptosporidium* reduction the treatment process will achieve under the full range of expected operating conditions for the system.
- (3) Approval by the director shall be in writing and may include monitoring and treatment performance criteria that the system shall demonstrate and report on an ongoing basis to remain eligible for the treatment credit. The director may designate such criteria where necessary to verify that the conditions under which the demonstration of performance credit was approved are maintained during routine operation.

(J) Bag and cartridge filters.

Systems receive *Cryptosporidium* treatment credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operated in series by meeting the criteria in paragraphs (J)(1) to (J)(10) of this rule. To be eligible for this credit, systems shall report the results of challenge testing that meets the requirements of paragraphs (J)(2) to (J)(9) of this rule to the director. The filters shall treat the entire plant flow taken from a surface water source.

- (1) The *Cryptosporidium* treatment credit awarded to bag or cartridge filters shall be based on the removal efficiency demonstrated during challenge testing that is conducted according to the criteria in paragraphs (J)(2) to (J)(9) of this rule. A factor of safety equal to 1-log for individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series shall be applied to challenge testing results to determine removal credit. Systems may use results from challenge testing conducted prior to January 5, 2006 if the prior testing was

consistent with the criteria specified in paragraphs (J)(2) to (J)(9) of this rule.

- (2) Challenge testing shall be performed on full-scale bag or cartridge filters, and the associated filter housing or pressure vessel, that are identical in material and construction to the filters and housings the system will use for removal of *Cryptosporidium*. Bag or cartridge filters shall be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.
- (3) Challenge testing shall be conducted using *Cryptosporidium* or a surrogate that is removed no more efficiently than *Cryptosporidium*. The microorganism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate shall be determined using a method capable of discretely quantifying the specific microorganism or surrogate used in the test; gross measurements such as turbidity may not be used.
- (4) The maximum feed water concentration that can be used during a challenge test shall be based on the detection limit of the challenge particulate in the filtrate (i.e., filtrate detection limit) and shall be calculated using the following equation:  
  
$$\text{Maximum Feed Concentration} = 1 \times 10^4 \times (\text{filtrate detection limit})$$
- (5) Challenge testing shall be conducted at the maximum design flow rate for the filter as specified by the manufacturer.
- (6) Each filter evaluated shall be tested for the duration sufficient to reach one hundred per cent of the terminal pressure drop, which establishes the maximum pressure drop under which the filter may be used to comply with the requirements in paragraph (E) of rule 3745-81-67 of the Administrative Code.
- (7) Removal efficiency of a filter shall be determined from the results of the challenge test and expressed in terms of log removal values using the following equation:

$$\text{LRV} = \text{LOG}_{10}(\text{Cf}) - \text{LOG}_{10}(\text{Cp})$$

Where: LRV = log removal value demonstrated during challenge testing; Cf = the feed concentration measured during the challenge test; and Cp = the filtrate concentration measured during the challenge test. In applying this

equation, the same units shall be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term Cp shall be set equal to the detection limit.

- (8) Each filter tested shall be challenged with the challenge particulate during three periods over the filtration cycle: within two hours of start-up of a new filter; when the pressure drop is between forty-five and fifty-five per cent of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached one hundred per cent of the terminal pressure drop. An LRV shall be calculated for each of these challenge periods for each filter tested. The LRV for the filter (LRV<sub>filter</sub>) shall be assigned the value of the minimum LRV observed during the three challenge periods for that filter.
  - (9) If fewer than twenty filters are tested, the overall removal efficiency for the filter product line shall be set equal to the lowest LRV<sub>filter</sub> among the filters tested. If twenty or more filters are tested, the overall removal efficiency for the filter product line shall be set equal to the tenth percentile of the set of LRV<sub>filter</sub> values for the various filters tested. The percentile is defined by  $(i/(n+1))$  where "i" is the rank of "n" individual data points ordered lowest to highest. If necessary, the tenth percentile may be calculated using linear interpolation.
  - (10) If a previously tested filter is modified in a manner that could change the removal efficiency of the filter product line, challenge testing to demonstrate the removal efficiency of the modified filter shall be conducted and submitted to the director.
- (K) Membrane filtration.
- (1) Systems receive Cryptosporidium treatment credit for membrane filtration that meets the criteria of this paragraph. Membrane cartridge filters that meet the definition of membrane filtration in rule 3745-81-01 of the Administrative Code are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under paragraphs (K)(1)(a) and (K)(1)(b) of this rule. The U.S. EPA "Membrane Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule" (November 2005), shall be used as a guide in the technical review of plans submitted for approval of membrane facilities. Approval of plans for membrane facilities may be conditioned upon requirements that may be necessary or desirable to ensure that the system being constructed, or of which the proposed project is a part, will be able to meet generally accepted standards for the design, equipping and operation of membrane

facilities. Systems shall keep daily operational logs used to determine monthly compliance with the direct and indirect integrity testing requirements. The operational logs must be signed by an operator of record and kept on a form acceptable to the director. Operational logs must be made available for review upon request.

- (a) The removal efficiency demonstrated during challenge testing conducted under the conditions in paragraph (K)(2) of this rule.
- (b) The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in paragraph (K)(3) of this rule.

(2) Challenge testing.

The membrane used by the system shall undergo challenge testing to evaluate removal efficiency, and the system shall report the results of challenge testing to the director. Challenge testing shall be conducted according to the criteria in paragraphs (K)(2)(a) to (K)(2)(g) of this rule. Systems may use data from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria in paragraphs (K)(2)(a) to (K)(2)(g) of this rule.

- (a) Challenge testing shall be conducted on either a full-scale membrane module, identical in material and construction to the membrane modules used in the system's treatment facility, or a smaller-scale membrane module, identical in material and similar in construction to the full-scale module. A module is defined as the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure.
- (b) Challenge testing shall be conducted using *Cryptosporidium* oocysts or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts. The organism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate, in both the feed and filtrate water, shall be determined using a method capable of discretely quantifying the specific challenge particulate used in the test; gross measurements such as turbidity may not be used.
- (c) The maximum feed water concentration that can be used during a challenge test is based on the detection limit of the challenge

particulate in the filtrate and shall be determined according to the following equation:

$$\text{maximum feed concentration} = 3.16 \times 10^6 \times (\text{filtrate detection limit})$$

- (d) Challenge testing shall be conducted under representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the manufacturer for the membrane module. Flux is defined as the throughput of a pressure driven membrane process expressed as flow per unit of membrane area. Recovery is defined as the volumetric per cent of feed water that is converted to filtrate over the course of an operating cycle uninterrupted by events such as chemical cleaning or a solids removal process (e.g., backwashing).
- (e) Removal efficiency of a membrane module shall be calculated from the challenge test results and expressed as a log removal value according to the following equation:

$$\text{LRV} = \text{LOG}_{10}(\text{Cf}) - \text{LOG}_{10}(\text{Cp})$$

Where:

LRV = log removal value demonstrated during the challenge test; Cf = the feed concentration measured during the challenge test; and Cp = the filtrate concentration measured during the challenge test.

Equivalent units shall be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, the term Cp is set equal to the detection limit for the purpose of calculating the LRV. An LRV shall be calculated for each membrane module evaluated during the challenge test.

- (f) The removal efficiency of a membrane filtration process demonstrated during challenge testing shall be expressed as a log removal value ( $\text{LRV}_{\text{C-Test}}$ ). If fewer than twenty modules are tested, then  $\text{LRV}_{\text{C-Test}}$  is equal to the lowest of the representative LRVs among the modules tested. If twenty or more modules are tested, then  $\text{LRV}_{\text{C-Test}}$  is equal to the tenth percentile of the representative LRVs among the modules tested. The percentile is defined by  $(i/(n+1))$  where "i" is the rank of "n" individual data points ordered lowest to highest. If necessary, the tenth percentile may be

calculated using linear interpolation.

- (g) The challenge test shall establish a quality control release value (QCRV) for a non-destructive performance test that demonstrates the *Cryptosporidium* removal capability of the membrane filtration module. This performance test shall be applied to each production membrane module used by the system that was not directly challenge tested in order to verify *Cryptosporidium* removal capability. Production modules that do not meet the established QCRV are not eligible for the treatment credit demonstrated during the challenge test.
- (h) If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane or the applicability of the non-destructive performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of, and determine a new QCRV for, the modified membrane shall be conducted and submitted to the director.

(3) Direct integrity testing.

Systems shall conduct direct integrity testing in a manner that demonstrates a removal efficiency equal to or greater than the removal credit awarded to the membrane filtration process and meets the requirements described in paragraphs (K)(3)(a) to (K)(3)(f) of this rule. A direct integrity test is defined as a physical test applied to a membrane unit in order to identify and isolate integrity breaches (e.g., one or more leaks that could result in contamination of the filtrate).

- (a) The direct integrity test shall be independently applied to each membrane unit in service. A membrane unit is defined as a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the system for the purpose of integrity testing or other maintenance.
- (b) The direct integrity method shall have a resolution of three micrometers or less, where resolution is defined as the size of the smallest integrity breach that contributes to a response from the direct integrity test.
- (c) The direct integrity test shall have the sensitivity sufficient to verify the log treatment credit approved by the director for the membrane



filtration process, where sensitivity is defined as the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity shall be determined using the approach in either paragraph (K)(3)(c)(i) or (K)(3)(c)(ii) of this rule as applicable to the type of direct integrity test the system uses.

- (i) For direct integrity tests that use an applied pressure or vacuum, the direct integrity test sensitivity shall be calculated according to the following equation:

$$LRV_{DIT} = \text{LOG}_{10} (Q_p / (VCF \times Q_{breach}))$$

Where:

$LRV_{DIT}$  = the sensitivity of the direct integrity test;  $Q_p$  = total design filtrate flow from the membrane unit;  $Q_{breach}$  = flow of water from an integrity breach associated with the smallest integrity test response that can be reliably measured; and  $VCF$  = volumetric concentration factor. The volumetric concentration factor is the ratio of the suspended solids concentration on the high pressure side of the membrane relative to that in the feed water.

- (ii) For direct integrity tests that use a particulate or molecular marker, the direct integrity test sensitivity shall be calculated according to the following equation:

$$LRV_{DIT} = \text{LOG}_{10}(C_f) - \text{LOG}_{10}(C_p)$$

Where:

$LRV_{DIT}$  = the sensitivity of the direct integrity test;  $C_f$  = the typical feed concentration of the marker used in the test; and  $C_p$  = the filtrate concentration of the marker from an integral membrane unit.

- (d) Systems shall establish a control limit within the sensitivity limits of the direct integrity test that is indicative of an integral membrane unit capable of meeting the removal credit approved by the director.
- (e) If the result of a direct integrity test exceeds the control limit established under paragraph (K)(3)(d) of this rule, the system shall

remove the membrane unit from service. Systems shall conduct a direct integrity test to verify any repairs, and may return the membrane unit to service only if the direct integrity test is within the established control limit.

- (f) Systems shall conduct direct integrity testing on each membrane unit at a frequency of not less than once each day that the membrane unit is in operation. The director may approve less frequent testing, based on demonstrated process reliability, the use of multiple barriers effective for *Cryptosporidium*, or reliable process safeguards.

(4) Indirect integrity monitoring.

Systems shall conduct continuous indirect integrity monitoring on each membrane unit according to the criteria in paragraphs (K)(4)(a) to (K)(4)(f) of this rule. Indirect integrity monitoring is defined as monitoring some aspect of filtrate water quality that is indicative of the removal of particulate matter. A system that implements continuous direct integrity testing of membrane units in accordance with the criteria in paragraphs (K)(3)(a) to (K)(3)(f) of this rule is not subject to the requirements for continuous indirect integrity monitoring. Systems shall submit a monthly report to the director summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case.

- (a) Unless the director approves an alternative parameter, continuous indirect integrity monitoring shall include continuous filtrate turbidity monitoring.
- (b) Continuous monitoring shall be conducted at a frequency of no less than once every fifteen minutes.
- (c) Continuous monitoring shall be separately conducted on each membrane unit.
- (d) If indirect integrity monitoring includes turbidity and if the filtrate turbidity readings are above 0.15 NTU for a period greater than fifteen minutes (i.e., two consecutive fifteen-minute readings above 0.15 NTU), direct integrity testing shall immediately be performed on the associated membrane unit as specified in paragraphs (K)(3)(a) to (K)(3)(f) of this rule.

- (e) The public water system shall validate the continuous measurement for accuracy on a regular basis using a protocol acceptable to the director.
- (f) If indirect integrity monitoring includes a director-approved alternative parameter and if the alternative parameter exceeds a director-approved control limit for a period greater than fifteen minutes, direct integrity testing shall immediately be performed on the associated membrane units as specified in paragraphs (K)(3)(a) to (K)(3)(f) of this rule.

(L) Second stage filtration.

Systems receive 0.5-log *Cryptosporidium* treatment credit for a separate second stage of filtration that consists of sand, dual media, GAC, or other fine grain media following granular media filtration if the director approves. To be eligible for this credit, the first stage of filtration shall be preceded by a coagulation step and both filtration stages shall treat the entire plant flow taken from a surface water source. A cap, such as GAC, on a single stage of filtration is not eligible for this credit. The director shall approve the treatment credit based on an assessment of the design characteristics of the filtration process.

(M) Slow sand filtration (as secondary filter).

Systems are eligible to receive 2.5-log *Cryptosporidium* treatment credit for a slow sand filtration process that follows a separate stage of filtration if both filtration stages treat entire plant flow taken from a surface water source and no disinfectant residual is present in the influent water to the slow sand filtration process. The director shall approve the treatment credit based on an assessment of the design characteristics of the filtration process. This paragraph does not apply to treatment credit awarded to slow sand filtration used as a primary filtration process.

(N) Inactivation toolbox components.

(1) Calculation of CT values.

- (a) CT is the product of the disinfectant contact time ("T", in minutes) and disinfectant concentration ("C", in milligrams per liter). Systems with treatment credit for chlorine dioxide or ozone under paragraph (N)(2) or (N)(3) of this rule shall calculate CT at least once each day, with both "C" and "T" measured during peak hourly flow as specified in rules 3745-81-27 and 3745-81-72 of the Administrative Code.

- (b) Systems with several disinfection segments in sequence may calculate CT for each segment, where a disinfection segment is defined as a treatment unit process with a measurable disinfectant residual level and a liquid volume. Under this approach, systems shall add the Cryptosporidium CT values in each segment to determine the total CT for the treatment plant.

(2) CT values for chlorine dioxide and ozone.

- (a) Systems receive the Cryptosporidium treatment credit listed in this table by meeting the corresponding chlorine dioxide CT value for the applicable water temperature, as described in paragraph (N)(1) of this rule.

CT Values (MG-MIN/L) for Cryptosporidium Inactivation by Chlorine Dioxide <sup>1</sup>

Log credit	Water Temperature, °C										
	<=0.5	1	2	3	5	7	10	15	20	25	30
(i) 0.25 ...	159	153	140	128	107	90	69	45	29	19	12
(ii) 0.50 ...	319	305	279	256	214	180	138	89	58	38	24
(iii) 1.0...	637	610	558	511	429	360	277	179	116	75	49
(iv) 1.5...	956	915	838	767	643	539	415	268	174	113	73
(v) 2.0...	1275	1220	1117	1023	858	719	553	357	232	150	98
(vi) 2.5...	1594	1525	1396	1278	1072	899	691	447	289	188	122
(vii) 3.0 ...	1912	1830	1675	1534	1286	1079	830	536	347	226	147

<sup>1</sup> Systems may use this equation to determine log credit between the indicated values:  $\text{Log credit} = (0.001506 \times (1.09116)^{\text{Temp}}) \times \text{CT}$ .

- (b) Systems receive the Cryptosporidium treatment credit listed in this table by meeting the corresponding ozone CT values for the applicable water temperature, as described in paragraph (N)(1) of this rule.

CT Values (MG-MIN/L) for Cryptosporidium Inactivation by Ozone <sup>1</sup>

Log credit	Water Temperature, °C										
	<=0.5	1	2	3	5	7	10	15	20	25	30
(i) 0.25 ...	6.0	5.8	5.2	4.8	4.0	3.3	2.5	1.6	1.0	0.6	0.39
(ii) 0.50 ...	12	12	10	9.5	7.9	6.5	4.9	3.1	2.0	1.2	0.78
(iii) 1.0...	24	23	21	19	16	13	9.9	6.2	3.9	2.5	1.6
(iv) 1.5...	36	35	31	29	24	20	15	9.3	5.9	3.7	2.4
(v) 2.0...	48	46	42	38	32	26	20	12	7.8	4.9	3.1
(vi) 2.5...	60	58	52	48	40	33	25	16	9.8	6.2	3.9
(vii) 3.0 ...	72	69	63	57	47	39	30	19	12	7.4	4.7

<sup>1</sup> Systems may use this equation to determine log credit between the indicated values:  $\text{Log credit} = (0.0397 \times (1.09757)^{\text{Temp}}) \times \text{CT}$ .

(3) Site-specific study.

The director may approve alternative chlorine dioxide or ozone CT values to those listed in paragraph (N)(2) of this rule on a site-specific basis. The director shall base this approval on a site-specific study a system conducts that follows a protocol acceptable to the director.

- (4) Ultraviolet light. Systems receive Cryptosporidium, Giardia lamblia, and virus treatment credits for ultraviolet (UV) light reactors by achieving the corresponding UV dose values shown in paragraph (N)(4)(a) of this rule. Systems shall validate and monitor UV reactors as described in paragraphs (N)(4)(b) and (N)(4)(c) of this rule to demonstrate that they are achieving a particular UV dose value for treatment credit. The U.S. EPA "Ultraviolet Disinfection Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule" (November 2006), shall be used as a guide in the technical review of plans submitted for approval of UV facilities. Approval of plans for UV facilities may be conditioned upon requirements that may be necessary or desirable to ensure that the system being constructed, or of which the proposed project is a part, will be able to meet generally accepted standards for the design, equipping and operation of UV facilities. Systems shall keep daily operational logs used to determine monthly compliance with

the percentage of water treated under validated conditions. The operational logs must be signed by an operator of record and kept on a form acceptable to the director. Operational logs must be made available for review upon request.

(a) UV dose table.

The treatment credits listed in this table are for UV light at a wavelength of two hundred fifty-four nanometers as produced by a low pressure mercury vapor lamp. To receive treatment credit for other lamp types, systems shall demonstrate an equivalent germicidal dose through reactor validation testing, as described in paragraph (N)(4)(b) of this rule. The UV dose values in this table are applicable only to post-filter applications of UV.

UV Dose Table for Cryptosporidium, Giardia lamblia, and Virus Inactivation Credit

Log credit	Cryptosporidium UV dose (mJ/cm <sup>2</sup> )	Giardia lamblia UV dose (mJ/cm <sup>2</sup> )	Virus UV dose (mJ/cm <sup>2</sup> )
(i) 0.5 ...	1.6	1.5	39
(ii) 1.0 ...	2.5	2.1	58
(iii) 1.5 ...	3.9	3.0	79
(iv) 2.0 ...	5.8	5.2	100
(v) 2.5 ...	8.5	7.7	121
(vi) 3.0 ...	12	11	143
(vii) 3.5 ...	15	15	163
(viii) 4.0 ...	22	22	186

(b) Reactor validation testing.

Systems shall use UV reactors that have undergone validation testing to determine the operating conditions under which the reactor delivers the UV dose required in paragraph (N)(4)(a) of this rule (i.e., validated operating conditions). These operating conditions shall

include flow rate, UV intensity as measured by a UV sensor, and UV lamp status.

- (i) When determining validated operating conditions, systems shall account for the following factors: UV absorbance of the water; lamp fouling and aging; measurement uncertainty of on-line sensors; UV dose distributions arising from the velocity profiles through the reactor; failure of UV lamps or other critical system components; and inlet and outlet piping or channel configurations of the UV reactor.
  - (ii) Validation testing shall include the following: Full scale testing of a reactor that conforms uniformly to the UV reactors used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp.
  - (iii) The director may approve an alternative approach to validation testing.
- (c) Reactor monitoring.
- (i) Systems shall monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under paragraph (N)(4)(b) of this rule. This monitoring shall include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters the director designates based on UV reactor operation. Systems shall verify the calibration of UV sensors and shall recalibrate sensors at least monthly in accordance with a protocol the director accepts. The following parameters shall be monitored and recorded at the frequencies indicated in the table below for each UV reactor:

Parameter	Recording Frequency	Required conditions for obtaining disinfection credit.
Off-specification alarm	At least every 5 minutes	Recording shall continue until the alarm condition has been corrected.

UV Intensity	At least every 4 hours	The UV intensity shall be greater than or equal to the validated set point.
UVT (required only if necessary for the dose monitoring strategy (e.g., calculated dose approach))	At least every 4 hours	The UVT shall be greater than or equal to the minimum UVT validated.
Validated Dose	At least every 4 hours	The validated dose shall be greater than or equal to the $D_{req}$ .
Lamp Status	At least every 4 hours	Lamps shall be energized if water is flowing through the UV reactor.
Flow Rate	At least every 4 hours	The flow rate shall be less than or equal to the maximum flow tested in validation.
Production Volume	Off-specification events and monthly total	The production volume shall be recorded so the off-specification compliance calculation can be completed.
Calibration of UV Sensors	At least monthly	Calibration shall be conducted in accordance with a protocol acceptable to the director.
Calibration of On-line UVT Analyzer (required only if necessary for the dose monitoring strategy (e.g., calculated dose approach))	Weekly	Calibration must be conducted in accordance with a protocol acceptable to the director.

- (ii) To receive treatment credit for UV light, systems shall treat at least ninety-five per cent of the water delivered to the public during each month by UV reactors operating within validated



conditions for the required UV dose, as described in paragraphs (N)(4)(a) and (N)(4)(b) of this rule. Systems shall demonstrate compliance with this condition by the monitoring required under paragraph (N)(4)(c)(i) of this rule.

[This rule references the U.S. EPA “Membrane Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule,” issued November 2005. This document is available from the “U.S. EPA Office of Ground Water and Drinking Water, Ariel Rios Building, 1200 Pennsylvania Ave, NW, Washington, DC 20460-0003, (202) 564-3750.” A copy may also be obtained from [www.epa.gov/safewater/disinfection/lt2/compliance.html](http://www.epa.gov/safewater/disinfection/lt2/compliance.html).]

[This rule references the U.S. EPA “Ultraviolet Disinfection Guidance Manual for Final Long Term 2 Enhanced Surface Water Treatment Rule,” issued November 2006. This document is available from the “U.S. EPA Office of Ground Water and Drinking Water, Ariel Rios Building, 1200 Pennsylvania Ave, NW, Washington, DC 20460-0003, (202) 564-3750.” A copy may also be obtained from [www.epa.gov/safewater/disinfection/lt2/compliance.html](http://www.epa.gov/safewater/disinfection/lt2/compliance.html).]

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**3745-81-69 Reporting and recordkeeping requirements for LT2 only.**

(A) Reporting requirements.

- (1) Systems shall report sampling schedules in accordance with paragraph (I) of rule 3745-81-65 of the Administrative Code and source water monitoring results in accordance with paragraph (A) of rule 3745-81-66 of the Administrative Code unless they notify the director that they will not conduct source water monitoring due to meeting the criteria of paragraph (D) of rule 3745-81-65 of the Administrative Code.
- (2) Systems shall report their Cryptosporidium bin classification as described in paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code.
- (3) Systems shall report disinfection profiles and benchmarks to the director as described in paragraph (E) of rule 3745-81-72 of the Administrative Code prior to making a significant change in disinfection practice.
- (4) Systems shall report to the director in accordance with the following table for any microbial toolbox options used to comply with treatment requirements in accordance with paragraph (E) of rule 3745-81-67 of the Administrative Code. Alternatively, the director may approve a system to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS		
Toolbox Option	Systems shall submit the following information	On the following schedule
(1) Watershed control program (WCP)	(i) Notice of intention to develop a new or continue an existing watershed control program.	No later than two years before the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
	(ii) Watershed control plan.	No later than one year before the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
	(iii) Annual watershed control program status report.	Every twelve months, beginning one year after

### MICROBIAL TOOLBOX REPORTING REQUIREMENTS

Toolbox Option	Systems shall submit the following information	On the following schedule
	(iv) Watershed sanitary survey report.	<p>the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p> <p>For community water systems, every three years beginning three years after the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code. For noncommunity water systems, every five years beginning five years after the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p>
(2) Alternative source/intake management	Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results.	No later than the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(3) Presedimentation	Monthly verification of the following: (i) Continuous basin operation (ii) Treatment of 100 per cent of the flow (iii) Continuous addition of a coagulant (iv) At least 0.5-log mean reduction of influent turbidity or compliance with alternative director-approved performance criteria.	Monthly reporting within ten days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.

### MICROBIAL TOOLBOX REPORTING REQUIREMENTS

Toolbox Option	Systems shall submit the following information	On the following schedule
(4) Two-stage lime softening	Monthly verification of the following: (i) Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration (ii) Both stages treated 100 per cent of the plant flow.	Monthly reporting within ten days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(5) Bank filtration	<p>(i) Initial demonstration of the following: (A) Unconsolidated, predominantly sandy aquifer (B) Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log credit).</p> <p>(ii) If monthly average of daily max turbidity is greater than 1 NTU then system shall report result and submit an assessment of the cause.</p>	<p>No later than the applicable treatment compliance date as specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p> <p>Report within thirty days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p>
(6) Combined filter performance	Monthly verification of combined filter effluent (CFE) turbidity levels less than or equal to 0.15 NTU in at least 95 per cent of the 4 hour CFE measurements taken each month.	Monthly reporting within ten days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.

### MICROBIAL TOOLBOX REPORTING REQUIREMENTS

Toolbox Option	Systems shall submit the following information	On the following schedule
(7) Individual filter performance	Monthly verification of the following: (i) Individual filter effluent (IFE ) turbidity levels less than or equal to 0.15 NTU in at least 95 per cent of samples each month in each filter (ii) No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.	Monthly reporting within ten days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(8) Demonstration of performance	<p>(i) Results from testing following a protocol acceptable to the director.</p> <p>(ii) As required by the director, monthly verification of operation within conditions of director approval for demonstration of performance credit.</p>	<p>No later than the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p> <p>Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p>
(9) Bag filters and cartridge filters	<p>(i) Demonstration that the following criteria are met: (A) Process meets the definition of bag or cartridge filtration; (B) Removal efficiency established through challenge testing that meets criteria of rule 3745-81-68 of the Administrative Code.</p> <p>(ii) Monthly verification that 100 per cent of plant flow was filtered.</p>	<p>No later than the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p> <p>Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified</p>

### MICROBIAL TOOLBOX REPORTING REQUIREMENTS

Toolbox Option	Systems shall submit the following information	On the following schedule
		in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(10) Membrane filtration	<p>(i) Results of verification testing demonstrating the following: (A) Removal efficiency established through challenge testing that meets criteria of rule 3745-81-68 of the Administrative Code; (B) Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and associated baseline.</p> <p>(ii) Monthly report summarizing the following: (A) All direct integrity tests above the control limit; (B) if applicable, any turbidity or alternative state-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken.</p>	<p>No later than the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p> <p>Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p>
(11) Second stage filtration	Monthly verification that 100 per cent of flow was filtered through both stages and that first stage was preceded by coagulation step.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(12) Slow sand filtration (as secondary filter)	Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100 per cent of flow.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule

### MICROBIAL TOOLBOX REPORTING REQUIREMENTS

Toolbox Option	Systems shall submit the following information	On the following schedule
		3745-81-67 of the Administrative Code.
(13) Chlorine dioxide	Summary of CT values for each day as described in paragraph (N) of rule 3745-81-68 of the Administrative Code.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(14) Ozone	Summary of CT values for each day as described in paragraph (N) of rule 3745-81-68 of the Administrative Code.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(15) UV	<p>(i) Validation test results demonstrating operating conditions that achieve required UV dose.</p> <p>(ii) Monthly report summarizing the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose as specified in paragraph (N)(4) of rule 3745-81-68 of the Administrative Code.</p>	<p>No later than the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p> <p>Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.</p>

(B) Recordkeeping requirements.

- (1) Systems shall keep results from the initial round of source water monitoring in accordance with paragraph (A) of rule 3745-81-65 of the Administrative Code and the second round of source water monitoring in accordance with paragraph (B) of rule 3745-81-65 of the Administrative Code until three years after bin classification in accordance with paragraphs (A) to (D) of rule 3745-81-67 for the particular round of monitoring.
- (2) Systems shall keep any notification to the director that they will not conduct source water monitoring due to meeting the criteria of paragraph (D) of rule 3745-81-65 of the Administrative Code for three years.
- (3) Systems shall keep the results of treatment monitoring associated with microbial toolbox options in accordance with paragraphs (B) to (N) of rule 3745-81-68 of the Administrative Code, as applicable, for three years.

Effective: 01/08/2010

R.C. 119.032 review dates: 01/08/2015 and 01/29/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04



**3745-81-70      Monitoring requirements for disinfectant residuals.**

- (A) Each public water system required to monitor under this rule shall develop and implement a monitoring plan. The public water system shall maintain the plan and make it available for inspection by the director and the general public. All surface water systems serving more than three thousand three hundred people shall submit a copy of the monitoring plan to the director no later than the date of the first report required by rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements. The public water system shall modify the plan as required by the director. The plan shall include at least the specific locations and schedules for collecting samples for any parameters included in this rule, and the plan shall include how the public water system will calculate compliance with maximum residual disinfectant levels (MRDLs). If a public water system is approved for monitoring as a consecutive system, or provides water to a consecutive system under the provisions of rule 3745-81-29 of the Administrative Code, its sampling plan shall reflect the entire distribution system. Failure to monitor according to the monitoring plan is a monitoring violation.
- (B) Public water systems shall take all disinfectant residual samples during normal operating conditions.
- (C) Failure to perform the required monitoring for total chlorine is a monitoring violation. The public water system will be in violation for the entire period covered by the running annual average.
- (D) All samples taken and analyzed under the provisions of this rule shall be included in determining compliance, even if that number is greater than the minimum required.
- (E) This paragraph applies to all community and nontransient noncommunity public water systems serving more than one thousand persons that treat their water with chlorine or chloramines for disinfection purposes. The monitoring requirements for total chlorine are as follows:
  - (1) Until March 31, 2016, the residual disinfectant level shall be measured at the same points in the distribution system and at the same time as total coliforms are sampled as specified in rule 3745-81-21 of the Administrative Code. However, surface water systems may use the results of residual disinfectant concentration sampling conducted under rule 3745-81-74 of the Administrative Code in lieu of taking separate samples.
  - (2) Beginning April 1, 2016, the residual disinfectant level shall be measured at the same points in the distribution system and at the same time as total coliforms are sampled as specified in rules 3745-81-51 and 3745-81-52 of the Administrative Code.
  - (3) Compliance shall be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under this rule. For total chlorine a public water system is in compliance with the MRDL when the running annual average of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. If the average of the quarterly averages covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the

MRDL and must notify the public according to rule 3745-81-32 of the Administrative Code, in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.

- (F) This paragraph applies to all public water systems that treat their water with chlorine dioxide. The monitoring requirements for chlorine dioxide are as follows:
- (1) Chlorine dioxide levels shall be measured daily in samples taken at the entrance to the distribution system.
  - (2) Compliance shall be based on consecutive daily samples. A public water system is in compliance with the MRDL when daily samples are taken at the entrance to the distribution system and no two consecutive daily samples exceed the MRDL. If any daily sample exceeds the MRDL, the public water system shall take three chlorine dioxide distribution system samples on the following day. These three samples are in addition to the sample required at the entrance to the distribution system.
    - (a) If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a disinfectant residual in the distribution system and there are no disinfection addition points after the entrance to the distribution system (i.e., no booster chlorination), the public water system shall take the three samples as close to the first customer as possible, at intervals of at least six hours.
    - (b) If chlorine is used to maintain a disinfectant residual in the distribution system and there is at least one disinfection addition point after the entrance to the distribution system (i.e., booster chlorination), the public water system shall take one sample at each of the following locations: close to the first customer; in a location representative of average residence time; and at a location reflecting maximum residence time in the distribution system.
    - (c) If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one or more of the three samples taken in the distribution system exceed the MRDL, the public water system is in violation of the MRDL. The public water system shall take immediate corrective action to lower the level of chlorine dioxide below the MRDL, and shall notify the public according to the procedures for acute health risks in rule 3745-81-32 of the Administrative Code in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.
    - (d) If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the public water system is in violation of the MRDL. The public water system shall take corrective action to lower the level of chlorine dioxide below the MRDL at the point of sampling and shall notify the public according to the procedures for nonacute health risks in rule 3745-81-32 of the Administrative Code in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.

- (3) Failure to monitor at the entrance to the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation. The public water system shall notify the public of the violation according to the provisions for nonacute violations in paragraph (C) of rule 3745-81-32 of the Administrative Code.
- (4) Failure to monitor in the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation and the system must notify the public of the violation according to the provisions for acute violations under paragraph (B) of rule 3745-81-32 of the Administrative Code.
- (G) Notwithstanding the MRDLs in rule 3745-81-10 of the Administrative Code, public water systems may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events or cross-connections events.

Effective: 04/01/2016

Five Year Review (FYR) Dates: 01/15/2016 and 04/01/2021

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.03, 6109.04  
Prior Effective Dates: 01/01/02, 01/01/04, 01/01/10

**3745-81-71 General requirements for filtration and disinfection of surface water sources.**

- (A) Rules 3745-81-71 to 3745-81-75 of the Administrative Code are derived from national primary drinking water regulations. The treatment technique requirements of this rule are established in lieu of maximum contaminant levels for the following contaminants: Cryptosporidium, Giardia lamblia, viruses, heterotrophic plate count bacteria, Legionella, and turbidity. Each public water system using a surface water source, in whole or in part, shall provide treatment of that source water which complies with the treatment technique requirements of this rule. The treatment technique requirements consist of installing and properly operating water treatment processes which consistently and reliably achieve the following:
- (1) At least 99.9 per cent (3 log) removal and/or inactivation of Giardia lamblia cysts between a point where the raw water is not subject to recontamination by surface water runoff and a later point before or at the first customer.
  - (2) At least 99.99 per cent (4 log) removal and/or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a later point before or at the first customer.
  - (3) At least 99.0 per cent (2 log) removal of Cryptosporidium between a point where the raw water is not subject to recontamination by surface water runoff and a later point before or at the first customer.
- (B) A public water system using a surface water source, in whole or in part, shall be in compliance with paragraph (A) of this rule if the public water system meets the filtration requirements of rule 3745-81-73 of the Administrative Code and the disinfection requirements of rule 3745-81-72 of the Administrative Code.
- (C) The owner of a public water system using a surface water source, in whole or in part, shall place the operation of the public water system under the supervision of an operator of record. The operator of record shall have a valid certification in accordance with Chapter 3745-7 of the Administrative Code.
- (D) "Uncovered finished water storage facility" means a tank, reservoir, or other facility used to store water that will undergo no further treatment except residual disinfection and is open to the atmosphere. Systems are not permitted to begin construction of uncovered finished water storage facilities. Failure to comply with this requirement is a treatment technique violation.
- (E) A new surface water source shall be sampled for twelve consecutive months and analyzed for the contaminants that are listed in the appendix to this rule, "Required Analyses for New Surface Water Sources." The director may reduce or add to the contaminants that are listed in the appendix to this rule because of treatment, promulgated drinking water standards, or other criteria. Other criteria may include existing or emerging contaminants which may pose a threat to public health. Samples collected from a public water system surface water source shall be

analyzed in a laboratory certified to analyze drinking water for contaminants in accordance with Chapter 3745-89 of the Administrative Code. The analytical methods shall be the same as required by the entry point to the distribution system monitoring in accordance with rule 3745-81-27 of the Administrative Code and shall include all the volatile organic and synthetic organic analytes that are quantified by the laboratory for the organic analytical method. Cryptosporidium samples for new surface water sources shall be collected in accordance with the source monitoring requirements in rules 3745-81-65 and 3745-81-66 of the Administrative Code.

Effective: 10/05/2013

R.C. 119.032 review dates: 07/16/2013 and 10/05/2018

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 12/31/90, 01/01/02, 01/01/05, 01/08/10

## APPENDIX

### Required Analysis for Surface Water Sources

#### Inorganic (quarterly testing)

Total dissolved solids	Sulfate
Calcium	Chloride
Magnesium	Fluoride
Iron	MBSA
Manganese	Asbestos
Nitrogen ammonia	Nitrite
Nitrate	Sodium

#### Heavy metals (quarterly testing)

Arsenic	Antimony
Barium	Beryllium
Cadmium	Cyanide
Chromium	Nickel
Lead	Thallium
Mercury	Silver
Selenium	Zinc

#### Radiological (quarterly testing)

Total alpha	
Total beta	

#### Volatile organic compounds (VOCs)

One sample taken initially in May, June, or July; quarterly if any detects.	

#### Synthetic organic compounds or SOC's (May, June, or July)

alachor	endrin
aldicarb	ethylene dibromide (EDB)
aldicarb sulfone	glyphosphate
aldicarb sulfoxide	heptachlor
atrazine	heptachlor epoxide
carbofuran	lindane
chlordane	methoxychlor
2,4-D	metolachlor
2,4,5-TP (silvex)	oxamyl (vydate)
dalaphon	pentachlorophenol
dibromochloropropane (DBCP)	picloram
dinoseb	polychlorinated biphenyls (PCB)
diquat	simazine

endothall	toxaphene
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## Disinfection byproducts

total trihalomethane simulated distribution system (TTHM-SDS) test (quarterly)	SUVA (monthly)
haloacetic acid simulated distribution system (HAA-SDS) test (quarterly)	UV absorbance (monthly)
total organic carbon (monthly)	total alkalinity (monthly)
pH (monthly)	

## Microbiological

total coliform (monthly)	Cryptosporidium (twice per month for 12 months)
fecal coliform (monthly)	

## Physical (daily)

Turbidity	



**3745-81-72 Disinfection of water from surface water sources.**

“Disinfection practice” means the application of a disinfectant to the treatment flow for the purpose of meeting CT requirements of this rule. Significant changes to disinfection practice include any change which will affect the ability of a system to meet the CT requirements of this rule.

- (A) A public water system that uses a surface water source, in whole or in part, shall provide the disinfection treatment specified in paragraph (B) of this rule. Failure to meet any requirement of this rule, excluding paragraph (E) of this rule, is a treatment technique violation for which public notification is required under rule 3745-81-32 of the Administrative Code. Failure to meet any requirement of paragraph (E) of this rule is a monitoring violation for which public notification is required under rule 3745-81-32 of the Administrative Code. A public water system that uses a surface water source, in whole or in part, and does not already provide filtration treatment shall comply with any interim disinfection requirements established by the director before filtration is installed.
- (B) Each public water system that uses a surface water source, in whole or in part, shall provide disinfection treatment of the water as follows:
  - (1) The disinfection treatment shall be considered sufficient if the total treatment processes of that public water system would consistently and reliably achieve at least 99.9 per cent (3 log) inactivation and/or removal of *Giardia lamblia* cysts and at least 99.99 per cent (4 log) inactivation and/or removal of viruses, as determined from table A, and tables B-1 to B-13 of this rule or tables under paragraph (N) of rule 3745-81-68 of the Administrative Code. The inactivation by disinfection is calculated from the actual CT divided by the required CT during the peak hourly flow of each day that the public water system is in operation.
  - (2) Table A of this rule lists: the minimum requirement for inactivation and/or removal of *Cryptosporidium*, *Giardia lamblia* and viruses; the extent to which a properly operated conventional filtration treatment, direct filtration, and slow sand filtration are considered sufficient to remove *Cryptosporidium*, *Giardia lamblia*, and viruses; and the minimum disinfection needed to complete the required minimum inactivation and/or removal of *Cryptosporidium*, *Giardia lamblia* and viruses. Table A specifies the additional minimum log inactivation of *Giardia lamblia* and viruses by disinfection if filtration is properly operated and the turbidity treatment technique requirements of rule 3745-81-73 of the Administrative Code are satisfied. The filtration and disinfection treatment shall include disinfection that consistently and reliably achieves at least the minimum log inactivation by disinfection

of *Giardia lamblia* and viruses as specified in table A.

- (3) The residual disinfectant concentration in the water entering the distribution system shall not be less than 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine for more than four consecutive hours.
- (4) The residual disinfectant concentration in the distribution system shall not be less than 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine in more than five per cent of the samples each month for any two consecutive months that the public water system serves water to the public.

(C) Disinfection treatment sufficiency determination.

- (1) Paragraph (B)(1) of this rule requires a minimum percentage of inactivation and/or removal of *Giardia lamblia* and viruses in water obtained at least partly from a surface water source. Because of the difficulties in measuring the concentrations of viable *Cryptosporidium*, *Giardia lamblia*, and viruses, maximum contaminant levels are not practical and treatment technique requirements are used to ensure control of these contaminants in drinking water. For disinfectants other than UV, tables B-1 to B-13 of this rule shall be used to determine the sufficiency of disinfection. This determination is made at the peak hourly flow rate of each day the water system is in operation. Systems using UV to comply with the inactivation requirements of this rule shall meet paragraph (N) of rule 3745-81-68 of the Administrative Code.
- (2) For disinfectants other than UV, the level of inactivation being provided by the system is determined by measuring actual CT values. The level of inactivation being provided by a system using UV is determined by the UV dosage. For systems using chlorine dioxide or ozone to comply with the additional *Cryptosporidium* treatment requirements in paragraph (E) of rule 3745-81-67 of the Administrative Code, unfiltered water flow may be used to achieve the additional treatment credit if approved by the director.

Only filtered water flow shall be used in the required CT calculations to meet the minimum log inactivation in table A of this rule, regardless of the disinfectant used.

Actual CT values are obtained by multiplying the residual disinfectant, C, by the disinfection contact time, T, giving the resultant, CT. The value of C in milligrams per liter is determined at a point before or at the first customer. The value of T in minutes is based on the time

available for the disinfectant to work from the point at which it is added to the water until the point at which C is measured. Values of T are determined based on the approved effective volume factor of the clearwell or contact tank. It may be appropriate to determine the value of C at more than one point of the water treatment flow, with the T associated with each C being estimated from the previous measurement point or the previous addition of disinfectant, whichever is closer. If more than one disinfectant concentration point is used, the products of each C and its associated T are added and the sum of these products is the actual CT value to compare with the appropriate value of the required minimum CT values for specified conditions and levels of inactivation in the following tables. Note that any disinfection after the last determination of C is not included in the actual CT value. Minimum required CT values for inactivation of *Giardia lamblia* and viruses by disinfection in relation to the disinfectant, the extent of inactivation, the disinfectant concentration, the pH, and the water temperature at the peak hourly flow rate for each day of operation are found in tables B-1 to B-13 of this rule. Applicable information for UV is found in paragraph (N) of rule 3745-81-68 of the Administrative Code.

- (3) In tables B-1 to B-13 of this rule, the required CT between the indicated pH or residual disinfectant concentration may be determined by linear interpolation. The required CT between the indicated temperatures of different tables may be determined by linear interpolation.

If no interpolation is used, then the required CT shall be determined at the lower temperature, and at the higher pH, and at the higher residual disinfectant concentration. For *Giardia lamblia* inactivation at a pH greater than nine, the required CT shall be the same as the required CT at a pH equal to nine. For virus inactivation at a pH greater than nine, the required CT shall be the same as the required CT at a pH equal to ten.

- (4) On each day when the actual CT value meets or exceeds the required minimum CT value in or linearly interpolated from tables B-1 to B-13 of this rule for chlorine, chlorine dioxide, ozone, or chloramines, or the table in paragraph (N) of rule 3745-81-68 of the Administrative Code for UV disinfection, then the water treatment plant is considered to be satisfying treatment technique requirements of this rule for disinfection of surface water sources. On each day when the actual CT value does not meet or exceed the required minimum CT value from tables B-1 to B-13 of this rule, then the water treatment plant is in violation of paragraph (B)(1) of this rule.

- (5) For each clearwell, or contact tank, the approved effective volume factor shall be determined by the director based upon its design characteristics including: the average flow path length to channel width ratio; baffling; and the proximity of the outlet to the inlet using figures B-1 and B-2 of this rule. The approved effective volume factor shall be the preliminary effective volume factor obtained from figure B-1 of this rule multiplied by the reduction factor obtained from figure B-2 of this rule, rounded down to the nearest 0.05. A public water system may request that the director approve an effective volume factor that was determined by tracer studies, hydraulic analysis or modeling, or an equivalent demonstration. For a tracer study to be acceptable, the net advection of the tracer shall be within ten per cent of the change in the tracer chemical storage within the clearwell system. Net advection means the amount of tracer convected out of the clearwell system minus the amount of tracer convected into the clearwell system over the duration of the tracer study.

[Note: Refer to the appendix to this rule for more information on how to determine disinfection sufficiency.]

- (D) A public water system that serves a population of at least ten thousand persons and was required to develop a disinfection profile or benchmark under 40 CFR 141.172 or 40 CFR 141.170(d), or a community or nontransient noncommunity public water system that serves a population of less than ten thousand persons and was required to develop a disinfection profile or benchmark under 40 CFR 141.530, shall follow these requirements:
  - (1) Prior to making a significant change in its disinfection practice, the public water system shall submit the disinfection profile to the director for review and consultation. Such changes may require approval if determined substantial by the director as specified by rule 3745-91-02 of the Administrative Code. Significant changes to disinfection practice include any of the following:
    - (a) Changes to the point of disinfection;
    - (b) Changes to the disinfectant used in the treatment plant;
    - (c) Changes to the disinfection process; and
    - (d) Any other modification identified by the director, including those identified and proposed in a general plan required by paragraph (A)(7) of rule 3745-81-24 of the Administrative Code.

[Comment: The 40 CFR 141.172, 40 CFR 141.170(d), and 40 CFR 141.530 refer to the "Code of Federal Regulations" published on July 1, 2012. At the effective date of this rule, a copy may be obtained from the "Superintendent of Documents, PO Box 371954, Pittsburgh, PA 15250-7954," (866) 512-1800, or <http://bookstore.gpo.gov>. This document is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Columbus, OH, 43215-3425."]

- (2) The public water system shall calculate its disinfection benchmark using the following procedure:
  - (a) The disinfection benchmark is the lowest monthly average value (for public water systems with one year of profiling data) or average of lowest monthly average values (for public water systems with more than one year of profiling data) of the monthly logs of *Giardia lamblia* inactivation in each year of profiling data.
  - (b) For each year of profiling data collected and calculated, the public water system shall determine the lowest average monthly *Giardia lamblia* inactivation in each year of profiling data. The average *Giardia lamblia* inactivation shall be determined by dividing the sum of *Giardia lamblia* inactivation values by the number of values calculated for that month. For public water systems with a combined population of at least ten thousand persons, daily values shall be used. For public water systems with a combined population less than ten thousand persons, weekly values may be used. Values for each calendar month for each year of profiling data shall be used in the calculation.
- (3) A public water system that uses chloramines, chlorine dioxide, or ozone for primary disinfection shall also calculate the disinfection benchmark for viruses using a method acceptable to the director.
- (4) Prior to making a significant change, the public water system shall submit the following information for review by the director:
  - (a) A description of the proposed change;
  - (b) The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) and disinfection benchmark; and
  - (c) An analysis of how the proposed change will affect the current levels of disinfection.

- (5) The public water system shall retain the disinfection profile data in graphic form, as a spreadsheet, or in some other format acceptable to the director for review as part of a sanitary survey. The disinfection profile, disinfection benchmark, and all data and analysis used to complete the disinfection profile shall be retained by the public water system indefinitely.
- (E) Disinfection profiling and benchmarking requirements for any system making a significant change to their disinfection practice.
  - (1) Following the completion of initial source water monitoring in accordance with paragraph (A) of rule 3745-81-65 of the Administrative Code, a system that plans to make a significant change to its disinfection practice, as defined in paragraph (E)(2) of this rule, shall develop disinfection profiles and calculate disinfection benchmarks for *Giardia lamblia* and viruses as described in paragraphs (E)(3) to (E)(7) of this rule. Prior to changing the disinfection practice, the system shall notify the director and shall include in this notice the following information:
    - (a) A completed disinfection profile and disinfection benchmark for *Giardia lamblia* and viruses as described in paragraphs (E)(3) to (E)(7) of this rule.
    - (b) A description of the proposed change in disinfection practice.
    - (c) An analysis of how the proposed change will affect the current level of disinfection.
  - (2) Significant changes to disinfection practices include any of the following:
    - (a) Changes to the point of disinfection;
    - (b) Changes to the disinfectant used in the treatment plant;
    - (c) Changes to the disinfection process; or
    - (d) Any other modification identified by the director as a significant change to disinfection practice.
  - (3) Systems required to develop disinfection profiles in accordance with paragraphs (E)(1) and (E)(2) of this rule shall monitor at least weekly

for a period of twelve consecutive months to determine the total log inactivation for *Giardia lamblia* and viruses. If systems monitor more frequently, the monitoring frequency shall be evenly spaced. Systems that operate for fewer than twelve months per year shall monitor weekly during the period of operation. Systems shall determine log inactivation for *Giardia lamblia* and viruses through the entire plant, based on  $CT_{99.9}$  values in tables B-1 to B-13 of this rule, as applicable. Systems shall determine log inactivation of viruses through the entire treatment plant based on a protocol accepted by the director.

- (4) Systems with a single point of disinfectant application prior to the entrance to the distribution system shall conduct the monitoring in this paragraph. Systems with more than one point of disinfectant application shall conduct the monitoring in this paragraph for each disinfection segment. Systems shall monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in accordance with paragraph (C) of rule 3745-81-27 of the Administrative Code.
  - (a) For systems using a disinfectant other than UV, the temperature of the disinfected water shall be measured at each residual disinfectant concentration sampling point during peak hourly flow or at an alternative location accepted by the director.
  - (b) For systems using chlorine, the pH of the disinfected water shall be measured at each chlorine residual disinfectant concentration sampling point during peak hourly flow or at an alternative location accepted by the director.
  - (c) The disinfectant contact time(s),  $T$ , shall be determined during peak hourly flow.
  - (d) The residual disinfectant concentration(s),  $C$ , of the water before or at the first customer and prior to each additional point of disinfectant application shall be measured during peak hourly flow.
- (5) In lieu of conducting new monitoring under paragraph (E)(4) of this rule, systems may elect to meet the requirements of paragraph (E)(5)(a) or (E)(5)(b) of this rule.
  - (a) Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of paragraph (E)(4) of this rule may use these data to develop disinfection profiles as specified in this rule if the system has

neither made a significant change to the treatment practice nor changed sources since the data were collected. Systems may develop disinfection profiles using up to three years of existing data.

- (b) Systems may use disinfection profile(s) developed in accordance with paragraph (D) of this rule in lieu of developing a new profile if the system has neither made a significant change to the treatment practice nor changed sources since the profile was developed. Systems that have not developed a virus profile under paragraph (D) of this rule shall develop a virus profile using the same monitoring data on which the *Giardia lamblia* profile is based.
- (6) Systems shall calculate the total inactivation ratio for *Giardia lamblia* as specified in paragraphs (E)(6)(a) to (E)(6)(c) of this rule.
- (a) Systems using only one point of disinfectant application may determine the total inactivation ratio for the disinfection segment based on either of the following:
    - (i) Determine one inactivation ratio ( $CT_{calc}/CT_{99.9}$ ) before or at the first customer during peak hourly flow.
    - (ii) Determine successive  $CT_{calc}/CT_{99.9}$  values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. The system shall calculate the total inactivation ratio by determining ( $CT_{calc}/CT_{99.9}$ ) for each sequence and then adding the ( $CT_{calc}/CT_{99.9}$ ) values together to determine ( $\Sigma(CT_{calc}/CT_{99.9})$ ).
  - (b) Systems using more than one point of disinfectant application before the first customer shall determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ( $CT_{calc}/CT_{99.9}$ ) value of each segment and ( $\Sigma(CT_{calc}/CT_{99.9})$ ) shall be calculated using the method in paragraph (E)(6)(a)(ii) of this rule.
  - (c) The system shall determine the total logs of inactivation by multiplying the value calculated in paragraph (E)(6)(a) or (E)(6)(b) of this rule by 3.0.



- (d) Systems shall calculate the log of inactivation for viruses using a protocol approved by the director.
- (7) Systems shall use the following procedures to calculate a disinfection benchmark:
  - (a) For each year of profiling data collected and calculated under paragraphs (E)(3) to (E)(6) of this rule, systems shall determine the lowest average monthly level of both Giardia lamblia and virus inactivation. Systems shall determine the average Giardia lamblia and virus inactivation for each calendar month for each year of profiling data by dividing the sum of daily or weekly Giardia lamblia and virus log inactivation by the number of values calculated for that month.
  - (b) The disinfection benchmark is the lowest monthly average value (for systems with one year of profiling data) or the average of the lowest monthly average values (for systems with more than one year of profiling data) of Giardia lamblia and virus log inactivation in each year of profiling data.

Table A  
Minimum Requirements For Inactivation Or Removal of Cryptosporidium,  
Giardia Lamblia, and Viruses

Type of Filtration	Required Minimum Log Removal/Inactivation			Expected Log Removal by Filtration			Minimum Log Inactivation by Disinfection	
	Cryptosporidium (Log Removal Only)	Giardia	Viruses	Cryptosporidium	Giardia	Viruses	Giardia	Viruses
Conventional	2	3	4	2	2.5	2.0	0.5	2.0
Direct	2	3	4	2	2.0	1.0	1.0	3.0
Slow Sand	2	3	4	2	2.0	2.0	1.0	2.0

Comment: Log removal and log inactivation refer to the negative logarithm of the quotient of the concentration of an impurity after treatment divided by the concentration before treatment. For instance, a 99.9 per cent decrease in viruses has a post treatment concentration 0.001 times the pretreatment concentration and a 3 log removal designation. Common conversions include:

Removal designation	Concentration decrease	Quotient after/before
0.5 log	70%	0.3
1 log	90%	0.1
1.5 log	97%	0.03
2 log	99%	0.01
2.5 log	99.7%	0.003
3 log	99.9%	0.001
4 log	99.99%	0.0001

Table B-1  
Required CT For Inactivation  
Of Giardia Cysts By Free Chlorine  
At 0.5° Celsius Or Less

pH≤6							pH=6.5							pH=7.0						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
0.4	23	46	69	91	114	137	27	54	82	109	136	163	33	65	98	130	163	195		
0.6	24	47	71	94	118	141	28	56	84	112	140	168	33	67	100	133	167	200		
0.8	24	48	73	97	121	145	29	57	86	115	143	172	34	68	103	137	171	205		
1	25	49	74	99	123	148	29	59	88	117	147	176	35	70	105	140	175	210		
1.2	25	51	76	101	127	152	30	60	90	120	150	180	36	72	108	143	179	215		
1.4	26	52	78	103	129	155	31	61	92	123	153	184	37	74	111	147	184	221		
1.6	26	52	79	105	131	157	32	63	95	126	158	189	38	75	113	151	188	226		
1.8	27	54	81	108	135	162	32	64	97	129	161	193	39	77	116	154	193	231		
2	28	55	83	110	138	165	33	66	99	131	164	197	39	79	118	157	197	236		
2.2	28	56	85	113	141	169	34	67	101	134	168	201	40	81	121	161	202	242		
2.4	29	57	86	115	143	172	34	68	103	137	171	205	41	82	124	165	206	247		
2.6	29	58	88	117	146	175	35	70	105	139	174	209	42	84	126	168	210	252		
2.8	30	59	89	119	148	178	36	71	107	142	178	213	43	86	129	171	214	257		
3	30	60	91	121	151	181	36	72	109	145	181	217	44	87	131	174	218	261		

pH=7.5							pH=8.0							pH=8.5						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
0.4	40	79	119	158	198	237	46	92	139	185	231	277	55	110	165	219	274	329		
0.6	40	80	120	159	199	239	48	95	143	191	238	286	57	114	171	228	285	342		
0.8	41	82	123	164	205	246	49	98	148	197	246	295	59	118	177	236	295	354		
1	42	84	127	169	211	253	51	101	152	203	253	304	61	122	183	243	304	365		
1.2	43	86	130	173	216	259	52	104	157	209	261	313	63	125	188	251	313	376		
1.4	44	89	133	177	222	266	54	107	161	214	268	321	65	129	194	258	323	387		
1.6	46	91	137	182	228	273	55	110	165	219	274	329	66	132	199	265	331	397		
1.8	47	93	140	186	233	279	56	113	169	225	282	338	68	136	204	271	339	407		
2	48	95	143	191	238	286	58	115	173	231	288	346	70	139	209	278	348	417		
2.2	50	99	149	198	248	297	59	118	177	235	294	353	71	142	213	284	355	426		
2.4	50	99	149	199	248	298	60	120	181	241	301	361	73	145	218	290	363	435		
2.6	51	101	152	203	253	304	61	123	184	245	307	368	74	148	222	296	370	444		
2.8	52	103	155	207	258	310	63	125	188	250	313	375	75	151	226	301	377	452		
3	53	105	158	211	263	316	64	127	191	255	318	382	77	153	230	307	383	460		

pH=9.0 or pH>9.0						
Chlorine Concentration (mg/L)	Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
0.4	65	130	195	260	325	390
0.6	68	136	204	271	339	407
0.8	70	141	211	281	352	422
1	73	146	219	291	364	437
1.2	75	150	226	301	376	451
1.4	77	155	232	309	387	464
1.6	80	159	239	318	398	477
1.8	82	163	245	326	408	489
2	83	167	250	333	417	500
2.2	85	170	256	341	426	511
2.4	87	174	261	348	435	522
2.6	89	178	267	355	444	533
2.8	91	181	272	362	453	543
3	92	184	276	368	460	552

[Comment: CT<sub>99.9</sub> = CT for 3 log inactivation.]

Table B-2  
Required CT For Inactivation  
Of Giardia Cysts By Free Chlorine  
At 5° Celsius

pH≤6							pH=6.5							pH=7.0						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
0.4	16	32	49	65	81	97	20	39	59	78	98	117	23	46	70	93	116	139		
0.6	17	33	50	67	83	100	20	40	60	80	100	120	24	48	72	95	119	143		
0.8	17	34	52	69	86	103	20	41	61	81	102	122	24	49	73	97	122	146		
1	18	35	53	70	88	105	21	42	63	83	104	125	25	50	75	99	124	149		
1.2	18	36	54	71	89	107	21	42	64	85	106	127	25	51	76	101	127	152		
1.4	18	36	55	73	91	109	22	43	65	87	108	130	26	52	78	103	129	155		
1.6	19	37	56	74	93	111	22	44	66	88	110	132	26	53	79	105	132	158		
1.8	19	38	57	76	95	114	23	45	68	90	113	135	27	54	81	108	135	162		
2	19	39	58	77	97	116	23	46	69	92	115	138	28	55	83	110	138	165		
2.2	20	39	59	79	98	118	23	47	70	93	117	140	28	56	85	113	141	169		
2.4	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	115	143	172		
2.6	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175		
2.8	21	41	62	83	103	124	25	49	74	99	123	148	30	59	89	119	148	178		
3	21	42	63	84	105	126	25	50	76	101	126	151	30	61	91	121	152	182		

pH=7.5							pH=8.0							pH=8.5						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
0.4	28	55	83	111	138	166	33	66	99	132	165	198	39	79	118	157	197	236		
0.6	29	57	86	114	143	171	34	68	102	136	170	204	41	81	122	163	203	244		
0.8	29	58	88	117	146	175	35	70	105	140	175	210	42	84	126	168	210	252		
1	30	60	90	119	149	179	36	72	108	144	180	216	43	87	130	173	217	260		
1.2	31	61	92	122	153	183	37	74	111	147	184	221	45	89	134	178	223	267		
1.4	31	62	94	125	156	187	38	76	114	151	189	227	46	91	137	183	228	274		
1.6	32	64	96	128	160	192	39	77	116	155	193	232	47	94	141	187	234	281		
1.8	33	65	98	131	163	196	40	79	119	159	198	238	48	96	144	191	239	287		
2	33	67	100	133	167	200	41	81	122	162	203	243	49	98	147	196	245	294		
2.2	34	68	102	136	170	204	41	83	124	165	207	248	50	100	150	200	250	300		
2.4	35	70	105	139	174	209	42	84	127	169	211	253	51	102	153	204	255	306		
2.6	36	71	107	142	178	213	43	86	129	172	215	258	52	104	156	208	260	312		
2.8	36	72	109	145	181	217	44	88	132	175	219	263	53	106	159	212	265	318		
3	37	74	111	147	184	221	45	89	134	179	223	268	54	108	162	216	270	324		

pH=9.0 or pH>9.0						
Chlorine Concentration (mg/L)	Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
0.4	47	93	140	186	233	279
0.6	49	97	146	194	243	291
0.8	50	100	151	201	251	301
1	52	104	156	208	260	312
1.2	53	107	160	213	267	320
1.4	55	110	165	219	274	329
1.6	56	112	169	225	281	337
1.8	58	115	173	230	288	345
2	59	118	177	235	294	353
2.2	60	120	181	241	301	361
2.4	61	123	184	245	307	368
2.6	63	125	188	250	313	375
2.8	64	127	191	255	318	382
3	65	130	195	259	324	389

[Comment: CT<sub>99.9</sub> = CT for 3 log inactivation.]

Table B-3  
Required CT For Inactivation  
Of Giardia Cysts By Free Chlorine  
At 10° Celsius

pH≤6							pH=6.5							pH=7.0						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
≤0.4	12	24	37	49	61	73	15	29	44	59	73	88	17	35	52	69	87	104		
0.6	13	25	38	50	63	75	15	30	45	60	75	90	18	36	54	71	89	107		
0.8	13	26	39	52	65	78	15	31	46	61	77	92	18	37	55	73	92	110		
1	13	26	40	53	66	79	16	31	47	63	78	94	19	37	56	75	93	112		
1.2	13	27	40	53	67	80	16	32	48	63	79	95	19	38	57	76	95	114		
1.4	14	27	41	55	68	82	16	33	49	65	82	98	19	39	58	77	97	116		
1.6	14	28	42	55	69	83	17	33	50	66	83	99	20	40	60	79	99	119		
1.8	14	29	43	57	72	86	17	34	51	67	84	101	20	41	61	81	102	122		
2	15	29	44	58	73	87	17	35	52	69	87	104	21	41	62	83	103	124		
2.2	15	30	45	59	74	89	18	35	53	70	88	105	21	42	64	85	106	127		
2.4	15	30	45	60	75	90	18	36	54	71	89	107	22	43	65	86	108	129		
2.6	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131		
2.8	16	31	47	62	78	93	19	37	56	74	93	111	22	45	67	89	112	134		
3	16	32	48	63	79	95	19	38	57	75	94	113	23	46	69	91	114	137		

pH=7.5							pH=8.0							pH=8.5						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
≤0.4	21	42	63	83	104	125	25	50	75	99	124	149	30	59	89	118	148	177		
0.6	21	43	64	85	107	128	26	51	77	102	128	153	31	61	92	122	153	183		
0.8	22	44	66	87	109	131	26	53	79	105	132	158	32	63	95	126	158	189		
1	22	45	67	89	112	134	27	54	81	108	135	162	33	65	98	130	163	195		
1.2	23	46	69	91	114	137	28	55	83	111	138	166	33	67	100	133	167	200		
1.4	23	47	70	93	117	140	28	57	85	113	142	170	34	69	103	137	172	206		
1.6	24	48	72	96	120	144	29	58	87	116	145	174	35	70	106	141	176	211		
1.8	25	49	74	98	123	147	30	60	90	119	149	179	36	72	108	143	179	215		
2	25	50	75	100	125	150	30	61	91	121	152	182	37	74	111	147	184	221		
2.2	26	51	77	102	128	153	31	62	93	124	155	186	38	75	113	150	188	225		
2.4	26	52	79	105	131	157	32	63	95	127	158	190	38	77	115	153	192	230		
2.6	27	53	80	107	133	160	32	65	97	129	162	194	39	78	117	156	195	234		
2.8	27	54	82	109	136	163	33	66	99	131	164	197	40	80	120	159	199	239		
3	28	55	83	111	138	166	34	67	101	134	168	201	41	81	122	162	203	243		

pH=9.0 or pH>9.0						
Chlorine Concentration (mg/L)	Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	35	70	105	139	174	209
0.6	36	73	109	145	182	218
0.8	38	75	113	151	188	226
1	39	78	117	156	195	234
1.2	40	80	120	160	200	240
1.4	41	82	124	165	206	247
1.6	42	84	127	169	211	253
1.8	43	86	130	173	216	259
2	44	88	133	177	221	265
2.2	45	90	136	181	226	271
2.4	46	92	138	184	230	276
2.6	47	94	141	187	234	281
2.8	48	96	144	191	239	287
3	49	97	146	195	243	292

[Comment: CT<sub>99,9</sub> = CT for 3 log inactivation.]

Table B-4  
Required CT For Inactivation  
Of Giardia Cysts By Free Chlorine  
At 15° Celsius

pH≤6							pH=6.5							pH=7.0						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
≤0.4	8	16	25	33	41	49	10	20	30	39	49	59	12	23	35	47	58	70		
0.6	8	17	25	33	42	50	10	20	30	40	50	60	12	24	36	48	60	72		
0.8	9	17	26	35	43	52	10	20	31	41	51	61	12	24	37	49	61	73		
1	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75		
1.2	9	18	27	36	45	54	11	21	32	43	53	64	13	25	38	51	63	76		
1.4	9	18	28	37	46	55	11	22	33	43	54	65	13	26	39	52	65	78		
1.6	9	19	28	37	47	56	11	22	33	44	55	66	13	26	40	53	66	79		
1.8	10	19	29	38	48	57	11	23	34	45	57	68	14	27	41	54	68	81		
2	10	19	29	39	48	58	12	23	35	46	58	69	14	28	42	55	69	83		
2.2	10	20	30	39	49	59	12	23	35	47	58	70	14	28	43	57	71	85		
2.4	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86		
2.6	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88		
2.8	10	21	31	41	52	62	12	25	37	49	62	74	15	30	45	59	74	89		
3	11	21	32	42	53	63	13	25	38	51	63	76	15	30	46	61	76	91		

pH=7.5							pH=8.0							pH=8.5						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
≤0.4	14	28	42	55	69	83	17	33	50	66	83	99	20	39	59	79	98	118		
0.6	14	29	43	57	72	86	17	34	51	68	85	102	20	41	61	81	102	122		
0.8	15	29	44	59	73	88	18	35	53	70	88	105	21	42	63	84	105	126		
1	15	30	45	60	75	90	18	36	54	72	90	108	22	43	65	87	108	130		
1.2	15	31	46	61	77	92	19	37	56	74	93	111	22	45	67	89	112	134		
1.4	16	31	47	63	78	94	19	38	57	76	95	114	23	46	69	91	114	137		
1.6	16	32	48	64	80	96	19	39	58	77	97	116	24	47	71	94	118	141		
1.8	16	33	49	65	82	98	20	40	60	79	99	119	24	48	72	96	120	144		
2	17	33	50	67	83	100	20	41	61	81	102	122	25	49	74	98	123	147		
2.2	17	34	51	68	85	102	21	41	62	83	103	124	25	50	75	100	125	150		
2.4	18	35	53	70	88	105	21	42	64	85	106	127	26	51	77	102	128	153		
2.6	18	36	54	71	89	107	22	43	65	86	108	129	26	52	78	104	130	156		
2.8	18	36	55	73	91	109	22	44	66	88	110	132	27	53	80	106	133	159		
3	19	37	56	74	93	111	22	45	67	89	112	134	27	54	81	108	135	162		

pH=9.0 or pH>9.0						
Chlorine Concentration (mg/L)	Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	23	47	70	93	117	140
0.6	24	49	73	97	122	146
0.8	25	50	76	101	126	151
1	26	52	78	104	130	156
1.2	27	53	80	107	133	160
1.4	28	55	83	110	138	165
1.6	28	56	85	113	141	169
1.8	29	58	87	115	144	173
2	30	59	89	118	148	177
2.2	30	60	91	121	151	181
2.4	31	61	92	123	153	184
2.6	31	63	94	125	157	188
2.8	32	64	96	127	159	191
3	33	65	98	130	163	195

[Comment: CT<sub>99.9</sub> = CT for 3 log inactivation.]

Table B-5  
Required CT For Inactivation  
Of Giardia Cysts By Free Chlorine  
At 20° Celsius

pH≤6							pH=6.5							pH=7.0						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
≤0.4	6	12	18	24	30	36	7	15	22	29	37	44	9	17	26	35	43	52		
0.6	6	13	19	25	32	38	8	15	23	30	38	45	9	18	27	36	45	54		
0.8	7	13	20	26	33	39	8	15	23	31	38	46	9	18	28	37	46	55		
1	7	13	20	26	33	39	8	16	24	31	39	47	9	19	28	37	47	56		
1.2	7	13	20	27	33	40	8	16	24	32	40	48	10	19	29	38	48	57		
1.4	7	14	21	27	34	41	8	16	25	33	41	49	10	19	29	39	48	58		
1.6	7	14	21	28	35	42	8	17	25	33	42	50	10	20	30	39	49	59		
1.8	7	14	22	29	36	43	9	17	26	34	43	51	10	20	31	41	51	61		
2	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62		
2.2	7	15	22	29	37	44	9	18	27	35	44	53	11	21	32	42	53	63		
2.4	8	15	23	30	38	45	9	18	27	36	45	54	11	22	33	43	54	65		
2.6	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66		
2.8	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67		
3	8	16	24	31	39	47	10	19	29	38	48	57	11	23	34	45	57	68		

pH=7.5							pH=8.0							pH=8.5						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
≤0.4	10	21	31	41	52	62	12	25	37	49	62	74	15	30	45	59	74	89		
0.6	11	21	32	43	53	64	13	26	39	51	64	77	15	31	46	61	77	92		
0.8	11	22	33	44	55	66	13	26	40	53	66	79	16	32	48	63	79	95		
1	11	22	34	45	56	67	14	27	41	54	68	81	16	33	49	65	82	98		
1.2	12	23	35	46	58	69	14	28	42	55	69	83	17	33	50	67	83	100		
1.4	12	23	35	47	58	70	14	28	43	57	71	85	17	34	52	69	86	103		
1.6	12	24	36	48	60	72	15	29	44	58	73	87	18	35	53	70	88	105		
1.8	12	25	37	49	62	74	15	30	45	59	74	89	18	36	54	72	90	108		
2	13	25	38	50	63	75	15	30	46	61	76	91	18	37	55	73	92	110		
2.2	13	26	39	51	64	77	16	31	47	62	78	93	19	38	57	75	94	113		
2.4	13	26	39	52	65	78	16	32	48	63	79	95	19	38	58	77	96	115		
2.6	13	27	40	53	67	80	16	32	49	65	81	97	20	39	59	78	98	117		
2.8	14	27	41	54	68	81	17	33	50	66	83	99	20	40	60	79	99	119		
3	14	28	42	55	69	83	17	34	51	67	84	101	20	41	61	81	102	122		

pH=9.0 or pH>9.0						
Chlorine Concentration (mg/L)	Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	18	35	53	70	88	105
0.6	18	36	55	73	91	109
0.8	19	38	57	75	94	113
1	20	39	59	78	98	117
1.2	20	40	60	80	100	120
1.4	21	41	62	82	103	123
1.6	21	42	63	84	105	126
1.8	22	43	65	86	108	129
2	22	44	66	88	110	132
2.2	23	45	68	90	113	135
2.4	23	46	69	92	115	138
2.6	24	47	71	94	118	141
2.8	24	48	72	95	119	143
3	24	49	73	97	122	146

[Comment: CT<sub>99.9</sub> = CT for 3 log inactivation.]

Table B-6  
Required CT For Inactivation  
Of Giardia Cysts By Free Chlorine  
At 25° Celsius And Greater

pH≤6							pH=6.5							pH=7.0						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
≤0.4	4	8	12	16	20	24	5	10	15	19	24	29	6	12	18	23	29	35		
0.6	4	8	13	17	21	25	5	10	15	20	25	30	6	12	18	24	30	36		
0.8	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37		
1	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37		
1.2	5	9	14	18	23	27	5	11	16	21	27	32	6	13	19	25	32	38		
1.4	5	9	14	18	23	27	6	11	17	22	28	33	7	13	20	26	33	39		
1.6	5	9	14	19	23	28	6	11	17	22	28	33	7	13	20	27	33	40		
1.8	5	10	15	19	24	29	6	11	17	23	28	34	7	14	21	27	34	41		
2	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	27	34	41		
2.2	5	10	15	20	25	30	6	12	18	23	29	35	7	14	21	28	35	42		
2.4	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43		
2.6	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44		
2.8	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45		
3	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46		

pH=7.5							pH=8.0							pH=8.5						
Chlorine Concentration (mg/L)	Log Inactivations						Log Inactivations						Log Inactivations							
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0		
≤0.4	7	14	21	28	35	42	8	17	25	33	42	50	10	20	30	39	49	59		
0.6	7	14	22	29	36	43	9	17	26	34	43	51	10	20	31	41	51	61		
0.8	7	15	22	29	37	44	9	18	27	35	44	53	11	21	32	42	53	63		
1	8	15	23	30	38	45	9	18	27	36	45	54	11	22	33	43	54	65		
1.2	8	15	23	31	38	46	9	18	28	37	46	55	11	22	34	45	56	67		
1.4	8	16	24	31	39	47	10	19	29	38	48	57	12	23	35	46	58	69		
1.6	8	16	24	32	40	48	10	19	29	39	48	58	12	23	35	47	58	70		
1.8	8	16	25	33	41	49	10	20	30	40	50	60	12	24	36	48	60	72		
2	8	17	25	33	42	50	10	20	31	41	51	61	12	25	37	49	62	74		
2.2	9	17	26	34	43	51	10	21	31	41	52	62	13	25	38	50	63	75		
2.4	9	17	26	35	43	52	11	21	32	42	53	63	13	26	39	51	64	77		
2.6	9	18	27	35	44	53	11	22	33	43	54	65	13	26	39	52	65	78		
2.8	9	18	27	36	45	54	11	22	33	44	55	66	13	27	40	53	67	80		
3	9	18	28	37	46	55	11	22	34	45	56	67	14	27	41	54	68	81		

pH=9.0 or pH>9.0						
Chlorine Concentration (mg/L)	Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	12	23	35	47	58	70
0.6	12	24	37	49	61	73
0.8	13	25	38	50	63	75
1	13	26	39	52	65	78
1.2	13	27	40	53	67	80
1.4	14	27	41	55	68	82
1.6	14	28	42	56	70	84
1.8	14	29	43	57	72	86
2	15	29	44	59	73	88
2.2	15	30	45	60	75	90
2.4	15	31	46	61	77	92
2.6	16	31	47	63	78	94
2.8	16	32	48	64	80	96
3	16	32	49	65	81	97

[Comment: CT<sub>99.9</sub> = CT for 3 log inactivation.]



Table B-7  
Required CT For Inactivation  
of Viruses by Free Chlorine

Temperature (Celsius)	..... Log Inactivation .....					
	2.0 Log		3.0 Log		4.0 Log	
	pH 6-9	pH 10	pH 6-9	pH 10	pH 6-9	pH 10
0.5	6	45	9	66	12	90
5	4	30	6	44	8	60
10	3	22	4	33	6	45
15	2	15	3	22	4	30
20	1	11	2	16	3	22
25	1	7	1	11	2	15

Table B-8  
CT Values for Inactivation of Giardia Cysts  
by Chlorine Dioxide pH 6-9

	..... Temperature (Celsius) .....					
Log Inactivation	≤1	5	10	15	20	≥25
0.5	10	4.3	4	3.2	2.5	2
1	21	8.7	7.7	6.3	5	3.7
1.5	32	13	12	10	7.5	5.5
2	42	17	15	13	10	7.3
2.5	52	22	19	16	13	9
3	63	26	23	19	15	11

Table B-9  
CT Values for Inactivation of Viruses  
By Chlorine Dioxide pH 6-9

	..... Temperature (Celsius) .....					
Log Inactivation	≤1	5	10	15	20	≥25
2	8.4	5.6	4.2	2.8	2.1	1.4
3	25.6	17.1	12.8	8.6	6.4	4.3
4	50.1	33.4	25.1	16.7	12.5	8.4

Table B-10  
CT Values for Inactivation of Giardia Cysts  
By Ozone pH 6-9

	..... Temperature (Celsius) .....					
Log Inactivation	≤1	5	10	15	20	≥25
0.5	0.48	0.32	0.23	0.16	0.12	0.08
1	0.97	0.63	0.48	0.32	0.24	0.16
1.5	1.5	0.95	0.72	0.48	0.36	0.24
2	1.9	1.3	0.95	0.63	0.48	0.32
2.5	2.4	1.6	1.2	0.79	0.60	0.40
3	2.9	1.9	1.43	0.95	0.72	0.48

Table B-11  
CT Values for Inactivation of Viruses by Ozone

	..... Temperature (Celsius) .....					
Log Inactivation	≤1	5	10	15	20	≥25
2	0.9	0.6	0.5	0.3	0.25	0.15
3	1.4	0.9	0.8	0.5	0.4	0.25
4	1.8	1.2	1.0	0.6	0.5	0.3

Table B-12

Required CT Values for Inactivation of Giardia Cysts by Chloramine, pH 6.0-9.0																									
Temperature (Celsius)																									
Log Inactivation	≤1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0.5	635	568	500	433	365	354	343	332	321	310	298	286	274	262	250	237	224	211	198	185	173	161	149	137	125
1	1270	1136	1003	869	735	711	687	663	639	615	592	569	546	523	500	474	448	422	396	370	346	322	298	274	250
1.5	1900	1700	1500	1300	1100	1066	1032	998	964	930	894	858	822	786	750	710	670	630	590	550	515	480	445	410	375
2	2535	2269	2003	1736	1470	1422	1374	1326	1278	1230	1184	1138	1092	1046	1000	947	894	841	788	735	688	641	594	547	500
2.5	3170	2835	2500	2165	1830	1772	1714	1656	1598	1540	1482	1424	1366	1308	1250	1183	1116	1049	982	915	857	799	741	683	625
3	3800	3400	3000	2600	2200	2130	2060	1990	1920	1850	1780	1710	1640	1570	1500	1420	1340	1260	1180	1100	1030	960	890	820	750

Table B-13

Required CT for Inactivation of Viruses by Chloramine<sup>1</sup>

Temperature (Celsius)																									
Log Inactivation	≤1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
2	1243	1147	1050	954	857	814	771	729	686	643	600	557	514	471	428	407	385	364	342	321	300	278	257	235	214
3	2063	1903	1743	1583	1423	1352	1281	1209	1138	1067	996	925	854	783	712	676	641	605	570	534	498	463	427	392	356
4	2883	2659	2436	2212	1988	1889	1789	1690	1590	1491	1392	1292	1193	1093	994	944	895	845	796	746	696	646	597	547	497

<sup>1</sup>These required CT may be assumed to achieve greater than 99.99 per cent inactivation of viruses only if chlorine is added and mixed in the water prior to the addition of ammonia. If this condition is not met, the public water system must demonstrate, based on onsite studies or other information, as approved by the director, that the public water system is achieving at least 99.99 per cent inactivation of viruses.

Figure B-1

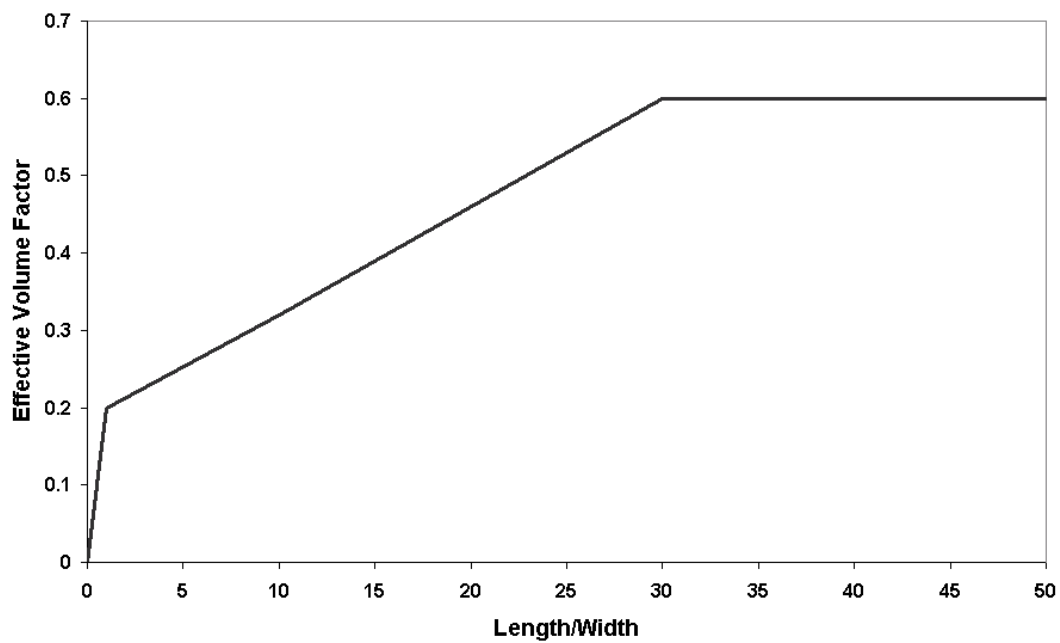
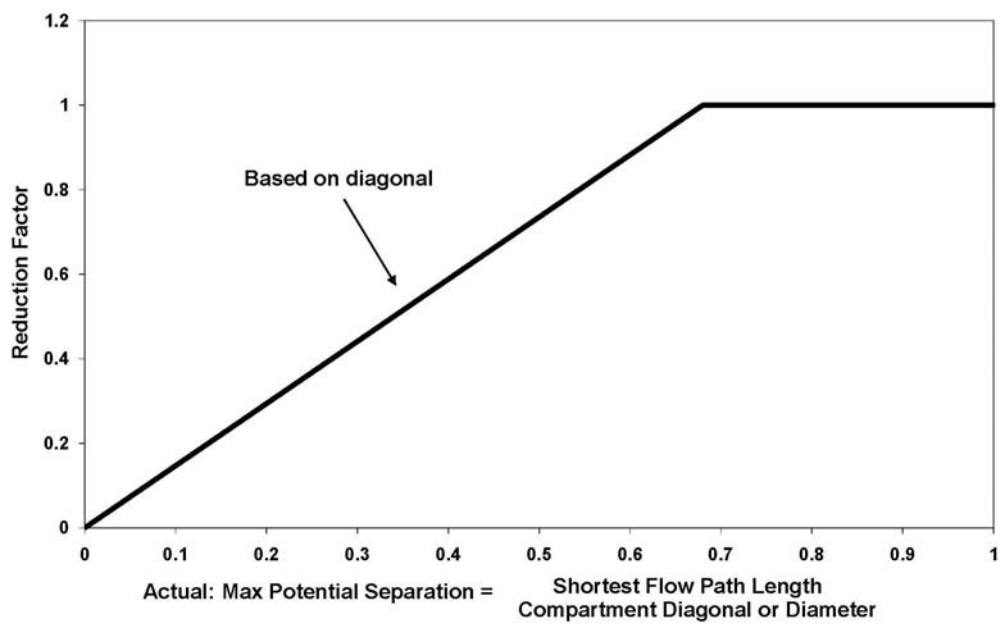


Figure B-2



Effective: 10/05/2013

R.C. 119.032 review dates: 10/31/2015 and 10/05/2018

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 01/01/05, 01/08/10, 10/31/10

## Appendix

### Disinfection Treatment Sufficiency Determination

This rule specifies the minimum log inactivation or removal of *Giardia lamblia*, *Cryptosporidium*, and viruses in water obtained from a surface water source, in whole or in part. A treatment technique is required in lieu of a maximum contaminant level for *Cryptosporidium*, *Giardia lamblia* viruses, heterotrophic plate count bacteria, *Legionella*, and turbidity.

The effectiveness of disinfection increases with increasing concentration of the disinfectant and with increasing time the disinfectant is in the water. A measure of the effectiveness of disinfection at the peak hourly flow rate, CT, is obtained by multiplying the lowest daily residual disinfectant concentration, C, by the lowest daily disinfectant contact time, T.

The value of C in milligrams per liter is determined at the entry to the distribution system and/or, if approved by the director, before the first customer. The value of T in minutes is based on the disinfectant contact time available for the disinfectant to work from the point where the disinfectant is added to the point where C is measured. Only filtered water flow shall be used in the required CT calculations to meet the minimum log inactivation in table A of this rule, regardless of the disinfectant used. For systems using chlorine dioxide or ozone to comply with additional *Cryptosporidium* treatment requirements in paragraph (E) of rule 3745-81-67 of the Administrative Code, unfiltered water flow may be used to achieve the additional treatment credit if approved by the director. Values of T shall be determined from:

- (a) Acceptable tracer studies; or
- (b) The lowest daily water volume divided by the peak flow; and
- (c) An approved effective volume factor as determined by the director.

For a typical day in many public water systems, the value of a single determination of C multiplied by its associated T will give an actual CT which is larger than the required CT. However, in other cases, it may be appropriate to determine the value of C at more than one point of the water treatment flow, with the T associated with each C being estimated from the previous measurement point or the previous addition of disinfectant, whichever is closer. If more than one disinfectant concentration point is used, the products of each C and its associated T are added and the sum of these products is the actual CT to compare with the appropriate value of the required CT for specified conditions and log inactivation. Any disinfection after the last determination of C is not included in the actual CT value.



On each day if the actual CT is greater than or equal to the required CT, then the public water system is considered to be satisfying this rule's treatment technique requirements for disinfection. On each day if the actual CT is less than the required CT, then the water treatment plant is in violation of this rule.

### **3745-81-73 Filtration of water from surface water sources.**

A public water system that uses a surface water source, in whole or in part, shall provide treatment consisting of both disinfection, as specified in paragraph (B) of rule 3745-81-72 of the Administrative Code, and filtration treatment which complies with paragraph (A), (B), or (C) of this rule. . Distinction between surface water sources and ground water sources is set forth in rule 3745-81-76 of the Administrative Code. Filtration treatment shall consistently and reliably achieve at least ninety-nine per cent (2 log) removal of *Cryptosporidium*. Failure to meet any requirement of this rule shall be a treatment technique violation and shall require public notification as set forth in rule 3745-81-32 of the Administrative Code.

- (A) Conventional filtration treatment or direct filtration treatment. All public water systems using conventional filtration treatment or direct filtration treatment to treat surface water shall meet the following:
  - (1) Turbidity levels of representative samples of filtered water shall be less than or equal to 0.3 nephelometric turbidity units (NTU) in at least ninety-five per cent of the samples analyzed each month.
  - (2) The turbidity level of representative samples of a public water system's filtered water shall not exceed one NTU.
- (B) Slow sand filtration. Filtration by a public water system filtering surface water by slow sand filtration shall meet the following:
  - (1) For a public water system using slow sand filtration, the turbidity level of representative samples of filtered water shall be less than or equal to one NTU in at least ninety-five per cent of the samples each month.
  - (2) The turbidity level of representative samples of a public water system's filtered water shall not exceed five NTU.
- (C) Alternative filtration technologies. If a public water system using a surface water source, in whole or in part, can demonstrate to the director, using pilot plant studies or other means, that a filtration technology not listed in paragraph (A) or (B) of this rule, in combination with disinfection treatment that meets the requirements of paragraph (B) of rule 3745-81-72 of the Administrative Code, consistently and reliably achieves ninety-nine per cent (2 log) removal of *Cryptosporidium*, 99.9 per cent (3 log) removal and/or inactivation of *Giardia lamblia* cysts and 99.99 per cent (4 log) removal and/or inactivation of viruses, the director may accept this alternative filtration technology for use by the public water system. For a public water system that makes this demonstration, the requirements of paragraph (A) of this rule apply. For a public water system that makes this demonstration, the minimum log removal and inactivation requirements for conventional filtration in table A of rule 3745-81-72 of the Administrative Code shall apply. Each membrane filter which has been awarded credit for log removal as described in this paragraph shall undergo direct integrity testing daily to verify the log removal it has been credited to achieve. The direct integrity testing requirements in paragraph (K)(3) of

rule 3745-81-68 of the Administrative Code shall apply. In addition, continuous filtrate turbidity monitoring shall be performed on each membrane filter. If the turbidity of a membrane filter exceeds 0.15 NTU in two consecutive readings taken fifteen minutes apart, the system shall conduct a direct integrity test on the membrane filter. A membrane filter shall be removed from service for repairs until the membrane filter can pass a direct integrity test to verify the log removal it has been credited to achieve. Systems shall submit a monthly report including daily direct integrity test results, any turbidity monitoring results which trigger direct integrity testing, and any corrective action taken.

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R.C. 119.032 review dates: 07/16/2013 and 10/05/2018

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 12/31/90, 09/13/93, 01/01/02, 01/01/05, 01/08/10

3745-81-74      **Turbidity and disinfection monitoring requirements for surface water systems.**

A public water system that uses a surface water source, in whole or in part, shall conduct turbidity and disinfection monitoring in accordance with this rule.

- (A) Turbidity measurements to ensure compliance with rule 3745-81-73 of the Administrative Code shall be performed on representative samples of filtered water at least every four hours that the water treatment plant is in operation. If using grab sampling for turbidity monitoring, samples shall be obtained within the first and last hours of filter operation and at least every four hours in between. Systems using grab sampling and monitoring at the clearwell effluent, the plant effluent, or immediately prior to entry into the distribution system shall monitor turbidity at least every four hours unless the high service pumps are locked out for a portion of the day. If the pumps are locked out for a portion of the day, samples shall be taken during the first and last hours of pump operations, and every four hours in-between. A public water system may substitute continuous turbidity monitoring (a reading at least every fifteen minutes) for grab sample monitoring if the public water system validates the continuous measurement for accuracy on a regular basis using a protocol acceptable to the director. Any of the following locations are acceptable for monitoring turbidity of filtered water:

- (1) At the combined filter effluent prior to entry into the clearwell
- (2) The average of turbidity measurements from each individual filter effluent if each filter has essentially the same loading rate
- (3) At the clearwell effluent
- (4) At the plant effluent or immediately prior to entry into the distribution system.

- (B) A public water system using conventional filtration treatment or direct filtration treatment, shall also conduct individual filter turbidity monitoring as follows:

- (1) A public water system that provides conventional filtration treatment or direct filtration treatment shall conduct continuous monitoring of turbidity for each individual filter effluent. The public water system shall validate the continuous measurement for accuracy on a regular basis using the protocol acceptable to the director. The public water system shall record the results of individual filter monitoring every fifteen minutes. A public water system serving a combined population of less than ten thousand and which has two filters may conduct continuous monitoring of turbidity of the combined filter effluent, prior to entry into the clearwell, in lieu of individual filter effluent turbidity monitoring. The public water system shall record the results of the combined filter monitoring every fifteen minutes.
- (2) If there is a failure in the continuous turbidity monitoring equipment, the public water system shall conduct grab sampling every four hours in lieu of continuous monitoring until the continuous turbidity monitoring equipment is repaired and placed back online. A public water system serving a combined population of at least ten thousand has no more than five working days after the failure of the equipment to repair the

continuous turbidity monitoring equipment and to place it back online. A public water system serving a combined population of less than ten thousand has no more than fourteen days after the failure of the equipment to repair the continuous turbidity monitoring equipment and to place it back online.

- (C) Turbidity analysis shall be conducted as specified in paragraph (C) of rule 3745-81-27 of the Administrative Code.
- (D) The residual disinfectant concentration of the water entering the distribution system shall be monitored continuously, and the lowest value must be recorded each day, except under the following conditions:
  - (1) If there is a failure in the continuous disinfection monitoring equipment, the public water system shall conduct grab sampling every four hours in lieu of continuous monitoring until the continuous monitoring equipment is repaired and placed back online. A public water system has no more than five working days after failure of the equipment to repair the continuous monitoring equipment and place it back online.
  - (2) Public water systems serving three thousand three hundred or fewer persons may, with prior acceptance by the director, take grab samples in lieu of providing continuous monitoring. Grab sample monitoring shall require at least one sample every four hours that the water treatment plant is in operation. Systems shall monitor disinfectant residual at least every four hours unless the high service pumps are locked out for a portion of the day. If the pumps are locked out for a portion of the day, samples shall be taken during the first and last hours of pump operations, and every four hours in-between.
- (E) Until March 31, 2016, the residual disinfectant concentration shall be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in rule 3745-81-21 of the Administrative Code.
- (F) Beginning April 1, 2016, the residual disinfectant concentration shall be measured at least at the sample points in the distribution system and at the same time as total coliforms are sampled, as specified in rules 3745-81-51 and 3745-81-52 of the Administrative Code.
- (G) Parameters necessary to determine the sufficiency of disinfection prior to the first customer as required in rule 3745-81-72 of the Administrative Code shall be measured and recorded at the peak hourly flow rate each day the public water system is in operation. Public water systems which do not record any or all of the parameters set forth in paragraphs (G)(1) to (G)(3) of this rule on continuously recording devices, may estimate the period at which peak hourly flow will occur from records of flow rates from previous days for that water plant. The parameters necessary to calculate the actual CT value may then be those measured during this estimated peak hourly flow period. Temperature, pH, and residual disinfection concentration shall be analyzed in accordance with the methods specified in rule 3745-81-27 of the Administrative Code. The parameters necessary to calculate the actual CT value include all of the following:
  - (1) The temperature of the disinfected water at each residual disinfectant concentration sampling point.

- (2) The pH of the disinfected water at each residual disinfectant concentration sampling point.
- (3) The kind of disinfectant used and the residual disinfectant concentration at each sampling point before or at the first customer.
- (4) The flow rate, clearwell used volume or depth, approved effective volume factor, and any other parameters needed to calculate the disinfectant contact time for each sampling point during each day's peak hourly flow.
- (5) The actual CT value as determined for each day in the month, calculated from the above water temperature, pH, residual disinfectant concentration, disinfectant contact time, and other characteristics of the water treatment plant as it was operating at peak hourly flow rate for that day.
- (6) The required CT value for each day of the month, determined from the water temperature, the water pH, the disinfectant in use, and other information referred to in rule 3745-81-72 of the Administrative Code.
- (7) The number of days, if any, for which the required CT value was greater than the actual CT value.

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### **3745-81-75 Recordkeeping, reporting and actionable requirements.**

A public water system that uses a surface water source shall report monthly to the director the information specified in paragraphs (A) to (F) of this rule. In addition, a public water system that must monitor for TTHM, HAA5, bromate, chlorite, total residual chlorine, chlorine dioxide, or TOC shall comply with the applicable sections of paragraph (G) of this rule.

- (A) Turbidity determinations as required by paragraph (A) of rule 3745-81-74 of the Administrative Code shall be reported to the director within ten days after the end of each month the public water system serves water to the public. The information reported shall include the following:
  - (1) The total number of filtered water turbidity determinations during the month. When filtered water turbidity is recorded continuously, the reported number shall be the number of hours in which turbidity values were recorded during the month.
  - (2) The number and per cent of filtered water turbidity determinations during the month which are less than or equal to the turbidity limits specified in paragraph (A)(1) or (B)(1) of rule 3745-81-73 of the Administrative Code for the filtration method being used. For public water systems which continuously monitor turbidity, the duration and per cent of filtered water turbidity readings during the month which are less than or equal to the turbidity limits in paragraph (A)(1) or (B)(1) of rule 3745-81-73 of the Administrative Code shall be reported.
  - (3) The date and value of each turbidity determination during the month which exceeds any applicable turbidity limit specified in rule 3745-81-73 of the Administrative Code for the filtration method being used. For public water systems which continuously monitor turbidity, the date and duration of each period during the month that the turbidity exceeds the turbidity limit specified in paragraph (A)(1) or (B)(1) and paragraph (A)(2) or (B)(2) of rule 3745-81-73 of the Administrative Code shall be reported.
- (B) The following individual filter turbidity monitoring activities as required by paragraph (B) of rule 3745-81-74 of the Administrative Code shall be reported to the director as follows:
  - (1) Confirmation that individual filter monitoring was conducted shall be reported within ten days after the end of each month the public water system serves water to the public.
  - (2) Public water systems serving a combined population of at least ten thousand shall report individual filter turbidity monitoring results within ten days after the end of each month the public water system serves water to the public only if measurements demonstrate one or more of the following conditions:
    - (a) For any individual filter that has a measured turbidity level of greater than



1.0 nephelometric turbidity units (NTU) in two consecutive measurements taken fifteen minutes apart, the public water system shall report the filter number, the turbidity measurements, and the date and times on which the exceedance occurred. In addition, the public water system shall either produce a filter profile for the filter within seven days of the exceedance and report that the filter profile has been produced or report the obvious reason for the exceedance.

- (b) For any individual filter that has a measured turbidity level of greater than 0.5 NTU in two consecutive measurements taken fifteen minutes apart between the end of the first four hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, and at the end of a filter run the public water system shall report the filter number, the turbidity measurements, and that date and times on which the exceedance occurred. In addition, the public water system shall either produce a filter profile for the filter within seven days of the exceedance and report that the profile has been produced or report the obvious reason for the exceedance.
  - (c) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken fifteen minutes apart at any time in each of three consecutive months, the public water system shall report the filter number, the turbidity measurements, and the dates and times on which the exceedance occurred. In addition, the public water system shall conduct a self-assessment of the filter within fourteen days of the exceedance and report that the self-assessment was conducted. The self assessment shall consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.
  - (d) For any individual filter that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken fifteen minutes apart at any time in each of two consecutive months, the public water system shall report the filter number, the turbidity measurements, and the dates and times on which the exceedance occurred. In addition, no later than thirty days following the exceedance, the public water system shall arrange for a comprehensive performance evaluation (CPE) to be conducted by the director. If the director decides not to conduct the CPE, then the CPE shall be conducted by a third party in accordance with procedures acceptable to the director. A report of the evaluation shall be completed and submitted to the director no later than ninety days following the exceedance. The director may require the public water system to correct any or all of the deficiencies noted in the report.
- (3) Public water systems serving a combined population of less than ten thousand shall report individual filter turbidity monitoring results within ten

days after the end of each month the public water system serves water to the public only if measurements demonstrate one or more of the following conditions:

- (a) For any individual filter (or combined filter effluent for systems with two filters that monitor combined filter effluent in lieu of individual filters) that has a measured turbidity level of greater than 1.0 nephelometric turbidity units (NTU) in two consecutive measurements taken fifteen minutes apart, the public water system shall report the filter number, the turbidity measurements, and the dates and times on which the exceedance occurred. In addition, the public water system shall report the cause of the exceedance if known.
- (b) For any individual filter (or combined filter effluent for systems with two or fewer filters that monitor combined filter effluent in lieu of individual filters) that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken fifteen minutes apart at any time in each of three consecutive months, the public water system shall report the filter number, the turbidity measurements, and the dates and times on which the exceedance occurred. In addition, the public water system shall conduct a self-assessment of the filter (or both filters if the system monitors the combined filter effluent in lieu of individual filters) within fourteen days of the exceedance and report that the self-assessment was conducted unless the requirement to conduct a comprehensive performance evaluation which includes a self-assessment of this filter is required during this time period by paragraph (B)(3)(c) of this rule. The self-assessments shall consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.
- (c) For any individual filter (or combined filter effluent for systems with two or fewer filters that monitor combined filter effluent in lieu of individual filters) that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken fifteen minutes apart at any time in each of two consecutive months, the public water system shall report the filter number, the turbidity measurements, and the dates and times on which the exceedance occurred. In addition, no later than sixty days following the exceedance, the public water system shall arrange for a comprehensive performance evaluation (CPE) to be conducted by the director. If the director decides not to conduct the CPE, then the CPE shall be conducted by a third party in accordance with procedures acceptable to the director. A report of the evaluation shall be completed and submitted to the director no later than one hundred twenty days following the exceedance. The director may require the public water system to correct any or all of the deficiencies noted in the report. If a

CPE has been completed within twelve months prior to the exceedance or if the director and public water system are jointly participating in an ongoing comprehensive technical assistance (CTA) at the system, the director may not require a new CPE to be conducted.

- (4) Recorded results of individual filter turbidity monitoring shall be maintained by the public water system for a minimum of three years.
- (C) Disinfection information specified in rule 3745-81-74 of the Administrative Code shall be reported to the director within ten days after the end of each month the public water system serves water to the public. The information reported shall include the following:
- (1) For each day, the lowest residual disinfectant concentration in milligrams per liter in water entering the distribution system.
  - (2) The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine and when the director was notified of the occurrence.
  - (3) The following information on all the residual disinfectant concentration samples taken in the distribution system in conjunction with total coliform monitoring pursuant to rule 3745-81-21 of the Administrative Code:
    - (a) The number of residual disinfectant concentration samples analyzed for the distribution system;
    - (b) The number of samples with residual disinfectant concentration determined to be less than 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine; and
    - (c) The per cent of samples with residual disinfectant concentration of at least 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine.
  - (4) The CT parameters during peak hourly flow rate for each day, including the temperature, pH, disinfectant, residual disinfectant concentration, disinfectant contact time, actual CT value, required CT value, and the number of days, if any, for which the required CT value is larger than the actual CT value.
- (D) Each public water system, upon discovering that a waterborne disease outbreak potentially attributable to that public water system has occurred, shall report that occurrence to the director as soon as possible, but no later than by the end of the next business day.
- (E) If at any time the turbidity in representative samples of filtered water in accordance with paragraph (A) of rule 3745-81-74 of the Administrative Code exceeds one NTU, for conventional or direct filtration or alternative filtration surface water

systems, the public water system shall notify the director as soon as practical, but no later than twenty-four hours after the exceedance is known. For all other surface water systems, if at any time the turbidity in representative samples of filtered water in accordance with paragraph (A) of rule 3745-81-74 exceeds five NTU, the public water system shall notify the director as soon as practical, but no later than twenty-four hours after the exceedance is known.

- (F) If at any time the residual disinfectant concentration falls below 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine in the water entering the distribution system, the public water system shall notify the director as soon as possible, but no later than by the end of the next business day. The public water system also shall notify the director by the end of the next business day whether or not the residual disinfectant concentration was restored to at least 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine within four hours.
- (G) This paragraph is applicable to public water systems that monitor for TTHM, HAA5, bromate, chlorite, chlorine, chloramines, chlorine dioxide, or TOC:
  - (1) Public water systems monitoring for TTHM and HAA5 under the provisions of rule 3745-81-24 of the Administrative Code shall ensure that the analytical results are reported to the director according to the requirements specified in rule 3745-89-08 of the Administrative Code. In order to determine compliance with the sample monitoring plan for total TTHM and HAA5, the sample submission reports shall contain the sample location description. Compliance with the MCLs for TTHM and HAA5 in rule 3745-81-12 of the Administrative Code shall be determined by the director. Exceedance of the operational evaluation level for TTHM and HAA5 in paragraph (D) of rule 3745-81-24 of the Administrative Code shall be determined by the director.
  - (2) Public water systems monitoring for bromate under rule 3745-81-23 of the Administrative Code shall report the following:
    - (a) The number of samples taken during the last quarter.
    - (b) The location, date, and result of each sample taken during the last quarter.
    - (c) The arithmetic average of the monthly arithmetic averages of all samples taken in the last year.
    - (d) Whether the MCL was exceeded.
  - (3) Public water systems monitoring for chlorite under rule 3745-81-23 of the Administrative Code shall report the following:
    - (a) The number of entry point samples taken each month for the last three months.
    - (b) The location, date, and result of each sample (both entry point and

distribution) taken during the last quarter.

- (c) For each month in the reporting period, the arithmetic average of all samples taken in each three sample sets taken in the distribution system.
  - (d) Whether the MCL was exceeded, in which month, and how many times it was exceeded each month.
- (4) Public water systems monitoring for total chlorine under rule 3745-81-70 of the Administrative Code shall report the following:
  - (a) The number of samples taken during each month of the last quarter.
  - (b) The monthly arithmetic average of all samples taken in each month for the last twelve months.
  - (c) The arithmetic average of the monthly averages for the last twelve months.
  - (d) Whether the MRDL was exceeded.
- (5) Public water systems monitoring for chlorine dioxide under rule 3745-81-70 of the Administrative Code shall report the following:
  - (a) The dates, results, and locations of samples taken during the last quarter.
  - (b) Whether the MRDL was exceeded.
  - (c) Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or nonacute.
- (6) Public water systems monitoring monthly or quarterly for TOC under rule 3745-81-77 of the Administrative Code and required to meet the enhanced coagulation or enhanced softening requirements in rule 3745-81-77 of the Administrative Code shall report the following:
  - (a) The number of paired (source water and treated water, prior to continuous disinfection) samples taken during the last quarter.
  - (b) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter.
  - (c) For each month in the reporting period that paired samples were taken, the arithmetic average of the per cent reduction of TOC for each paired sample and the required TOC per cent removal.
  - (d) Calculations for determining compliance with the TOC per cent removal requirements, as provided in rule 3745-81-77 of the Administrative Code.

- (e) Whether the public water system is in compliance with the enhanced coagulation or enhanced softening per cent removal requirements in rule 3745-81-77 of the Administrative Code for the last four quarters.
- (7) Public water systems monitoring monthly or quarterly for TOC under rule 3745-81-77 of the Administrative Code and meeting one or more of the alternative compliance criteria in rule 3745-81-77 of the Administrative Code shall report the following:
- (a) The alternative compliance criterion that the system is using.
  - (b) The number of paired samples taken during the last quarter.
  - (c) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter.
  - (d) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for public water systems meeting a criterion in paragraph (D)(1) or (D)(3) of rule 3745-81-77 of the Administrative Code or of treated water TOC for public water systems meeting the criterion in paragraph (D)(2) of rule 3745-81-77 of the Administrative Code.
  - (e) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for public water systems meeting the criterion in paragraph (D)(6) of rule 3745-81-77 of the Administrative Code or of treated water SUVA for public water systems meeting the criterion in paragraph (D)(7) of rule 3745-81-77 of the Administrative Code.
  - (f) The running annual average of source water alkalinity for public water systems meeting the criterion in paragraph (D)(3) of rule 3745-81-77 of the Administrative Code and of treated water alkalinity for public water systems meeting the criterion in paragraph (E)(1) of rule 3745-81-77 of the Administrative Code.
  - (g) The running annual average for both TTHM and HAA5 for public water systems meeting the criterion in paragraph (D)(3) or (D)(5) of rule 3745-81-77 of the Administrative Code.
  - (h) The running annual average of the amount of magnesium hardness removal (as  $\text{CaCO}_3$ , in mg/l) for public water systems meeting the criterion in paragraph (E)(2) of rule 3745-81-77 of the Administrative Code.
  - (i) Whether the public water system is in compliance with the particular alternative compliance criterion in rule 3745-81-77 of the Administrative Code.

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**3745-81-76 Water source designation.**

- (A) Source water which is open to the atmosphere or subject to surface runoff is designated as surface water. Surface water sources include streams, rivers, ponds, lakes, reservoirs, springs, roof collection and impoundments.
- (B) Source water which is obtained from a well is designated as ground water unless the director designates the source as surface water.
- (C) The director may designate a well as surface water based on information available in Ohio environmental protection agency files about the water source and the water produced from the source, information from on-site sanitary or geological surveys, information supplied by the public water system upon a request from the director, any additional information which becomes available, and the guidelines outlined in the following paragraphs. A public water system shall provide information requested by the director within six months of receipt of a written request. Information requested for each water source may concern water quality, well construction and location, geological information, particulate analysis, Cryptosporidium analysis, Giardia lamblia analysis, E.coli analysis, ground water source samples related to rules 3745-81-41 to 3745-81-43 of the Administrative Code, and other information related to designation of the water source. A well may be designated as surface water if it meets any of the following criteria:
  - (1) The well does not meet all of the requirements for wells in Chapter 3745-9 of the Administrative Code;
  - (2) The well obtains water from a site at which rapid pathways or compromised hydrogeologic barriers have been identified; or
  - (3) If required by the director, analysis shows the annual mean E. coli concentration is greater than or equal to ten E. coli per one hundred milliliters.
- (D) The director shall at a minimum consider the following criteria in making a surface water designation for a well:
  - (1) A well does not meet all of the requirements for wells in Chapter 3745-9 of the Administrative Code;
  - (2) A well obtains water from a site at which rapid pathways or compromised hydrogeologic barriers have been identified;
  - (3) A well is cased less than fifteen feet in depth;
  - (4) A vertical well where the sum of the casing depth plus the horizontal distance to a normal surface water pool is less than forty feet;
  - (5) A horizontal collector well lateral or infiltration gallery collector pipe less than twenty-five feet below the ground surface;
  - (6) A horizontal collector well where the sum of the depth of any lateral below



grade or stream, lake, reservoir bed plus the horizontal distance measured at the end of any lateral to a normal surface water pool is less than fifty feet; or

- (7) An annual mean E. coli concentration equal to or more than ten E.coli colonies per one hundred milliliters based on monitoring of the source.
- (E) Assessment source water monitoring as described in paragraph (B) of rule 3745-81-42 of the Administrative Code shall be completed for the source when one of the following conditions exist:
- (1) A well is cased between fifteen and twenty-five feet in depth;
  - (2) A well is located less than fifty feet from a normal water surface;
  - (3) Infiltration galleries, recharge lagoons or other basins constructed to increase the rate of infiltration are used;
  - (4) A horizontal collector which meets the criteria in paragraph (D)(5) or (D)(6) of this rule;
  - (5) Any potential for surface water contamination exists within the approved isolation radius, including but not limited to improperly abandoned wells, leach beds, sanitary or combined sewers, or septic tanks;
  - (6) Gravity sewers built to water line standards and pressure tested are closer than one third the usually required isolation or if there are manholes on these pressure tested lines within the isolation area;
  - (7) A well is located in bedrock where the bedrock may be directly connected to surface water such as through fractures or solution features;
  - (8) A waterborne disease outbreak has been associated with the well; or
  - (9) Other surface water contamination hazards exist.
- (F) Designation of a public water system's water sources as including surface water shall bring this public water system under the requirements of rules 3745-81-64 to 3745-81-69 and 3745-81-71 to 3745-81-75 of the Administrative Code.
- (G) Designation of a public water system's water sources as including ground water shall bring this public water system under the requirements of rules 3745-81-41 to 3745-81-45 of the Administrative Code, unless all of the ground water is combined with surface water prior to treatment under rule 3745-81-71 of the Administrative Code.
- (H) The director may redesignate a water source as surface water or as ground water at any time that additional information indicates that redesignation is appropriate.

Replaces: former 3745-81-76

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**3745-81-77 Treatment techniques for control of disinfection byproduct (DBP) precursors.**

- (A) Surface water community and nontransient noncommunity public water systems using conventional filtration treatment shall operate with enhanced coagulation or enhanced softening to achieve the TOC per cent removal levels specified in paragraph (F) of this rule unless the system meets at least one of the alternative compliance criteria listed in paragraph (D) or (E) of this rule.
- (B) Surface water systems using conventional filtration treatment shall comply with the following monitoring requirements for disinfection byproduct precursors (DBPP).
  - (1) Routine monthly monitoring: public water systems using surface water as a source which use conventional filtration treatment shall monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All public water systems required to monitor under this paragraph shall also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems shall monitor for alkalinity in the source water prior to any treatment. Public water systems shall take one paired sample and one source water alkalinity sample every thirty days per plant at a time representative of normal operating conditions and influent water quality. The thirty day monitoring frequency may be extended or reduced by three days to allow for unplanned circumstances that prevent monitoring precisely thirty days apart, as long as the samples are collected during each calendar month.
  - (2) Reduced quarterly monitoring: public water systems using surface water as a source with an average treated water TOC of less than 2.0 mg/l for two consecutive years, or less than 1.0 mg/l for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant every ninety days. The ninety day monitoring frequency may be extended or reduced by five days to allow for unplanned circumstances that prevent monitoring precisely ninety days apart, as long as the samples are collected during each calendar quarter. The public water system must revert to routine monitoring in the month following the quarter when the running annual average treated water TOC  $\geq$  2.0 mg/l.
- (C) Public water systems may begin monitoring twelve months prior to the

compliance date for the system, to determine whether step 1 TOC removals can be met. This monitoring is not required and failure to monitor during this period is not a violation. However, any public water system that does not monitor during this period, and then determines in the first twelve months after the compliance date that it is not able to meet the step 1 requirements in paragraph (F)(2) of this rule and must apply for alternate minimum TOC removal (step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (step 2) requirements as allowed by paragraph (F)(3) of this rule and is in violation of the treatment technique for TOC removal of this rule. Public water systems may apply for alternate minimum TOC removal (step 2) requirements any time after the compliance date.

- (D) Alternative compliance criteria for enhanced coagulation and enhanced softening systems. Surface water systems using conventional filtration treatment may use one or more of the alternative compliance criteria in paragraphs (D)(1) to (D)(7) of this rule to comply with this rule in lieu of complying with paragraph (F) of this rule. Public water systems must still comply with the monitoring requirements of paragraph (B) of this rule.
- (1) The system's source water TOC level, measured according to rule 3745-81-27 of the Administrative Code, is less than 2.0 mg/l, calculated quarterly as a running annual average.
  - (2) The system's treated water TOC level, measured according to rule 3745-81-27 of the Administrative Code, is less than 2.0 mg/l, calculated quarterly as a running annual average.
  - (3) The system's source water TOC level, measured according to rule 3745-81-27 of the Administrative Code, is less than 4.0 mg/l, calculated quarterly as a running annual average; the source water alkalinity, measured according to rule 3745-81-27 of the Administrative Code, is greater than 60.0 mg/l (as  $\text{CaCO}_3$ ), calculated quarterly as a running annual average and the TTHM and HAA5 running annual averages are no greater than 0.040 mg/l and 0.030 mg/l, respectively.
  - (4) The system's source water TOC level, measured according to rule 3745-81-27 of the Administrative Code, is less than 4.0 mg/l, calculated quarterly as a running annual average; the source water alkalinity, measured according to rule 3745-81-27 of the Administrative Code, is greater than 60.0 mg/l (as  $\text{CaCO}_3$ ), calculated quarterly as a running annual average and the system has made a clear and irrevocable financial commitment to use technologies that will limit the levels of

TTHMs and HAA5 to no more than 0.040 mg/l and 0.030 mg/l, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the director for approval. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of the Administrative Code primary drinking water regulations for control of disinfection byproduct precursors.

- (5) The TTHM and HAA5 running annual averages are no greater than 0.040 mg/l and 0.030 mg/l, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.
  - (6) The system's source water SUVA, prior to any treatment and measured monthly according to ~~of~~ rule 3745-81-27 of the Administrative Code, is less than or equal to 2.0 l/mg-m, calculated quarterly as a running annual average.
  - (7) The system's finished water SUVA, measured monthly according to rule 3745-81-27 of the Administrative Code, is less than or equal to 2.0 l/mg-m, calculated quarterly as a running annual average.
- (E) Additional alternative compliance criteria for softening systems. Systems practicing enhanced softening that cannot achieve the TOC removals required by paragraph (F)(2) of this rule may use the alternative compliance criteria in paragraph (E)(1) or (E)(2) of this rule in lieu of complying with paragraph (F) of this rule. Systems must still comply with monitoring requirements in paragraph (B) of this rule.
- (1) Softening that results in lowering the treated water alkalinity to less than 60.0 mg/l (as  $\text{CaCO}_3$ ), measured monthly according to rule 3745-81-27 of the Administrative Code and calculated quarterly as a running annual average.
  - (2) Softening that results in removing at least 10.0 mg/l of magnesium hardness (as  $\text{CaCO}_3$ ), measured monthly according to paragraph (C)(4)(c) of rule 3745-81-27 of the Administrative Code and calculated quarterly as an annual running average.
- (F) Enhanced coagulation and enhanced softening performance requirements.

- (1) Public water systems must achieve the per cent reduction of TOC specified in paragraph (F)(2) of this rule between the source water and the combined filter effluent, unless the director approves a system's request for alternate minimum TOC removal (step 2) requirements under paragraph (F)(3) of this rule.
- (2) Required step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured according to rule 3745-81-27 of the Administrative Code. Systems practicing softening are required to meet the step 1 TOC reductions in the far-right column (source water alkalinity >120 mg/l) for the specified source water TOC:

Step 1 required removal of TOC by enhanced coagulation and enhanced softening for surface water systems using conventional treatment<sup>1,2</sup>

Source-water TOC, mg/l	Source-water alkalinity, mg/l as CaCO <sub>3</sub>		
	0 - 60 (Per cent)	>60 - 120 (Per cent)	>120 <sup>3</sup> (Per cent)
>2.0 - 4.0	35.0	25.0	15.0
>4.0 - 8.0	45.0	35.0	25.0
>8.0	50.0	40.0	30.0

- <sup>1</sup> Systems meeting at least one of the conditions in paragraphs (D)(1) to (D)(7) of this rule are not required to operate with enhanced coagulation.
- <sup>2</sup> Softening systems meeting one of the alternative compliance criteria in paragraphs (E)(1) and (E)(2) of this rule are not required to operate with enhanced softening.
- <sup>3</sup> Systems practicing softening must meet the TOC removal requirements in this column.

- (3) Surface water conventional treatment systems that cannot achieve the step 1 TOC removals required by paragraph (F)(2) of this rule due to water quality parameters or operational constraints shall apply to the director, within three months of failure to achieve the TOC removals required by paragraph (F)(2) of this rule, for approval of alternative minimum TOC removal (step 2) requirements submitted by the system. If the director approves the alternative minimum TOC removal (step 2) requirements, the director may make those requirements retroactive for the purposes of determining compliance. Until the director approves the alternate minimum TOC removal (step 2) requirements, the system must

meet the step 1 TOC removals contained in paragraph (F)(2) of this rule.

- (4) Alternate minimum TOC removal (step 2) requirements. Applications made to the director by enhanced coagulation systems for approval of alternative minimum TOC removal (step 2) requirements under paragraph (F)(3) of this rule shall include, at a minimum, results of bench- or pilot-scale testing conducted under paragraphs (F)(6) to (F)(9) of this rule. The submitted bench- or pilot-scale testing shall be used to determine the alternate enhanced coagulation level.
- (5) Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in paragraphs (F)(6) to (F)(9) of this rule such that an incremental addition of 10.0 mg/l of alum (or equivalent amount of ferric salt) results in a TOC removal of  $\leq 0.3$  mg/l. The per cent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the director, this minimum requirement supersedes the minimum TOC removal required by the table in paragraph (F)(2) of this rule. This requirement will be effective until such time as the director approves a new value based on the results of a new bench- or pilot-scale test. Failure to achieve alternative minimum TOC removal levels as set by the director is a violation of the Administrative Code primary drinking water regulations for control of disinfection byproduct precursors.
- (6) Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10.0 mg/l increments of alum (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation step 2 target pH shown in the following table:

Enhanced coagulation step 2 target pH

Alkalinity (mg/l as CaCO <sub>3</sub> )	Target pH
0 - 60	5.5
>60 - 120	6.3
>120 - 240	7.0
>240	7.5

- (7) For waters with alkalinities of less than 60.0 mg/l for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system must add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/l per 10.0 mg/l alum added (or equivalent addition of iron coagulant) is reached.
  - (8) The system may operate at any coagulant dose or pH necessary (consistent with other state primary drinking water regulations) to achieve the minimum TOC per cent removal approved under paragraph (F)(3) of this rule.
  - (9) If the TOC removal is consistently less than 0.3 mg/l of TOC per 10.0 mg/l of incremental alum dose at all dosages of alum (or equivalent addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply to the director for a waiver of enhanced coagulation requirements.
- (G) Compliance calculations: surface water systems other than those identified in paragraph (D) or (E) of this rule shall comply with requirements contained in paragraph (F)(2) or (F)(3) of this rule. Systems shall calculate compliance quarterly, beginning after the system has collected twelve months of data, by determining a running annual average using the following method:
- (1) Determine actual monthly TOC per cent removal. This is equal to:  $(1.0 - (\text{treated water TOC} / \text{source water TOC})) \times 100.0$ .
  - (2) Determine the required monthly TOC per cent removal (from either the table in paragraph (F)(2) of this rule or from paragraph (F)(3) of this rule).
  - (3) Divide the value determined according to paragraph (G)(1) of this rule by the value determined according to paragraph (G)(2) of this rule.
  - (4) Add together the results of paragraph (G)(3) of this rule for the last twelve months and divide by twelve.
  - (5) If the value calculated in paragraph (G)(4) of this rule is less than 1.00, the system is not in compliance with the TOC per cent removal requirements.
  - (6) Systems may use the provisions in paragraphs (G)(7) to (G)(11) of this rule in lieu of the calculations in paragraphs (G)(1) to (G)(5) of this rule to



determine compliance with TOC per cent removal requirements.

- (7) In any month that the system's treated or source water TOC level, measured according to rule 3745-81-27 of the Administrative Code, is less than 2.0 mg/l, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).
  - (8) In any month that a system practicing softening removes at least 10.0 mg/l of magnesium hardness (as  $\text{CaCO}_3$ ), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).
  - (9) In any month that the system's source water SUVA, prior to any treatment and measured according to rule 3745-81-27 of the Administrative Code, is  $\leq 2.0$  l/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).
  - (10) In any month that the system's finished water SUVA, measured according to rule 3745-81-27 of the Administrative Code, is  $\leq 2.0$  l/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).
  - (11) In any month that a system practicing enhanced softening lowers alkalinity below 60.0 mg/l (as  $\text{CaCO}_3$ ), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).
  - (12) Surface water systems using conventional treatment may also comply with the requirements of this rule by meeting the criteria in paragraph (D) or (E) of this rule.
- (H) Treatment technique requirements for DBP precursors. The director identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: for surface water systems using conventional treatment, enhanced coagulation or enhanced softening.
- (I) Each public water system required to monitor under this rule shall develop and implement a monitoring plan. The public water system shall maintain the plan and make it available for inspection by the director and the general public no later than thirty days following the applicable compliance dates in this rule. All surface water systems serving more than three thousand three hundred people

shall submit a copy of the monitoring plan to the director no later than the date of the first report required under paragraph (G) of rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements to ensure monitoring will be adequate for required compliance determinations. The public water system shall modify the plan as required by the director. The plan shall include how the public water system will calculate compliance with the treatment technique for disinfection byproduct precursors. Failure to sample according to the monitoring plans is monitoring violation.

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Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 01/01/02, 01/01/04

### 3745-81-79 **Filter backwash recycling.**

A surface water system that uses conventional filtration treatment or direct filtration treatment and that recycles spent filter backwash water, thickener supernatant, or liquid from a dewatering process shall meet the following:

- (A) Surface water systems shall notify the director in writing if spent filter backwash water, thickener supernatant, or liquid from a dewatering process is recycled prior to initiation of recycling if the notification requirements of this paragraph have not been completed previously. This notification must include at least the following information:
  - (1) A plant schematic showing the origin of all flows which are recycled that may include, but are not limited to:
    - (a) Spent filter backwash water.
    - (b) Thickener supernatant.
    - (c) Liquid from a dewatering process.
    - (d) Filter to waste.
    - (e) The hydraulic conveyance used to transport them.
    - (f) The location where they are mixed in the water treatment process.
  - (2) The typical recycle flow, the highest observed plant flow during the previous twelve months and the state approved design capacity. All flows shall be reported in gallons per minute.
- (B) Surface water systems which recycle spent filter backwash water, thickener supernatant, or a liquid from a dewatering process shall return these flows through the existing conventional filtration treatment or direct filtration treatment, or through an alternative location that is approved by the director. Failure to comply with this paragraph is a treatment technique violation.
- (C) Surface water systems which recycle spent filter backwash water, thickner supernatant, or liquid from a dewatering process shall collect and retain on file the following recycle flow information for review and evaluation:
  - (1) A copy of the recycle notification and information that was submitted to the director in accordance to paragraph (A)(1) of this rule:
  - (2) A list of all recycle flows and the frequency with which they are returned.
  - (3) The average and maximum backwash flow rates through the filters and the average and maximum durations of the filter backwash in minutes.
  - (4) The typical filter run length and a written summary of how filter run length is determined.

- (5) The type of treatment provided for the recycle flow.
- (6) Data on the physical dimensions of the equilization and treatment units, typical and maximum hydraulic loading rates, type of treatment chemicals used and average dose and frequency of use, and, if applicable, frequency that solids are removed.

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Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 08/03/04

**3745-81-80 Control of lead and copper - general requirements.**

- (A) Applicability. The requirements of rules 3745-81-80 to 3745-81-90 of the Administrative Code are based on the national primary drinking water regulations for lead and copper. Unless otherwise indicated, each of the provisions of these rules applies to community water systems and nontransient noncommunity water systems (hereinafter referred to as "water systems" or "systems").
- (B) Scope. These regulations establish a treatment technique that includes requirements for corrosion control treatment, source water treatment, lead service line replacement, and public education. Lead and copper action levels, measured in samples collected at consumers' taps, may trigger these requirements.
- (C) Lead and copper action levels, and lead threshold levels.
- (1) The lead action level is exceeded if, at any time during the monitoring period, the concentration of lead in more than ten per cent of tap water samples collected during any monitoring period conducted in accordance with rule 3745-81-86 of the Administrative Code is greater than 0.015 milligram per liter, i.e., if the ninetieth percentile lead level is greater than 0.015 milligram per liter.
  - (2) The copper action level is exceeded if, at any time during the monitoring period, the concentration of copper in more than ten percent of tap water samples collected during any monitoring period conducted in accordance with rule 3745-81-86 of the Administrative Code is greater than 1.3 milligrams per liter, i.e., if the ninetieth percentile copper level is greater than 1.3 milligrams per liter.
  - (3) The ninetieth percentile lead and copper levels shall be computed as follows:
    - (a) The analytical results of all lead or copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each analytical result shall be assigned a consecutive whole number, beginning with the number one for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be that of the total number of samples analyzed.
      - (i) If less than the minimum number of samples required by rule 3745-81-86 of the Administrative Code have been taken, the minimum number of samples shall be used in calculations.
      - (ii) If greater than or equal to the minimum number of samples required by rule 3745-81-86 of the Administrative Code have been taken, the total number of samples shall be used in calculations.
    - (b) The number of samples taken during the monitoring period shall be multiplied by 0.9.
    - (c) The contaminant concentration in the numbered sample with the number yielded by the calculation in paragraph (C)(3)(b) of this rule is the ninetieth percentile contaminant level.

If the result of the calculation in paragraph (C)(3)(b) of this rule is not a whole number, the concentrations for the samples above and below the result shall be iterated to yield the ninetieth percentile contaminant level.
    - (d) For public water systems that monitor five samples per monitoring period, the ninetieth percentile is computed by taking the average for the two samples with highest concentrations.
    - (e) For public water systems that have been allowed by the director to collect fewer than five samples under rule 3745-81-86 of the Administrative Code, the sample result with the highest concentration is considered the ninetieth percentile value.

(4) The lead threshold level is exceeded at 0.015 milligrams per liter concentration of lead in an individual tap water sample.

(D) Corrosion control treatment requirements.

(1) All water systems shall install and operate optimal corrosion control treatment as defined in rule 3745-81-01 of the Administrative Code.

(2) Any water system that complies with the applicable corrosion control treatment requirements approved by the director under rules 3745-81-81 and 3745-81-82 of the Administrative Code shall be deemed in compliance with the treatment requirement contained in paragraph (D)(1) of this rule.

(E) Source water treatment requirements. Any system exceeding the lead or copper action level shall implement all applicable source water treatment requirements specified by the director under rule 3745-81-83 of the Administrative Code.

(F) Lead service line requirements. Any system that replaces lead service lines, replaces water mains in areas that contain or are likely to contain lead service lines or exceeds the lead action level after implementation of applicable corrosion control and source water treatment requirements shall complete the requirements contained in rule 3745-81-84 of the Administrative Code.

(G) Consumer notification, lead public notification and public education requirements.

(1) Consumer notification. Pursuant to rule 3745-81-85 of the Administrative Code, the owner or operator of a public water system shall provide a consumer notice of lead tap water monitoring results to persons served at the sites (taps) that are sampled.

(2) Lead public notification. Any system with results of lead tap water monitoring that show an exceedance of the lead action level shall provide lead public notification in accordance with rule 3745-81-85 of the Administrative Code.

(3) Public education. Any system exceeding the lead action level shall implement the public education requirements contained in rule 3745-81-85 of the Administrative Code.

(H) Monitoring and analytical requirements. Monitoring of tap water for lead and copper, monitoring for water quality parameters, monitoring of source water at each entry point to the distribution system for lead and copper, and analyses of these monitoring samples shall be completed in compliance with rules 3745-81-86 to 3745-81-89 of the Administrative Code and Chapter 3745-89 (laboratory approval) of the Administrative Code.

(I) Reporting requirements. Public water systems shall report to the director any information required by the treatment provisions of rules 3745-81-80 to 3745-81-90 of the Administrative Code.

(J) Recordkeeping requirements. Public water systems shall maintain records in accordance with rule 3745-81-90 of the Administrative Code.

(K) Violation of primary drinking water regulations. Failure to comply with the applicable requirements of rules 3745-81-80 to 3745-81-90 of the Administrative Code, including requirements established by the director pursuant to these provisions, shall constitute a violation of the Administrative Code primary drinking water regulations for lead or copper.

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**3745-81-81 Control of lead and copper; applicability of corrosion control treatment steps to small, medium, and large water systems.**

- (A) Public water systems shall complete the applicable corrosion control treatment requirements described in rule 3745-81-82 of the Administrative Code by the deadlines established in this rule.
- (1) A large system (serving more than fifty thousand persons) shall complete the corrosion control treatment steps specified in paragraph (D) of this rule, unless otherwise determined by the director.
  - (2) A small system (serving less than or equal to three thousand three hundred persons) and a medium system (serving more than three thousand three hundred and less than or equal to fifty thousand persons) shall complete the corrosion control treatment steps specified in paragraph (E) of this rule, unless otherwise determined by the director.
- (B) A public water system is deemed to have optimized corrosion control and may not be required to complete the applicable corrosion control treatment steps identified in this rule if the system satisfies one of the criteria specified in paragraphs (B)(1) to (B)(3) of this rule. Any such system deemed to have optimized corrosion control under this paragraph, and which has treatment in place, shall continue to operate and maintain optimal corrosion control treatment and meet any requirements that the director determines appropriate to ensure optimal corrosion control treatment is maintained.
- (1) A small or medium water system is deemed to have optimized corrosion control if the lead or copper action level has not been exceeded.
  - (2) Any public water system may be deemed by the director to have optimized corrosion control treatment if the system demonstrates to the satisfaction of the director that the system has conducted activities equivalent to the corrosion control steps applicable to such system under this rule. If the director makes this determination, the director shall provide the system with written notice explaining the basis for the director's decision and shall specify the water quality control parameters representing optimal corrosion control in accordance with paragraph (F) of rule 3745-81-82 of the Administrative Code. Water systems deemed to have optimized corrosion control under this paragraph shall operate in compliance with the designated optimal water quality control parameters in accordance with paragraph (G) of rule 3745-81-82 of the Administrative Code and continue to conduct lead and copper tap and water quality parameter sampling in accordance with paragraph (D)(3) of rule 3745-81-86 and paragraph (D) of rule 3745-81-87 of the Administrative Code, respectively. A system shall provide the director with the following information in order to support a determination under this paragraph:
    - (a) The results of all test samples collected for each of the water quality parameters in paragraph (C)(3) of rule 3745-81-82 of the Administrative Code.
    - (b) A report explaining the test methods used by the water system to evaluate the corrosion control treatments listed in paragraph (C)(1) of rule 3745-81-82 of the Administrative Code, the results of all tests conducted, and the basis for the system's selection of optimal corrosion control treatment.
    - (c) A report explaining how corrosion control has been installed and how it is being maintained to insure minimal lead and copper concentrations at consumers' taps.
    - (d) The results of tap water monitoring with samples collected in accordance with rule 3745-81-86 of the Administrative Code at least once every six months for one year after corrosion control has been installed.



- (3) Any water system is deemed to have optimized corrosion control if, for two consecutive six-month monitoring periods, the difference between the ninetieth percentile tap water level computed under paragraph (C)(3) of rule 3745-81-80 of the Administrative Code and the highest source water at the entry point to the distribution system lead concentration is less than the practical quantitation level (PQL) of 0.005 milligrams per liter. Monitoring shall be conducted in accordance with rules 3745-81-86 and 3745-81-88 of the Administrative Code.
- (a) Those systems whose highest source water at the entry point to the distribution system lead level is below the method detection limit (MDL) may also be deemed to have optimized corrosion control under this paragraph if the ninetieth percentile tap water lead level is less than or equal to the PQL of 0.005 milligram per liter for two consecutive six-month monitoring periods.
- (b) Any water system deemed to have optimized corrosion control in accordance with this paragraph shall continue monitoring for lead and copper at the tap in accordance with paragraph (C) and paragraph (D) of rule 3745-81-86 of the Administrative Code.
- (c) Any water system deemed to have optimized corrosion control in accordance with this paragraph shall submit water quality information to the director with plan submittal, as required, for any change or modification in treatment or the addition of a new source in accordance with paragraph (A)(3) of rule 3745-81-90 of the Administrative Code. The director shall review and approve the addition of a new source or substantial change in treatment before it is implemented by the water system. The director may require any such water system to conduct additional monitoring, perform corrosion control studies or to take other action the director deems appropriate to ensure that minimal levels of corrosion in the distribution system are maintained.
- (d) As of the effective date of this rule, a system is not deemed to have optimized corrosion control under this paragraph, and shall implement corrosion control treatment pursuant to paragraph (B)(3)(e) of this rule unless the system meets the lead and copper action level.
- (e) Any system triggered into corrosion control because it is no longer deemed to have optimized corrosion control under this paragraph shall implement corrosion control treatment in accordance with the deadlines in paragraph (E) of this rule. Any such large system shall adhere to the schedule specified in that paragraph for medium systems, with the time periods for completing each step being triggered by the date the system is no longer deemed to have optimized corrosion control under this paragraph.
- (C) The requirement for any water system to implement corrosion control treatment steps in accordance with paragraph (D) of this rule for large systems and paragraph (E) of this rule for small or medium systems, including systems previously deemed to have optimized corrosion control under paragraph (B) of this rule, is triggered whenever monitoring exceeds the lead or copper action level.
- (D) Treatment steps for large systems. Except as provided in paragraphs (B)(2) and (B)(3) of this rule, large systems shall complete the following corrosion control treatment steps (described in the referenced portions of rules 3745-81-82, 3745-81-86, and 3745-81-87 of the Administrative Code):
- (1) Step one: The system shall conduct initial monitoring (in accordance with paragraph (D)(1) of rule 3745-81-86 and paragraph (B) of rule 3745-81-87 of the Administrative Code) during two consecutive six-month monitoring periods.
- (2) Step two: The system shall complete corrosion control studies and submit plans for approval for optimal corrosion control treatment (in accordance with paragraph (C) of rule 3745-81-82 of the Administrative

Code) within eighteen months after the director requires that such studies be conducted. The system shall submit interim status reports of action taken to complete the studies once every six months from the initiation of the corrosion control studies.

- (3) Step three: The director shall complete the review and approval of optimal corrosion control treatment plans (in accordance with paragraph (D) of rule 3745-81-82 of the Administrative Code).
  - (4) Step four: The system shall install optimal corrosion control treatment (in accordance with paragraph (E) of rule 3745-81-82 of the Administrative Code) within six months after the director approves plans unless an alternative schedule is approved by the director.
  - (5) Step five: The system shall complete follow-up monitoring after installation of treatment (in accordance with paragraph (D)(2) of rule 3745-81-86 of the Administrative Code and paragraph (C) of rule 3745-81-87 of the Administrative Code).
  - (6) Step six: The director shall review installation of treatment and specify optimal water quality parameters (in accordance with paragraph (F) of rule 3745-81-82 of the Administrative Code) after completion of step five.
  - (7) Step seven: The system shall operate in compliance with the director-specified optimal water quality control parameters (in accordance with paragraph (G) of rule 3745-81-82 of the Administrative Code) and continue to conduct tap sampling (in accordance with paragraph (D)(3) of rule 3745-81-86 of the Administrative Code and paragraph (D) of rule 3745-81-87 of the Administrative Code).
- (E) Treatment steps and deadlines for small and medium systems. Except as provided in paragraph (B) of this rule, small and medium systems shall complete the following corrosion control treatment steps (described in the referenced portions of rules 3745-81-82, 3745-81-86, and 3745-81-87 of the Administrative Code) within the indicated time periods:
- (1) Step one: The system shall conduct initial tap monitoring (in accordance with paragraph (D)(1) of rule 3745-81-86 of the Administrative Code and paragraph (B) of rule 3745-81-87 of the Administrative Code) until the system either exceeds the lead or copper action level or becomes eligible for reduced monitoring under paragraph (D)(4) of rule 3745-81-86 of the Administrative Code, as follows:
    - (a) A small system exceeding the lead or copper action level shall recommend optimal corrosion control treatment (in accordance with paragraph (A) of rule 3745-81-82 of the Administrative Code), and submit plans if required by Chapter 3745-91 of the Administrative Code, within six months after the end of the monitoring period during which it exceeds one of the action levels.
    - (b) A medium system exceeding the lead or copper action level shall proceed to step two, paragraph (E)(2) of this rule, requiring corrosion control studies (in accordance with paragraph (B) of rule 3745-81-82 of the Administrative Code).
  - (2) Step two: Within twelve months after the end of the monitoring period during which a small system exceeds the lead or copper action level, the director may require the system to perform corrosion control studies (in accordance with paragraph (B) of rule 3745-81-82 of the Administrative Code). If the director does not require the small system to perform such studies, the director shall complete the review and approval of optimal corrosion control treatment plans (in accordance with paragraph (D) of rule 3745-81-82 of the Administrative Code) within twelve months after the end of the monitoring period during which the system exceeds the lead or copper action level.

Any medium system exceeding the lead or copper action level is required to perform corrosion control studies (in accordance with paragraph (B) of rule 3745-81-82 of the Administrative Code).

- (3) Step three: When the director requires a system to perform corrosion control studies under step two, the system shall complete the studies and submit approvable plans for optimum corrosion control treatment (in accordance with paragraph (C) of rule 3745-81-82 of the Administrative Code) within eighteen months after the director requires that such studies be conducted. The system shall submit interim status reports of action taken to complete the studies once every six months from the initiation of the corrosion control studies.
  - (4) Step four: If the system has performed corrosion control studies under step two, the director shall complete the review and approval of optimal corrosion control treatment plans (in accordance with paragraph (D) of rule 3745-81-82 of the Administrative Code) after completion of step three.
  - (5) Step five: The system shall install optimal corrosion control treatment (in accordance with paragraph (E) of rule 3745-81-82 of the Administrative Code) within six months after the director approves plans unless an alternative schedule is approved by the director.
  - (6) Step six: The system shall complete follow-up monitoring after installation of treatment (in accordance with paragraphs (D)(2) of rule 3745-81-86 and (C) of rule 3745-81-87 of the Administrative Code).
  - (7) Step seven: The director shall review the system's installation of treatment and specify optimal water quality control parameters (in accordance with paragraph (F) of rule 3745-81-82 of the Administrative Code) after completion of step six.
  - (8) Step eight: The system shall operate in compliance with the director-specified optimal water quality control parameters (in accordance with paragraph (G) of rule 3745-81-82 of the Administrative Code) and continue to conduct tap sampling (in accordance with paragraphs (D)(3) of rule 3745-81-86 and (D) of rule 3745-81-87 of the Administrative Code).
- (F) New or updated treatment recommendations, studies or plans.
- (1) The owner or operator of a water system shall provide a new or update an existing corrosion control treatment recommendation, study or submit plans in accordance with paragraph (A) of this rule if any of the following occur:
    - (a) The system changes its water source or adds a new water source. The owner or operator shall notify the director prior to changes to the water system source and complete the recommendation, study or submit plans within eighteen months.
    - (b) The system makes a substantial change in water treatment. The owner or operator shall notify the director prior to changes in the water system treatment and complete the recommendation, study or submit plans within eighteen months.
    - (c) The system operates out of previously-approved acceptable ranges for lead, copper, pH or other corrosion control indicators, as determined by the director. The owner or operator of the water system shall complete the recommendation, study or submit plans within eighteen months after the system operates out of acceptable ranges.

If the system exceeds the lead or copper action level while operating out of previously-approved acceptable ranges for pH or other corrosion control indicators, the owner or operator of the water system shall review the corrosion control study. If the water quality has not changed, the owner or

operator of the water system shall submit an updated treatment recommendation. If the water quality has changed, the owner or operator of the water system shall complete a new study. The updated treatment recommendation or new study shall be completed within eighteen months after the system operates out of acceptable ranges.

- (d) Any other event determined by the director to have the potential to impact the water quality or corrosiveness of water in the system. The owner or operator of the water system shall complete the recommendation, study or submit plans within eighteen months from the date the director provides written notice to the system of such event.
- (2) An owner or operator of a system required to provide a treatment recommendation, complete a corrosion control treatment study or submit a plan in accordance with paragraph (F)(1) of this rule, shall notify any consecutive or wholesale system of their new or updated treatment recommendation, corrosion control treatment study or plan.
- (3) An owner or operator of a system required to provide a treatment recommendation, complete a corrosion control treatment study or submit a plan in accordance with paragraph (F)(1) of this rule, shall complete the recommendation, study or submit the plan to the director for approval even if sampling results conducted subsequent to the initiation of the study and plan do not exceed the lead action level.
- (G) The director may waive the requirement to conduct a new or updated corrosion control recommendation, study or submit plans as required in paragraph (F) of this rule upon demonstration by the system that items under paragraphs (F)(1)(a) to (F)(1)(c) of this rule will not have the potential to or will not impact the water quality or corrosiveness of the system.

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**3745-81-82      Control of lead and copper; description of corrosion control treatment requirements.**

Each public water system shall complete the corrosion control treatment requirements described below which are applicable to such system under rule 3745-81-81 of the Administrative Code.

- (A) Small public water system recommendation regarding corrosion control treatment. Based upon the results of lead and copper tap monitoring and water quality parameter monitoring, small water systems exceeding the lead or copper action level shall recommend installation of and submit plans for one or more of the corrosion control treatments listed in paragraph (C)(1) of this rule which the system believes constitute optimal corrosion control for that system. The director may require the small system to conduct additional water quality parameter monitoring in accordance with paragraph (B) of rule 3745-81-87 of the Administrative Code to assist the director in reviewing the system's recommendation.
- (B) Studies of corrosion control treatment by small and medium systems. The director may require any small system that exceeds the lead or copper action level to perform corrosion control studies under paragraph (C) of this rule to identify optimal corrosion control treatment for the system. Any medium system that exceeds the lead or copper action level shall perform corrosion control studies under paragraph (C) of this rule in order to identify optimal corrosion control treatment for the system.
- (C) Performance of corrosion control studies.
  - (1) Any public water system performing corrosion control studies shall evaluate the effectiveness of each of the following treatments and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for that system:
    - (a) Alkalinity and pH adjustment;
    - (b) Calcium hardness adjustment; and
    - (c) The addition of a phosphate-based or silicate-based corrosion inhibitor at a concentration sufficient to maintain an effective residual concentration in all test tap samples.
  - (2) The water system shall evaluate each of the corrosion control treatments using either pipe rig/loop tests, metal coupon tests, partial-system tests, or analyses based on documented analogous treatments with other

systems of similar size, water chemistry, and distribution system configuration.

- (3) The water system shall measure the following water quality parameters in any tests conducted under this paragraph before and after evaluating the corrosion control treatments listed above:
  - (a) Lead;
  - (b) Copper;
  - (c) pH;
  - (d) Alkalinity;
  - (e) Calcium;
  - (f) Conductivity;
  - (g) Orthophosphate (when an inhibitor containing a phosphate compound is used);
  - (h) Silicate (when an inhibitor containing a silicate compound is used); and
  - (i) Water temperature.
- (4) The water system shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and document such constraints with at least one of the following:
  - (a) Data and documentation showing that a particular corrosion control treatment has adversely affected other water treatment processes when used by another water system with comparable water quality characteristics; and/or
  - (b) Data and documentation demonstrating that the water system has previously attempted to evaluate a particular corrosion control treatment and has found that the treatment is ineffective or adversely affects other water quality treatment processes.
- (5) The water system shall evaluate the effect of the chemicals used for corrosion control treatment on other water quality treatment processes.
- (6) On the basis of an analysis of the data generated during each evaluation, the water system shall recommend to the director in writing the treatment

option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that system, and submit approvable plans therefor in accordance with Chapter 3745-91 of the Administrative Code. The water system shall provide a rationale for its recommendation along with all supporting documentation specified in paragraphs (C)(1) to (C)(5) of this rule.

(D) Director approval of optimal corrosion control treatment plans.

- (1) Based upon consideration of available information, including, where applicable, studies performed under paragraph (C) of this rule and a system's recommended treatment alternative, the director shall review the corrosion control treatment plan submitted by the system. When reviewing the submitted optimal treatment plan the director shall consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes.
- (2) The director shall notify the system of the decision on the optimal corrosion control treatment plan in writing and explain the basis for this determination. If the director requests additional information to aid the review, the water system shall provide the information.

(E) Installation of optimal corrosion control. Each public water system shall properly install and operate throughout its distribution system the optimal corrosion control treatment approved by the director under paragraph (D) of this rule.

(F) Director review of treatment and specification of optimal water quality control parameters. The director shall evaluate the results of all lead and copper tap monitoring and water quality parameter monitoring submitted by the public water system and determine whether the system has properly installed and operated the optimal corrosion control treatment plan approved by the director in paragraph (D) of this rule. Upon reviewing the results of tap water and water quality parameter monitoring by the system, both before and after the system installs optimal corrosion control treatment, the director shall specify values for the applicable water quality control parameters listed in paragraphs (F)(1) to (F)(5) of this rule to reflect optimal corrosion control treatment for the system. The director may specify values for additional water quality control parameters determined by the director to reflect optimal corrosion control for the system. The director shall notify the system in writing of these determinations and explain the basis for the decisions. Common water quality control parameters include:

- (1) A minimum value or a range of values for pH measured at each entry point to the distribution system;



- (2) A minimum value for pH measured in all tap samples taken for water quality parameter determinations. Such value shall be equal to or greater than 7.0, unless the director determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the system to optimize corrosion control;
  - (3) If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, that the director determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system;
  - (4) If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples; and
  - (5) If calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or range of concentrations for calcium, measured in all tap samples.
- (G) Continued operation and monitoring. All public water systems optimizing corrosion control shall continue to operate and maintain optimal corrosion control treatment, including maintaining water quality parameters at or above minimum values or within ranges designated by the director under paragraph (F) of this rule, in accordance with this paragraph for all samples collected under paragraphs (D) to (F) of rule 3745-81-87 of the Administrative Code. Compliance with the requirements of this paragraph shall be determined every six months, as specified under paragraph (D) of rule 3745-81-87 of the Administrative Code. A water system is out of compliance with the requirements of this paragraph for a six-month period if it has excursions for any director-specified parameter on more than nine days during the period. An excursion occurs whenever the daily value for one or more of the water quality parameters measured at the sampling location is below the minimum value or outside the range designated by the director. Daily values are calculated as follows. The director has discretion to delete results of obvious sampling errors from this calculation.
- (1) On days when more than one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the average of all results collected during the day regardless of whether they are collected through continuous monitoring, grab sampling, or a combination of both.

- (2) On days when only one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the result of that measurement.
  - (3) On days when no measurement is collected for the water quality parameter at the sampling location, the daily value shall be the daily value calculated on the most recent day on which the water quality parameter was measured at the site.
- (H) Modification of the director's treatment decisions. Upon the director's own initiative or in response to a request by a public water system, the director may modify the approval of the optimal corrosion control treatment plans under paragraph (D) of this rule or optimal water quality control parameters under paragraph (F) of this rule. A request for modification by a system shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The director may modify the approval where the director concludes that such change is necessary to ensure that the system continues to optimize corrosion control treatment. A revised approval shall be made in writing, set forth the new treatment requirements, explain the basis for the director's decision, and provide an implementation schedule for completing the treatment modifications.

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Rule Amplifies: 6109.04

Prior Effective Dates: 09/13/93, 10/17/03

**3745-81-83      Control of lead and copper; source water treatment requirements.**

Public water systems shall complete the applicable source water at the entry point to the distribution system monitoring and treatment requirements (described in the referenced portions of paragraph (B) of this rule and in rules 3745-81-86 and 3745-81-88 of the Administrative Code) by the deadlines in paragraphs (A)(1) to (A)(6) of this rule.

**(A) Deadlines for completing source water treatment steps.**

- (1) Step one: a system exceeding the lead or copper action level shall complete source water at the entry point to the distribution system monitoring for lead and copper (in accordance with paragraph (B) of rule 3745-81-88 of the Administrative Code), make a treatment recommendation, and submit approvable plans, if needed, to the director (in accordance with paragraph (B)(1) of this rule) no later than one hundred eighty days after the end of the monitoring period during which the lead or copper action level was exceeded.

If monitoring is required annually, triennially, or less frequently, the end of the monitoring period is September thirtieth of the calendar year in which the sampling occurs. If the director has established an alternate period, then the end of the monitoring period will be the last day of that period.

- (2) Step two: the director shall complete the review and approval of plans regarding source water treatment (in accordance with paragraph (B)(2) of this rule) within six months after submission of monitoring results under step one.
- (3) Step three: if the director requires installation of source water treatment, the system shall install the treatment (in accordance with paragraph (B)(3) of this rule) within twenty-four months after completion of step two.
- (4) Step four: the system shall complete follow-up tap water monitoring (in accordance with paragraph (D)(2) of rule 3745-81-86 of the Administrative Code) and source water at the entry point to the distribution system monitoring (in accordance with paragraph (C) of rule 3745-81-88 of the Administrative Code) within thirty-six months after completion of step two.
- (5) Step five: the director shall review the system's installation and operation of source water treatment and specify maximum permissible source water at the entry point to the distribution system levels (in accordance

with paragraph (B)(4) of this rule) within six months after completion of step four.

- (6) Step six: the system shall operate in compliance with the director-specified maximum permissible lead and copper source water at the entry point to the distribution system levels (in accordance with paragraph (B)(4) of this rule) and continue monitoring (in accordance with paragraph (D) of rule 3745-81-88 of the Administrative Code).

(B) Description of source water treatment requirements.

- (1) System treatment recommendation. Any system which exceeds the lead or copper action level shall recommend in writing to the director the installation and operation of one of the source water treatments listed in paragraph (B)(2) of this rule. A system may recommend that no treatment be installed based upon a demonstration that source water treatment is not necessary to minimize lead and copper levels at user's taps.
- (2) Director determination regarding source water treatment. The director shall complete an evaluation of the results of all source water at the entry point to the distribution system monitoring submitted by the water system to determine whether source water treatment is necessary to minimize lead or copper levels in water delivered to users' taps. If the director determines that treatment is needed, the system shall submit approvable plans for source water treatment selected from ion exchange, reverse osmosis, lime softening, or coagulation/filtration. If the director requests additional information to aid in the review, the water system shall provide the information by the date specified in the director's request. The director shall notify the system in writing of the determination and set forth the basis for the decision.
- (3) Installation of source water treatment. Each system shall properly install and operate the source water treatment approved by the director under paragraph (B)(2) of this rule.
- (4) Director's review of source water treatment and specification of maximum permissible levels of lead and copper at source water at the entry points to the distribution system. The director shall review the source water at the entry point to the distribution system monitoring completed by the water system both before and after the system installs source water treatment, and determine whether the system has properly installed and operated the source water treatment approved by the director. Based upon the review, the director shall specify the maximum permissible lead and copper concentrations for finished water entering the distribution system. Such levels shall reflect the contaminant removal

capability of the treatment properly operated and maintained. The director shall notify the system in writing and explain the basis for the decision.

- (5) Continued operation and maintenance. Each water system shall maintain lead and copper levels below the maximum permissible concentrations specified by the director at each sampling point monitored in accordance with rule 3745-81-88 of the Administrative Code. The system is out of compliance with this paragraph if the level of lead or copper at any sampling point is greater than the maximum permissible concentration specified by the director.
- (6) Modification of director treatment decisions. Upon the director's initiative or in response to a request by a water system, the director may modify the approval of the source water treatment plans under paragraph (B)(2) of this rule, or maximum permissible lead and copper concentrations for finished water entering the distribution system under paragraph (B)(4) of this rule. A request for modification by a system shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The director may modify the approval where the director concludes that such change is necessary to ensure that the system continues to minimize lead and copper concentrations in source water at the entry point to the distribution system. A revised approval shall be made in writing, set forth the new treatment requirements, explain the basis for the director's decision, and provide an implementation schedule for completing the treatment modifications.

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**3745-81-84 Control of lead and copper - lead service line requirements.**

All water systems that replace lead service lines, replace water mains in areas that contain or are likely to contain lead service lines, or exceed the lead action level after the implementation of corrosion control or source water treatment shall comply with all applicable requirements in this rule.

(A) Requirements for public water systems that exceed the lead action level in tap water monitoring pursuant to paragraph (D)(2) of rule 3745-81-86 of the Administrative Code, after installing corrosion control or source water treatment (whichever sampling occurs later).

- (1) The water system shall identify the initial number of lead service lines in its distribution system, including an identification of the portion owned by the system, based on a materials evaluation, including the evaluation required under paragraph (A) of rule 3745-81-86 of the Administrative Code and relevant legal authorities regarding the portion owned by the system (e.g., contracts and local ordinances).
- (2) The water system shall replace annually at least seven per cent of the initial number of lead service lines in its distribution system. The initial number of lead service lines is the number of lead lines in place at the time the replacement program begins. The first year of lead service line replacement shall begin on the first day following the end of the monitoring period in which the action level was exceeded under paragraph (A) of this rule. If monitoring is required annually, or triennially, the end of the monitoring period is September thirtieth of the calendar year in which the sampling occurs. If the director has established an alternate period, then the end of the monitoring period will be the last day of that period.

The director shall require a public water system to replace lead service lines on a shorter schedule than that required by this rule, taking into account the number of lead service lines in the system, where such a shorter replacement schedule is feasible. The director shall make this determination in writing and notify the system of the finding within six months after the system is required to commence lead service line replacement based on monitoring referenced in this paragraph.

- (3) If the water system is in violation of rule 3745-81-81 or rule 3745-81-83 of the Administrative Code for failure to install source water treatment or corrosion control treatment, the director may require the system to commence lead service line replacement under this rule after the date by which the system was required to conduct monitoring under paragraph (D)(2) of rule 3745-81-86 of the Administrative Code has passed.
- (4) Any public water system may cease replacing lead service lines whenever first-draw samples collected pursuant to paragraph (B)(2) of rule 3745-81-86 of the Administrative Code meet the lead action level during each of two consecutive monitoring periods and the system submits the results to the director. If first-draw tap samples monitored in any such water system thereafter exceed the lead action level, the system shall recommence replacing lead service lines, pursuant to paragraph (C) of this rule.
- (5) Any water system resuming a lead service replacement program after the cessation of its lead service line replacement program, as allowed by paragraph (A)(4) of this rule, shall update its inventory of lead service lines. The system will then divide the updated number of remaining lead service lines by the number of remaining years in the program to determine the number of lines that must be replaced per year (seven per cent lead service line replacement is based on a fifteen year replacement program: e.g., systems resuming lead service line replacement after previously conducting two years of replacement would divide the updated inventory by thirteen). For those systems that have completed a fifteen year lead service line replacement program, the director will determine a schedule for replacing or retesting lines that were previously tested out under the replacement program when the system re-exceeds the action level

- (6) The water system shall replace lead service lines in accordance with the requirements of paragraph (C) of this rule.
  - (7) The water system shall report to the director the information specified in paragraph (E) of rule 3745-81-90 of the Administrative Code.
- (B) Beginning October 1, 2018, systems conducting a water main replacement in an area with known lead service lines or in an area that is likely to contain lead service lines shall do so in accordance with this paragraph.
- (1) The water system shall provide notice of the work to be performed by the system to consumers in the impacted area at least forty-five days prior to commencing the replacement. The director may allow the owner or operator of a water system to provide notice under the previous sentence less than forty-five days prior to commencing the replacement where such replacement is in conjunction with emergency repairs. The notice shall include language, acceptable to the director, that explains that work being performed may cause a temporary increase in lead levels in drinking water, provides instructions on filter use required to be offered in paragraph (D) of this rule, and guidance on measures the consumer can take to reduce lead levels at their tap.
  - (2) The water system shall comply with the requirements in paragraph (D) of this rule.
- (C) Beginning October 1, 2018, except in conjunction with action level exceedence, any system performing a lead service line replacement shall do so in accordance with this paragraph. A public water system shall replace that portion of the lead service line that it owns. In cases where the system does not own the entire lead service line, the system shall notify the owner of the line, or the owner's authorized agent, that the system will replace the portion of the service line that it owns and shall offer to replace the owner's portion of the line. A system is not required to bear the cost of replacing the privately-owned portion of the line, nor is it required to replace the privately-owned portion where the owner chooses not to pay the cost of replacing the privately-owned portion of the line, or where replacing the privately-owned portion would be precluded by state, local, or common law. A water system shall maintain a record of a full or partial lead service line replacement with an acknowledgment from the owner of the line of the work performed by the water system, for a minimum of twelve years. A water system that does not replace the entire length of the service line shall complete the following tasks and the requirements in paragraph (D) of this rule:
- (1) At least forty-five days prior to commencing with the partial replacement of a lead service line, the owner or operator of a water system shall provide notice to the residents of all buildings served by the line. The notice shall include language, acceptable to the director, that explains that work being performed may cause a temporary increase in lead levels in drinking water, provides instructions on filter use required to be offered in paragraph (D) of this rule, and guidance on measures the consumer can take to reduce lead levels at their tap. The director may allow the owner or operator of a water system to provide notice under the previous sentence less than forty-five days prior to commencing partial lead service line replacement where such replacement is in conjunction with emergency repairs. In addition, the water system shall inform the residents serviced by the line that the system will, at the system's expense, collect a sample from each partially-replaced lead service line that is representative of the water in the service line for analysis of lead content, as prescribed under paragraph (B)(3) of rule 3745-81-86 of the Administrative Code, within seventy-two hours after the completion of the partial replacement of the service line. The system shall collect the sample and report the results of the analysis to the owner and the residents served by the line within two business days of receiving the laboratory results. Mailed notices post-marked within two business days of receiving the laboratory results shall be considered "on time."

- (2) The water system shall provide the information required by paragraph (C)(1) of this rule to the residents of individual dwellings by mail or by other methods approved by the director. In instances where multi-family dwellings are served by the line, the water system shall have the option to post information at a conspicuous location. In instances where a school, hospital or other non-residential building is served by the line, the water system shall notify the building administrator. In the case of public water systems that are schools, day cares, nursing homes or correctional institutions, the parents, legal guardians or power of attorney shall be directly notified.
- (D) Prior to beginning a partial lead service line replacement in accordance with paragraph (C) of this rule or a water main replacement in accordance with paragraph (B) of this rule, a water system shall offer and provide drinking water treatment unit filters up to a period of three months to consumers in the area impacted by the replacement. The filters shall meet NSF/ANSI standard 53 for "Drinking Water Treatment Units - Health Effects."
- (E) In lieu of completing lead service line replacement as required under this rule, the director may use sole discretion to allow a public water system to use an alternative method to eliminate exposure to lead from lead service lines when, at a minimum, the following conditions are met:
- (1) The alternative method has been approved by U.S. EPA as an acceptable alternative for lead service line replacement pursuant to the Safe Drinking Water Act.
  - (2) The director grants approval to the public water system to use the alternative method.

When using the alternative method under this paragraph, a public water system shall comply with all the other substantive requirements of this rule and with the reporting requirements under paragraph (E) of rule 3745-81-90 of the Administrative Code.

[Comment: NSF/ANSI Standard 53, Drinking Water Treatment Units - Health Effects, October 1, 2015, Document Number NSF/ANSI 53-2010. This rule incorporates this standard by reference. Copies may be obtained from "NSF International, 789 N. Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48105," (734) 769-8010, <http://www.nsf.org>. This standard is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215.]"



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**3745-81-85 Control of lead and copper - response to lead monitoring results.**

All public water systems collecting tap water samples in accordance with rule 3745-81-86 of the Administrative Code shall comply with all applicable requirements in this rule.

**(A) Consumer notice of results.**

A water system shall complete all applicable notice requirements in this rule for the results of tap water monitoring collected in accordance with rule 3745-81-86 of the Administrative Code, as follows:

- (1) Provide notice of the lead results, from each individual tap water sample to the owner and persons served at the residence or other structure where the tap was sampled as soon as practical but no later than two business days after receipt of the laboratory results.
- (2) The consumer notice shall include the results of lead tap water monitoring for the tap that was tested, an explanation of health effects of lead, list steps consumers can take to reduce exposure to lead in drinking water and contact information for the system. The notice shall also provide the maximum contaminant level goal, the action level for lead, the lead threshold level, and definitions from rule 3745-81-01 of the Administrative Code.
- (3) Consumer notice of tap water monitoring results shall be provided to persons served at the tap that was tested, by the following methods accepted by the director:
  - (a) For results below the lead threshold level, notice may include hand-delivery, mail, electronic mail, and phone calls.
  - (b) For results above the lead threshold level, notice may include hand-delivery, electronic mail, and documented phone calls followed by written notice that is mailed.

The system shall provide the notice to customers at sample taps tested, including consumers who do not receive water bills. In the case of schools, day cares, nursing homes or correctional institutions, legal guardians or power of attorney shall be notified by a method accepted by the director.

- (4) If the results of lead tap water monitoring show that a sample from an individual tap is above the lead threshold level, the following, as applicable shall be completed:
  - (a) Provide information on the availability of health screening and blood lead level testing to the owner and persons served at the residence or other structure where the tap was sampled no later than two business days after receipt of the laboratory results.
  - (b) Provide notice of the laboratory results to the applicable board of health no later than two business days after receipt of the laboratory results.
  - (c) The owner and operator of a nontransient noncommunity water system shall immediately remove from service all fixtures identified as contributing to elevated lead levels.

**(B) Supplemental monitoring and consumer notice of results.**

A water system that exceeds the lead action level on the basis of tap water samples collected in accordance with rule 3745-81-86 of the Administrative Code shall provide information on the availability of tap water monitoring to any customer who requests it. The system is not required to pay for collecting or analyzing the sample, nor is the system required to collect and analyze the sample. Water systems shall complete applicable consumer notice requirements in paragraph (A) of this rule for all samples collected or analyzed

by the water system.

(C) Lead public notification.

- (1) If the results of lead tap water monitoring show an exceedance of the lead action level, the water system shall provide lead public notification of lead action level exceedance to all of the system's water consumers no later than two business days after receipt of the laboratory results.

A water system that exceeds the action level prior to the end of the monitoring period may collect additional samples that meet the criteria established in rule 3745-81-86 of the Administrative Code.

- (a) If the ninetieth percentile lead level falls below the lead action level prior to the deadlines established in paragraphs (C)(2) and (C)(3) of this rule, the water system does not have to complete the requirements of paragraphs (C)(2) and (C)(3) of this rule.
- (b) If the water system subsequently exceeds the lead action level the requirements in paragraphs (C)(2) and (C)(3) of this rule will be required.
- (c) A second lead public notification shall be issued at the end of the monitoring period with updated results.

- (2) Community water systems shall provide information on the availability of tap water testing for lead to all consumers served by the system no later than five business days after receipt of the laboratory results.
- (3) Comply with public education requirements as established in paragraph (F) of this rule no later than thirty business days after receipt of the laboratory results.

(D) Content of public notification.

Lead public notification shall include the ninetieth percentile lead level, number of samples used to compute the ninetieth percentile lead level, an explanation of the health effects of lead, a list of the steps consumers can take to reduce exposure to lead in drinking water, and contact information for the water system.

(E) Delivery of public notification.

- (1) Lead public notification shall be provided by a method accepted by the director, including broadcast media (e.g., radio and television), social media, delivering the notification by hand, delivering the notification by electronic mail or posting the notice in conspicuous locations throughout the area served by the water system.
- (2) A community water system shall repeat the lead public notification twice every twelve months on a schedule agreed upon with the director.

(F) Content of public education.

A water system that exceeds the lead action level based on tap water samples collected in accordance with rule 3745-81-86 of the Administrative Code, shall deliver public education material in accordance with paragraph (G) of this rule using the following content:

- (1) The content of written public education materials shall be in print (e.g., brochures and pamphlets) and include the exact language in paragraphs (F)(1)(a), (F)(1)(b) and (F)(1)(f) of this rule, except for the text in brackets in these paragraphs for which the water system shall include system-specific information. Any additional information presented by a system shall be consistent with the information below and be

in plain language that can be understood by the general public. All written public education material content shall be acceptable to the director prior to delivery.

(a) "IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER.

[INSERT NAME OF WATER SYSTEM] found elevated levels of lead in drinking water in some homes / buildings. Lead can cause serious health problems, especially for pregnant women and young children. Please read this information closely to see what you can do to reduce lead in your drinking water."

(b) "HEALTH EFFECTS OF LEAD.

Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones, and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development."

(c) Sources of lead:

(i) Explain what lead is.

(ii) Explain possible sources of lead in drinking water and how lead enters drinking water. Include information on home or building plumbing material and service lines that may contain lead.

(iii) Discuss other important sources of lead exposure in addition to drinking water (e.g., paint).

(d) Discuss the steps the consumer can take to reduce their exposure to lead in drinking water.

(i) Encourage running the water to flush out the lead.

(ii) Explain concerns using hot water from the tap and specifically caution against the use of hot water for preparing baby formula.

(iii) Explain that boiling water does not reduce lead levels.

(iv) Discuss other options consumers can take to reduce exposure to lead in drinking water, such as alternative sources or treatment of water.

(v) Note that the centers for disease control and prevention (CDC) recommends children and pregnant women use bottled water or water from a filtration system that has been certified by an independent testing organization to reduce or eliminate lead for cooking, drinking and baby formula preparation in homes.

(vi) Suggest that parents have their child's blood tested for lead.

(vii) Provide information about the availability of health screenings and blood lead level testing in the areas served by the system.

(viii) Explain that parents can have their drinking water tested for lead. Provide a list of Ohio EPA

approved laboratories that test for lead, including their names and phone numbers.

(e) Explain why there are elevated levels of lead in the system's drinking water (if known) and what the water system is doing to reduce the lead levels in homes or buildings in this area.

(f) Provide an analysis of laboratory results.

(g) "For more information call us at [INSERT YOUR PHONE NUMBER] [(if applicable) or visit our web site at [INSERT YOUR WEB SITE HERE]]. For more information on reducing lead exposure around your home / building and the health effects of lead, visit EPA's web site at <http://www.epa.gov/lead> or contact your local health care provider."

(2) Community water system. In addition to including the elements specified in paragraph (F)(1) of this rule, community water systems shall discuss lead in plumbing components and the difference between low lead and lead free.

(G) Delivery of public education materials.

(1) In the case of public water systems that are schools, day cares, nursing homes or correctional institutions, legal guardians or power of attorney shall be directly notified.

(2) For public water systems serving a large population of non-English speaking consumers, as determined by the director, the public education material must contain information in the appropriate language regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the public education materials or to request assistance in the appropriate language.

(3) Community water systems.

A community water system that exceeds the lead action level on the basis of tap water samples collected in accordance with rule 3745-81-86 of the Administrative Code, and that is not already conducting public education tasks under this rule, shall conduct the following public education tasks within thirty business days after receipt of the laboratory results:

(a) Deliver printed materials meeting the content requirements of paragraph (F) of this rule to all bill paying customers.

(b) Contact customers who are most at risk by doing the following:

(i) Delivering education materials that meet the content requirements of paragraph (F) of this rule to local public health agencies even if they are not located within the service area of the public water system, along with an informational notice that encourages distribution to all potentially affected customers of the organization or users of the community water system. The water system shall contact the local public health agencies directly by phone or in person. The local public health agencies may provide a specific list of additional community based organizations serving target populations, which may include organizations outside the service area of the water system. If such lists are provided, systems shall deliver education materials that meet the content requirements of paragraph (F) of this rule to all organizations on the provided lists.

(ii) Delivering materials that meet the content of paragraph (F) of this rule to the organizations listed below that are located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or

community water system's users:

- (a) Public and private schools or school boards.
  - (b) Women, infant and children (WIC) and head start programs.
  - (c) Public and private hospitals and medical clinics.
  - (d) Pediatricians.
  - (e) Family planning clinics.
  - (f) Local welfare agencies and jobs and family services.
- (iii) Make a good faith effort to locate the following organizations within the service area and deliver materials that meet the content requirements of paragraph (F) of this rule to them, along with an informational notice that encourages distribution to all potentially affected customers or users. The good faith effort to contact at-risk customers may include requesting a specific contact list of the following organizations from the local public health agencies, even if the agencies are not located within the water system's service area:
- (a) Licensed childcare centers.
  - (b) Public and private preschools.
  - (c) Obstetricians, gynecologists and midwives.
- (c) No less often than quarterly, provide information on or in each water bill as long as the system exceeds the action level of lead. The message on the water bill shall include the following statement exactly as written except for the text in brackets for which the water system shall include system-specific information: "[INSERT NAME OF WATER SYSTEM] found high levels of lead in drinking water in some homes. Lead can cause serious health problems. For more information please call [INSERT YOUR NUMBER] (or visit [INSERT YOUR WEB SITE HERE])." The message or delivery mechanism can be modified in consultation with the director; specifically, the director may allow a separate mailing of public education materials to customers if the water system cannot place the information on water bills.
- (d) Post material meeting the content requirements of paragraph (F) of this rule on the water system's web site if the system serves a population greater than one hundred thousand.
- (e) In addition to paragraphs (G)(3)(a) to (G)(3)(d) of this rule, systems shall implement at least three of the following activities:
- (i) Public service announcements.
  - (ii) Paid advertisements.
  - (iii) Public area information displays.
  - (iv) E-mails to customers.
  - (v) Public meetings.
  - (vi) Household deliveries.

- (vii) Targeted individual customer contact.
- (viii) Direct material distribution to all multi-family homes and institutions.
- (ix) Other methods approved by the director.

The educational content and selection of these activities shall be determined in consultation with the director.

(4) Frequency of delivery for community water systems. As long as a community water system exceeds the action level, the activities shall be repeated pursuant to paragraph (G)(3) of this rule as follows:

- (a) A community water system shall repeat the tasks contained in paragraphs (G)(3)(a), (G)(3)(b), and (G)(3)(e) of this rule every twelve months.
- (b) A community water system shall repeat tasks contained in paragraph (G)(3)(c) of this rule with each billing cycle.
- (c) A community water system serving a population greater than one hundred thousand shall post and retain material on a publically accessible web site pursuant to paragraph (G)(3)(d) of this rule.

(5) Nontransient noncommunity water systems.

Frequency of delivery for nontransient noncommunity water systems. Within thirty days after receipt of the laboratory results [unless it already is repeating public education tasks pursuant to paragraph (G)(6) of this rule], a nontransient noncommunity water system shall deliver the public education materials specified by paragraph (F) of this rule as follows:

- (a) Post informational posters on lead in drinking water in a public place or common area in each of the buildings served by the system.
- (b) Distribute information via pamphlets, brochures or electronic transmission on lead in drinking water to each person served by the nontransient noncommunity water system.

(6) A nontransient noncommunity water system shall repeat the tasks contained in paragraph (G)(5) of this rule at least once during each calendar year in which the system exceeds the lead action level.

(7) A water system may discontinue delivery of public education materials if the system has not exceeded the lead action level during the most recent six-month monitoring period conducted pursuant to rule 3745-81-86 of the Administrative Code. Such a system shall recommence public education in accordance with this rule if the system subsequently exceeds the lead action level during any monitoring period.

(8) A community water system may only perform the tasks listed in paragraphs (G)(5) and (G)(6) of this rule in lieu of the tasks in paragraphs (G)(3) and (G)(4) of this rule if the following criteria are met:

- (a) The system is a facility, such as a prison or a hospital, where the population served is not capable of or is prevented from making improvements to plumbing.
- (b) The system provides water as part of the cost of services provided and does not separately charge for water consumption.

(9) A community water system serving thirty-three hundred or fewer people may limit certain aspects of the

public education programs as follows:

- (a) The water system shall implement at least one of the activities listed in paragraph (G)(3)(e) of this rule.
- (b) The water system may limit the distribution of the public education materials required in paragraph (G)(3)(b) of this rule to facilities and organizations served by the system that are most likely to be visited regularly by pregnant women and children, unless the system is notified by the director in writing that the system shall make a broader distribution.



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**3745-81-86 Control of lead and copper - monitoring requirements for lead and copper in tap water.****(A) Sample site location and mapping requirements.**

- (1) Each public water system shall complete a materials evaluation of the distribution system in order to identify a pool of targeted sampling sites that meets the requirements of this rule and is sufficiently large to ensure that the public water system can collect the number of lead and copper tap samples required in paragraph (C) of this rule. All sites from which first-draw samples are collected shall be selected from this pool of targeted sampling sites. Sampling sites may not include taps that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants.
- (2) A public water system shall use any information on lead, copper, and galvanized steel that the system has collected in corrosivity monitoring when conducting a materials evaluation. When such information is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria in paragraph (A) of this rule, the public water system shall review the following sources of information in order to identify a sufficient number of sampling sites:
  - (a) All plumbing codes, permits, and records in the files of the building department which indicate the plumbing materials that are installed within publicly and privately owned structures connected to the distribution system.
  - (b) Inspections and records of the distribution system that indicate the material composition of the service connections that connect a structure to the distribution system.
  - (c) All existing water quality information, which includes the results of all prior analyses of the system or individual structures connected to the system, indicating locations that may be particularly susceptible to high lead or copper concentrations.

In addition, the system shall seek to collect such information where possible in the course of normal operations (e.g., checking service line materials while reading water meters or performing maintenance activities).

- (3) The sampling sites selected for a community public water system's sampling pool ("tier one sampling sites") shall consist of single family structures that meet one of the following:
  - (a) Contain copper pipes with lead solder installed after 1982 and before 1989 or contain lead pipes; or.
  - (b) Are served by a lead service line. When multiple-family residences comprise at least twenty per cent of the structures served by a public water system, the system may include these types of structures in the sampling pool.
- (4) Any community public water system with insufficient tier one sampling sites shall complete the sampling pool with "tier two sampling sites", consisting of buildings, including multiple-family residences, that meet one of the following:
  - (a) Contain copper pipes with lead solder installed after 1982 and before 1989 or contain lead pipes; or.
  - (b) Are served by a lead service line.
- (5) Any community public water system with insufficient tier one and tier two sampling sites shall complete the sampling pool with "tier three sampling sites", consisting of single family structures that contain copper pipes with lead solder installed before 1983. A community public water system with insufficient

tier 1, tier 2, and tier 3 sampling sites shall complete the sampling pool with representative sites throughout the distribution system. For the purpose of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the public water system.

- (6) The sampling sites selected for a nontransient noncommunity public water system ("tier one sampling sites") shall consist of buildings that meet one of the following:
- (a) Contain copper pipes with lead solder installed after 1982 and before 1989 or contain lead pipes.
  - (b) Are served by a lead service line.
- (7) A nontransient noncommunity public water system with insufficient tier one sites that meet the targeting criteria in paragraph (A)(6) of this rule shall complete the sampling pool with sampling sites that contain copper pipes with lead solder installed before 1983. If additional sites are needed to complete the sampling pool, the nontransient noncommunity water system shall use representative sites throughout the distribution system. For the purpose of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the public water system.
- (8) Any public water system whose distribution system contains lead service lines shall draw fifty per cent of the samples collected during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and fifty per cent of those samples from sites served by a lead service line. A public water system that cannot identify a sufficient number of sampling sites served by a lead service line shall collect first-draw samples from all of the sites identified as being served by such lines.
- (9) Mapping requirements.

The owner or operator of a community or nontransient noncommunity water system shall do all of the following, as applicable:

- (a) Community water systems.

The owner or operator shall identify and map areas of the system that are known or likely to contain lead service lines, and identify characteristics of buildings served by the system that may have solder, fixtures or pipes that contain lead. Characteristics of buildings may be described in a narrative referenced in paragraph (A)(9)(d) of this rule.

- (b) Single building community water systems and nontransient noncommunity water systems.

The owner or operator shall identify and map areas of the system with solder, fixtures or pipes containing lead in buildings served by the system. Characteristics of the system may be described in a narrative referenced in paragraph (A)(9)(d) of this rule.

- (c) Submit a copy of the applicable map to the Ohio department of health and the Ohio department of job and family services.
- (d) The applicable map, and a list of sampling site locations identified in paragraphs (A)(1) to (A)(8) of this rule including the contact information for the owner and occupant for each sampling site shall be submitted to the director. Water systems may submit a narrative providing additional detail (e.g., description of the building and the plumbing materials) with the map and list of sampling site locations. The documentation submitted shall be acceptable and complete.

- (e) The owner or operator of an existing community or nontransient noncommunity water system shall complete the initial submission of the information specified in paragraphs (A)(9)(a) or (A)(9)(b) of this rule in accordance with section 6109.121 of the Revised Code. The owner or operator of a new community or nontransient noncommunity water system shall complete the initial submission of the information specified in paragraph (A)(9)(a) or (A)(9)(b) of this rule when applying for plan approval in accordance with Chapter 3745-91 of the Administrative Code.
- (f) The water system owner or operator shall update and resubmit information required in paragraphs (A)(9)(a) to (A)(9)(d) of this rule once every five years, beginning five years after March 9, 2017.

(B) Sample collection methods.

- (1) All tap samples for lead and copper collected in accordance with rules 3745-81-80 to 3745-81-89 of the Administrative Code, with the exception of lead service line samples collected under paragraph (C)(1) of rule 3745-81-84 of the Administrative Code and samples collected under paragraph (B)(3) of this rule, shall be first-draw samples.
- (2) Each first-draw tap sample for lead and copper shall be one liter in volume and have stood motionless in the plumbing system of its sampling site for at least six hours. First-draw samples from residential housing shall be collected from the cold-water kitchen tap or bathroom sink tap. First-draw samples from a non-residential building shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. Non-first-draw samples collected in lieu of first-draw samples pursuant to paragraph (B)(5) of this rule shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. First-draw samples may be collected by the public water system or the system may allow residents to collect first-draw samples after instructing the residents of the sampling procedures specified in this paragraph. To avoid problems of residents handling nitric acid, acidification of first-draw samples may be done up to fourteen days after the sample is collected. After acidification to resolubilize the metals, the sample must stand in the original container for the time specified in the approved EPA method before the sample can be analyzed. If a public water system allows residents to perform sampling, the system may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.
- (3) Each service line sample shall be one liter in volume and have stood motionless in the lead service line for at least six hours. Each lead service line sample shall be collected in one of the following three ways:
  - (a) At the tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and the lead service line.
  - (b) Tapping directly into the lead service line.
  - (c) If the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the lead service line.
- (4) A public water system shall collect each first-draw tap sample from the same sampling site from which a previous sample was collected. If, for any reason, the water system cannot gain entry to a sampling site in order to collect a follow-up tap sample, the system may collect the follow-up tap sample from another sampling site in its sampling pool as long as the new site meets the same targeting criteria and is within reasonable proximity of the original site.

(5) A nontransient noncommunity water system, or a community water system that meets the criteria of paragraph (G)(8) of rule 3745-81-85 of the Administrative Code, that does not have enough taps that can supply first-draw samples, as defined in rule 3745-81-01 of the Administrative Code may apply to the director in writing to substitute non-first-draw samples. Such public water systems shall collect as many first-draw samples from appropriate taps as possible and identify sampling times and locations that would likely result in the longest standing time for the remaining sites.

(C) Number of samples. Public water systems shall collect at least one sample during each monitoring period specified in paragraph (D) of this rule from the number of sites listed in the second column ("standard monitoring") of the table in this paragraph. A system conducting reduced monitoring under paragraph (D)(4) of this rule shall collect at least one sample from the number of sites specified in the third column ("reduced monitoring") of the table in this paragraph during each monitoring period specified in paragraph (D)(4) of this rule. Such reduced monitoring sites shall be representative of the sites required for standard monitoring. A public water system that has fewer than five drinking water taps that can be used for human consumption meeting the sample site criteria of paragraph (A) of this rule to reach the required number of sample sites listed in paragraph (C) of this rule, shall collect at least one sample from each tap and then shall collect additional samples from those taps on different days during the monitoring period to meet the required number of sites. Alternately, the director may allow these public water systems to collect a number of samples less than the number of sites specified in paragraph (C) of this rule, provided that one hundred per cent of all taps that can be used for human consumption are sampled. The director shall approve this reduction of the minimum number of samples in writing based on a request from the system or onsite verification by the director. The director may specify sampling locations when a public water system is conducting reduced monitoring. The table is as follows:

System size (number of people served)	Number of sites (standard monitoring)	Number of sites (reduced monitoring)
>100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
<101	5	5

(D) Timing of monitoring.

(1) Initial tap sampling. The first six-month monitoring period for new community or nontransient noncommunity water systems shall begin on either January first or July first, whichever comes first after activation as a water system.

(a) All large systems shall monitor during two consecutive six-month periods.

(b) All small and medium systems shall monitor during each six-month monitoring period until one of the following occurs:

(i) The public water system exceeds the lead or copper action level and is therefore required to implement the corrosion control treatment requirements under rule 3745-81-81 of the Administrative Code, in which case the system shall continue monitoring in accordance with paragraph (D)(2) of this rule.

- (ii) The public water system monitoring results do not exceed the lead or copper action level during two consecutive six-month monitoring periods, in which case the system may reduce monitoring in accordance with paragraph (D)(4) of this rule.

(2) Monitoring after installation of corrosion control and source water treatment.

- (a) Any large system which installs optimal corrosion control treatment pursuant to paragraph (D)(4) of rule 3745-81-81 of the Administrative Code shall monitor during two consecutive six-month monitoring periods in accordance with paragraph (D)(5) of rule 3745-81-81 of the Administrative Code.
- (b) Any small or medium system which installs optimal corrosion control treatment pursuant to paragraph (E)(5) of rule 3745-81-81 of the Administrative Code shall monitor during two consecutive six-month monitoring periods in accordance with paragraph (E)(6) of rule 3745-81-81 of the Administrative Code.
- (c) Any public water system which installs source water treatment pursuant to paragraph (A)(3) of rule 3745-81-83 of the Administrative Code shall monitor during two consecutive six-month monitoring periods by the date specified in paragraph (A)(4) of rule 3745-81-83 of the Administrative Code.

(3) Monitoring after the director specifies water quality parameter values for optimal corrosion control. After the director specifies the values for water quality control parameters under paragraph (F) of rule 3745-81-82 of the Administrative Code, the public water system shall monitor during each subsequent six-month monitoring period, with the first monitoring period to begin on the date the director specifies the optimal values under paragraph (F) of rule 3745-81-82 of the Administrative Code.

(4) Reduced monitoring.

- (a) A small or medium water system that does not exceed either the lead or copper action level during two consecutive six-month monitoring periods may reduce the number of samples according to paragraph (C) of this rule, and reduce the frequency of sampling to one monitoring period per year. A small or medium public water system collecting fewer than five samples as specified in paragraph (C) of this rule, that does not exceed either the lead or copper action level during two consecutive six-month monitoring periods may reduce the frequency of sampling to one monitoring period per year. In no case can this public water system reduce the number of samples required below the minimum of one sample per available tap. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period.
- (b) Reduced annual monitoring. Any public water system that meets the lead action level and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment approved by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code during each of two consecutive six-month monitoring periods may reduce the frequency of monitoring to once per year and to reduce the number of lead and copper samples in accordance with paragraph (C) of this rule if it receives written approval from the director. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period. The director shall review monitoring, treatment, and other relevant information submitted by the public water system in accordance with rule 3745-81-90 of the Administrative Code, and shall notify the system in writing, when the director determines the system is eligible to commence reduced monitoring pursuant to this paragraph. The director shall review, and where appropriate, revise such a determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling become available.

- (c) Reduced triennial monitoring. As of the effective date of this rule, no water systems are eligible to monitor for lead and copper once every three years without applying for and obtaining written approval from the director. Any public water system that exceeds the lead action level or fails to maintain the range of values for the water quality control parameters reflecting optimal corrosion control treatment approved by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code during five consecutive monitoring periods will not be eligible to reduce the frequency of monitoring from annually to once every three years. To apply for approval, an eligible water system shall provide the director with documentation that at least one of the criteria listed in paragraphs (D)(4)(c)(i) to (D)(4)(c)(iii) of this rule were met. Samples collected once every three years shall be collected no later than every third calendar year. In addition to reviewing information submitted pursuant to paragraphs (D)(4)(c)(i) to (D)(4)(c)(iii) of this rule, the director shall review monitoring, treatment and other relevant information submitted by the public water system in accordance with rule 3745-81-90 of the Administrative Code, as part of the monitoring frequency determination. Any water systems that did not receive written approval from the director and were conducting triennial monitoring prior the effective date of this rule, shall conduct annual lead and copper monitoring. When the water system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available, the director shall review, and where appropriate, revise the determination.
- (i) The water system shall demonstrate that the tap water lead level computed under paragraph (C)(3) of rule 3745-81-80 of the Administrative Code is less than or equal to 0.005 milligrams per liter and the tap water copper level computed under paragraph (C)(3) of rule 3745-81-80 of the Administrative Code is less than or equal to 0.65 milligrams per liter for five consecutive monitoring periods.
- (ii) The water system shall demonstrate that the system has maintained the range of values for water quality control parameters reflecting optimal corrosion control treatment approved by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code, if applicable, during five consecutive monitoring periods.
- (iii) The water system shall demonstrate that the system does not own service lines, fixtures, pipe or solder that contain lead.
- (d) A public water system that reduces the number of sampling sites and the frequency of monitoring shall collect these samples from representative sites included in the pool of targeted sampling sites identified in paragraph (A) of this rule. Public water systems monitoring annually or less frequently shall conduct the lead and copper tap water monitoring during the months of June through September unless the director has approved a different sampling period in accordance with paragraph (D)(4)(d)(i) of this rule.
- (i) The director may approve a different period for conducting the lead and copper tap sampling for public water systems collecting a reduced number of samples. Such a period shall be no longer than four consecutive months and shall represent a time of normal operation where the highest levels of lead are most likely to occur. For a nontransient noncommunity water system that does not operate during the months of June through September, and for which the period of normal operation where the highest levels of lead are most likely to occur is not known, the director shall designate a period that represents a time of normal operation for the system. This sampling shall begin during the period approved by the director in the calendar year immediately following the end of the second consecutive six-month monitoring period for systems initiating annual monitoring and during the three-year period following the end of the third consecutive

year of annual monitoring for systems initiating triennial monitoring.

- (ii) Public water systems monitoring annually, that have been collecting samples during the months of June through September and that receive the director's approval to alter their sample collection period under paragraph (D)(4)(d)(i) of this rule, shall collect their next round of samples during a time period that ends no later than twenty-one months after the previous round of sampling. Public water systems monitoring triennially that have been collecting samples during the months of June through September, and receive the director's approval to alter the sampling collection period in accordance with paragraph (D)(4)(d)(i) of this rule, shall collect their next round of samples during a time period that ends no later than forty-five months after the previous round of sampling. Subsequent rounds of sampling shall be collected annually or triennially, as required by this rule.

(5) Action level exceedance while on reduced monitoring.

- (a) A small or medium water system subject to reduced monitoring that exceeds the lead or copper action level shall resume tap water monitoring in accordance with paragraph (D)(3) of this rule and collect the number of samples specified for standard monitoring under paragraph (C) of this rule. Such a public water system shall also conduct water quality parameter monitoring in accordance with paragraph (B), (C), or (D), as appropriate, of rule 3745-81-87 of the Administrative Code during the monitoring period in which the system exceeded the action level. Any such public water system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in paragraph (C) of this rule after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of paragraph (D)(4)(a) of this rule or may resume triennial monitoring for lead and copper after it demonstrates that it meets the criteria of paragraph (D)(4)(c) of this rule.
- (b) Any public water system subject to the reduced monitoring frequency that exceeds the lead or copper action level during any four-month monitoring period or fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code for more than nine days in any six-month period specified in paragraph (D) of rule 3745-81-87 of the Administrative Code shall conduct tap water sampling for lead and copper at the frequency specified in paragraph (D)(3) of this rule, collect the number of samples specified for standard monitoring for lead and copper under paragraph (C) of this rule, and shall resume monitoring for water quality parameters within the distribution system in accordance with paragraph (D) of rule 3745-81-87 of the Administrative Code. This standard tap water monitoring shall begin no later than the six-month period beginning January first or July first, whichever comes first, following the lead or copper action level exceedance or water quality parameter excursion. Such a public water system may resume reduced monitoring for lead and copper at the tap and for water quality parameters within the distribution system under the following conditions:
  - (i) The public water system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in paragraph (C) of this rule after it has completed two subsequent six-month rounds of monitoring that meet the criteria of paragraph (D)(4)(b) of this rule and the system has received written acceptance from the director that it is appropriate to resume reduced monitoring on an annual frequency. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period.



- (ii) The system may resume triennial monitoring for lead and copper after it demonstrates that it meets the criteria of paragraph (D)(4)(c) of this rule and the public water system has received written acceptance from the director.
- (iii) The public water system may reduce the number of water quality parameter tap water samples required in accordance with paragraph (E)(1) of rule 3745-81-87 of the Administrative Code and the frequency with which the system collects such samples in accordance with paragraph (E)(2) of rule 3745-81-87 of the Administrative Code. Such a system may not resume triennial monitoring for water quality parameters at the tap until the system demonstrates, in accordance with the requirements of paragraph (E)(3) of rule 3745-81-87 of the Administrative Code, that the system has re-qualified for triennial monitoring.

(6) Reduced monitoring and changes in water quality, treatment or water source. Any public water system subject to a reduced monitoring frequency under paragraph (D)(4) of this rule shall notify the director, and any consecutive or wholesale system, in writing in accordance with paragraph (A)(3) of rule 3745-81-90 of the Administrative Code of any of the following including, but not limited to changes in water quality that has the potential to affect or is affecting optimal corrosion control, upcoming substantial change in treatment, or an addition of a new source. The director shall review and approve the addition of a new source or substantial change in water treatment before it is implemented by the water system. The director may require the public water system to resume sampling in accordance with paragraph (D)(3) of this rule and collect the number of samples specified for standard monitoring under paragraph (C) of this rule or take other appropriate steps such as increased water quality parameter monitoring or re-evaluation of its corrosion control treatment given the potentially different water quality considerations.

(E) Additional monitoring by public water systems.

The results of any monitoring conducted in addition to the minimum requirements of this rule shall be considered by the public water system and the director in making any determinations, i.e., calculating the ninetieth percentile lead or copper level, under rule 3745-81-80 of the Administrative Code. Samples meeting any of the criteria in paragraphs (E)(1) to (E)(5) of this rule will be identified as special purpose and not be considered for compliance with rules 3745-81-80 to 3745-81-90 of the Administrative Code. Water systems shall comply with the requirements for consumer notice of special purpose sample results per paragraph (A) of rule 3745-81-85 of the Administrative Code.

- (1) Samples taken outside the required monitoring period.
- (2) Samples taken from a tier site lower than the required tier.
- (3) Repeat samples taken from the same site during the same monitoring period (i.e. investigatory samples) unless the water system has fewer than five taps as described in paragraph (C) of this rule.
- (4) Samples not collected in accordance with the approved sampling methodology of this rule.
- (5) Samples taken after lead service line replacement in accordance with rule 3745-81-84 of the Administrative Code.

(F) Invalidation of lead or copper tap water samples.

A sample invalidated under this paragraph does not count toward determining lead or copper ninetieth percentile levels under paragraph (C)(3) of rule 3745-81-80 of the Administrative Code or toward meeting

the minimum monitoring requirements of paragraph (C) of this rule.

- (1) The director may invalidate a lead or copper tap water sample if at least one of the following conditions is met.
  - (a) The laboratory establishes that improper sample analysis caused erroneous results.
  - (b) The director determines that the sample was taken from a site that did not meet the site selection criteria of this rule.
  - (c) The sample container was damaged in transit.
  - (d) There is substantial reason to believe that the sample was subject to tampering.
- (2) The public water system shall report the results of all samples to the director and all supporting documentation for samples the system believes should be invalidated.
- (3) To invalidate a sample under paragraph (F)(1) of this rule, the decision and the rationale for the decision shall be documented in writing. The director may not invalidate a sample solely on the grounds that a follow-up sample result is higher or lower than that of the original sample.
- (4) The public water system shall collect replacement samples for any samples invalidated under paragraph (F)(1) of this rule if, after the invalidation of one or more samples, the system has too few samples to meet the minimum requirements of paragraph (C) of this rule. Any such replacement samples shall be taken as soon as possible, but no later than twenty days after the date the director invalidates the sample or by the end of the applicable sampling period, whichever occurs later. Replacement samples taken after the end of the applicable sampling period shall not also be used to meet the sampling requirements of a subsequent sampling period. The replacement samples shall be taken at the same locations as the invalidated samples or, if that is not possible, at locations other than those already used for sampling during the sampling period.

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### **3745-81-87 Control of lead and copper; monitoring requirements for water quality parameters.**

All large public water systems shall monitor water quality parameters in addition to lead and copper in accordance with this rule. All small and medium public water systems that exceed the lead or copper action level shall monitor water quality parameters in addition to lead and copper in accordance with this rule. For performing the analyses of water quality parameters set forth in this rule, laboratories are exempt from the requirements of rule 3745-89-02 of the Administrative Code. The requirements of this rule are summarized in the table at the end of this rule.

#### **(A) General requirements.**

##### **(1) Sample collection methods.**

- (a) Tap samples shall be representative of water quality throughout the distribution system taking into account the number of persons served, the different sources of water, the different treatment methods employed by the public water system, and seasonal variability. Tap sampling under this rule is not required to be conducted at taps targeted for lead and copper sampling under paragraph (A) of rule 3745-81-86 of the Administrative Code.
- (b) Samples collected at the entry points to the distribution system shall be from locations representative of each water source after treatment. If a public water system draws water from more than one water source and the sources are combined before distribution, the system shall monitor at each sampling point during periods of normal operating conditions, that is, when water is representative of all sources being used.

##### **(2) Number of samples.**

- (a) Public water systems shall collect two tap samples for applicable water quality parameters during each monitoring period specified under paragraphs (B) to (E) of this rule from the following number of sites.

System size (number of people served)	Number of sites for water quality parameters
> 100,000	25
10,001 - 100,000	10
3,301 - 10,000	3
501 - 3,300	2
101 - 500	1
< 101	1

- (b) Except as provided in paragraph (C)(3) of this rule, public water systems shall collect two samples for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in paragraph (B) of this rule. During each monitoring period specified in paragraphs (C) to (E) of this rule, systems shall collect one sample for each applicable water quality parameter at each entry point to the distribution system.

- (B) Initial sampling. All large public water systems shall measure the applicable water quality parameters as specified below at taps and at each entry point to the distribution system during each six-month period specified in paragraph (D)(1) of rule 3745-81-86 of the Administrative Code. All small and medium public water systems shall measure the applicable water quality parameters at the locations specified below during

each six month monitoring period specified in paragraph (D)(1) of rule 3745-81-86 of the Administrative Code during which the system exceeds the lead or copper action level.

(1) At taps, measure the following:

- (a) pH.
- (b) Alkalinity.
- (c) Orthophosphate, when an inhibitor containing a phosphate compound is used.
- (d) Silica, when an inhibitor containing a silicate compound is used.
- (e) Calcium.
- (f) Conductivity.
- (g) Water temperature.

(2) At each entry point to the distribution system: all of the applicable parameters listed in paragraph (B)(1) of this rule.

(C) Monitoring after installation of corrosion control. Any large public water system which installs optimal corrosion control treatment pursuant to paragraph (D)(4) of rule 3745-81-81 of the Administrative Code shall measure the water quality parameters at the locations and frequencies specified in paragraphs (C)(1) and (C)(2) of this rule during each six-month monitoring period specified in paragraph (D)(2)(a) of rule 3745-81-86 of the Administrative Code. Any small or medium public water system which installs optimal corrosion control treatment shall conduct water quality parameter monitoring specified in paragraphs (C)(1) and (C)(2) of this rule during each six-month monitoring period specified in paragraph (D)(2)(b) of rule 3745-81-86 of the Administrative Code.

(1) At taps, two samples for the following:

- (a) pH.
- (b) Alkalinity.
- (c) Orthophosphate, when an inhibitor containing a phosphate compound is used.
- (d) Silica, when an inhibitor containing a silicate compound is used.
- (e) Calcium, when calcium carbonate stabilization is used as part of corrosion control.

(2) Except as provided in paragraph (C)(3) of this rule, at each entry point to the distribution system, at least one sample no less frequently than every two weeks for the following:

- (a) pH.
- (b) Alkalinity concentration when alkalinity is adjusted as part of optimal corrosion control. A reading of the dosage rate of the chemical used to adjust alkalinity shall also be included.
- (c) The concentration of orthophosphate or silica, whichever is applicable, when a corrosion inhibitor is used as part of optimal corrosion control. A reading of the dosage rate of the inhibitor used shall also be included.

(3) Any ground water system can limit entry point sampling described in paragraph (C)(2) of this rule to those entry points that are representative of water quality and treatment conditions throughout the system. If water from untreated ground water sources mixes with water from treated water sources, the public water system shall monitor for water quality parameters both at representative entry points receiving treatment and representative entry points receiving no treatment. Prior to the start of monitoring under this paragraph, the public water system shall provide to the director written information on seasonal variability, sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(D) Monitoring after the director specifies water quality parameter values for optimal corrosion control. After the director specifies the values for applicable water quality control parameters reflecting optimal corrosion control treatment under paragraph (F) of rule 3745-81-82 of the Administrative Code, all large public water systems shall measure the applicable water quality parameters in accordance with paragraph (C) of this rule and determine compliance with the requirements of paragraph (G) of rule 3745-81-82 of the Administrative Code for every six-month period to begin on either January first or July first, whichever comes first, after the director specifies the optimal values under paragraph (F) of rule 3745-81-82 of the Administrative Code.

Any small or medium public water system shall conduct such monitoring during each six-month period specified in this paragraph. For any such small or medium public water system that is subject to a reduced monitoring frequency pursuant to paragraph (D)(4) of rule 3745-81-86 of the Administrative Code, at the time of the action level exceedance, the start of the applicable six-month period under this paragraph shall coincide with the start of the applicable monitoring period under paragraph (D)(4) of rule 3745-81-86 of the Administrative Code. Compliance with director-designated optimal water quality parameter values shall be determined as specified under paragraph (G) of rule 3745-81-82 of the Administrative Code.

Upon the determination of an action level exceedance, any public water system that is subject to a reduced monitoring frequency pursuant to paragraph (D)(4) of rule 3745-81-86 of the Administrative Code shall report applicable water quality parameters in accordance with this rule within thirty days or by the end of the water quality parameter monitoring period, whichever is sooner.

(E) Reduced monitoring.

(1) Any public water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during each of two consecutive six-month monitoring periods under paragraph (D) of this rule shall continue monitoring at the entry points to the distribution system as specified in paragraph (C)(2) of this rule. Such system may monitor with two tap samples for applicable water quality parameters from each of the following reduced number of sites during each six-month monitoring period. A water system monitoring from a reduced number of sites prior to the effective date of this rule may continue with the reduced number of monitoring sites except as modified by paragraph (E)(5) of this rule.

System size (number of people served)	Reduced number of sites for water quality parameters
> 100,000	10
10,001 - 100,000	7
3,301 - 10,000	3
501 - 3,300	2

101 - 500	1
< 101	1

- (2) Reduced annual water quality parameter monitoring. In order to reduce the monitoring frequency to annual monitoring of the number of tap samples for applicable water quality parameters, the water system shall submit a request to the director for approval. This request shall demonstrate the system maintains the ranges of values for the water quality parameters reflecting optimal corrosion control treatment specified by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code during three consecutive years of monitoring. If approved by the director, this sampling begins during the calendar year immediately following the end of the monitoring period in which the third consecutive year of six-month monitoring occurs.
- (3) Reduced triennial water quality parameter monitoring. As of the effective date of this rule, no water systems are eligible to continue to conduct or reduce to triennial monitoring of the number of tap samples for applicable water quality parameters specified in paragraph (E)(1) of this rule without meeting criteria in paragraph (E)(3)(a) or (E)(3)(b) of this rule and receiving written approval from the director. Any water systems that did not receive approval from the director and were conducting triennial monitoring prior to the effective date of this rule, shall conduct water quality parameter monitoring, at a minimum, annually.
- (a) In order to conduct triennial monitoring of the number of tap samples for applicable water quality parameters, the water system shall demonstrate the system maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code during three consecutive years of annual monitoring. If approved by the director, this sampling begins no later than the third calendar year following the end of the monitoring period in which the third consecutive year of monitoring occurs.
- (b) In order to conduct triennial monitoring of the number of tap samples for applicable water quality parameters specified in paragraph (E)(1) of this rule, the water system shall demonstrate during two consecutive monitoring periods that its tap water lead level at the ninetieth percentile is less than or equal to the practical quantitation limit (PQL) for lead specified in paragraph (B)(2) of rule 3745-81-89 of the Administrative Code, that its tap water copper level at the ninetieth percentile is less than or equal to 0.65 milligrams per liter in paragraph (C)(2) of rule 3745-81-80 of the Administrative Code, and that it has maintained the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code. If approved by the director, triennial monitoring shall be done no later than every third calendar year.
- (4) A public water system that conducts monitoring annually shall collect samples evenly throughout the year so as to reflect seasonal variability.
- (5) Any public water system subject to annual or triennial monitoring that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code for more than nine days in any six-month period specified in paragraph (G) of rule 3745-81-82 of the Administrative Code shall resume tap water sampling in accordance with the number and frequency requirements in paragraph (D) of this rule. Such a system may resume annual monitoring for water quality parameters at the tap at the reduced number of sites specified in paragraph (E)(1) of this rule after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of that paragraph or may resume

triennial monitoring for water quality parameters at the tap at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either paragraph (E)(2) or (E)(3) of this rule.

- (F) Additional monitoring by public water systems. The results of any monitoring conducted in addition to the minimum requirements of this rule shall be considered by the system and the director in making any determinations, i.e., determining concentrations of water quality parameters, under this rule or rule 3745-81-82 of the Administrative Code.

Summary of Monitoring Requirements for Water Quality Parameters <sup>1</sup>

Monitoring Period	Parameters	Location	Frequency
Initial monitoring.	pH, alkalinity, orthophosphate or silica <sup>2</sup> , calcium, conductivity, temperature.	Taps and at entry point(s) to distribution system.	Every 6 months.
After installation of corrosion control.	pH, alkalinity, orthophosphate or silica <sup>2</sup> , calcium <sup>3</sup> .	Taps.	Every 6 months.
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate <sup>4</sup> and orthophosphate or silica <sup>2</sup> .	Entry point(s) to distribution system <sup>5</sup> .	No less frequently than every two weeks.
After director specifies parameter values for optimal corrosion control.	pH, alkalinity, orthophosphate or silica <sup>2</sup> , calcium <sup>3</sup> .	Taps.	Every 6 months.
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate <sup>4</sup> and orthophosphate or silica <sup>2</sup> .	Entry point(s) to distribution system <sup>5</sup> .	No less frequently than every two weeks.
Reduced monitoring.	pH, alkalinity, orthophosphate or silica <sup>2</sup> , calcium <sup>3</sup> .	Taps.	Every 6 months, annually <sup>6</sup> or every 3 years <sup>7</sup> ; reduced



Summary of Monitoring Requirements for Water Quality Parameters <sup>1</sup>

			number of sites.
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate <sup>4</sup> and orthophosphate or silica <sup>2</sup> .	Entry point(s) to distribution system <sup>5</sup> .	No less frequently than every two weeks.

<sup>1</sup> Table is for illustrative purposes; consult the text of this rule for precise regulatory requirements.

<sup>2</sup> Orthophosphate shall be measured only when an inhibitor containing a phosphate compound is used. Silica shall be measured only when an inhibitor containing silicate compound is used.

<sup>3</sup> Calcium shall be measured only when calcium carbonate stabilization is used as part of corrosion control.

<sup>4</sup> Inhibitor dosage rates (orthophosphate or silica) shall be measured only when an inhibitor is used.

<sup>5</sup> Ground water systems may limit monitoring to representative locations throughout the public water system.

<sup>6</sup> Water systems may reduce frequency of monitoring for water quality parameters at the tap from every six months to annually if the system meets the requirements in paragraph (E)(2) of this rule.

<sup>7</sup> Water systems may further reduce the frequency of monitoring for water quality parameters at the tap from annually to once every three years if the system meets the requirements in paragraph (E)(2) or (E)(3) of this rule.

Effective: 5/1/2018

Five Year Review (FYR) Dates: 1/31/2018 and 05/01/2023

Promulgated Under: 119.03

Statutory Authority: 6109.121, 6109.04

Rule Amplifies: 6109.04, 6109.121

Prior Effective Dates: 9/13/93, 10/17/03, 7/24/09, 2/23/15

3745-81-88      **Control of lead and copper - monitoring requirements for lead and copper in source water at the entry point to the distribution system.**

(A) Sampling point locations, collection methods, and number of samples.

(1) A public water system that exceeds the lead or copper action level on the basis of tap water samples collected in accordance with rule 3745-81-86 of the Administrative Code shall monitor for lead and copper in source water at the entry point to the distribution system in accordance with the following requirements regarding sampling point locations, collection methods, and number of samples:

- (a) Ground water systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). The public water system shall take one sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.
- (b) Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point). The public water system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

Note: For the purposes of this paragraph, surface water systems include systems with a combination of surface and ground water sources.

- (c) If a public water system draws water from more than one source and the sources are combined before distribution, the public water system shall sample at an entry point to the distribution system during periods of normal operating conditions, i.e., when water is representative of all sources being used.
- (d) The director may reduce the total number of samples which must be analyzed by allowing the use of compositing. Compositing of samples shall be done by certified laboratory personnel. Composite samples from a maximum of five samples are allowed, provided that if the lead concentration in the composite sample is greater than or equal to 0.001 milligram per liter or the copper concentration is greater than or equal to 0.160 milligram per liter, then either:

- (i) A follow-up sample shall be taken and analyzed within fourteen days at each sampling point included in the composite; or
  - (ii) If duplicates of or sufficient quantities from the original samples from each sampling point used in the composite are available, the public water system may use these instead of resampling.
- (2) Where the results of monitoring indicate an exceedance of maximum permissible levels in the source water at the entry point to the distribution system established under paragraph (B)(4) of rule 3745-81-83 of the Administrative Code, the director may require that the public water system monitor with one additional sample as soon as possible after the initial monitoring (but not to exceed two weeks) at the same sampling point. If a director-required confirmation sample is taken for lead or copper, then the results of the initial and confirmation monitoring shall be averaged in determining compliance with the director-specified maximum permissible levels. Any sample value below the method detection limit (MDL) shall be considered to be zero. Any lead value above the MDL but below the practical quantitation level (PQL) of 0.005 milligram per liter shall be considered as the measured value. Any copper value above the MDL but below the PQL of 0.050 milligram per liter shall be considered as the measured value.
- (B) Monitoring frequency after public water system exceeds tap water action level. Any system which exceeds the lead or copper action level at the tap shall monitor one sample from each source water at the entry point to the distribution system no later than six months after the end of the monitoring period during which the lead or copper action level was exceeded. For monitoring periods that are annual or less frequent, the end of the monitoring period is September thirtieth of the calendar year in which the sampling occurs, or if the director established an alternate period, the last day of that period.
- (C) Monitoring frequency after installation of source water treatment. Any public water system which installs source water treatment pursuant to paragraph (A)(3) of rule 3745-81-83 of the Administrative Code shall collect an additional sample from each source water at the entry point to the distribution system during each of two consecutive six-month monitoring periods by the deadline specified in paragraph (A)(4) of rule 3745-81-83 of the Administrative Code.
- (D) Monitoring frequency after the director specifies maximum permissible lead and copper levels in source water at entry points to the distribution system or determines that source water treatment is not needed.

- (1) A public water system shall monitor at the frequency specified in paragraph (D)(1)(a) or (D)(1)(b) of this rule in cases where the director specifies maximum permissible source water at the entry point to the distribution system levels under paragraph (B)(4) of rule 3745-81-83 of the Administrative Code or determines that the public water system is not required to install source water treatment under paragraph (B)(2) of rule 3745-81-83 of the Administrative Code.
  - (a) A public water system using only ground water shall monitor once during the three-year compliance period (as that term is defined in rule 3745-81-01 of the Administrative Code) in effect when the applicable director's determination under paragraph (D)(1) of this rule is made. Such public water systems shall monitor once during each subsequent compliance period. Triennial samples shall be collected every third calendar year.
  - (b) A public water system using surface water (or a combination of surface water and ground water) shall monitor once during each year, the first annual monitoring period to begin during the year in which the applicable director's determination is made under paragraph (D)(1) of this rule.
- (2) A public water system is not required to conduct source water at the entry point to the distribution system sampling for lead and/or copper if the system does not exceed the action level for the specific contaminant in tap water samples at any time during the sampling period applicable to the system under paragraph (D)(1)(a) or (D)(1)(b) of this rule.

(E) Reduced monitoring frequency.

- (1) A public water system using only ground water may reduce the monitoring frequency for lead and copper in source water at the entry point to the distribution system once during each nine-year compliance cycle (as that term is defined in rule 3745-81-01 of the Administrative Code) provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:
  - (a) The public water system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the director in paragraph (B)(4) of rule 3745-81-83 of the Administrative Code during at least three consecutive compliance periods under paragraph (D)(1) of this rule; or
  - (b) The director has determined that source water treatment is not needed and the system demonstrates that, during at least three

consecutive compliance periods in which sampling was conducted under paragraph (D)(1) of this rule, the concentration of lead in source water at the entry point to the distribution system was less than or equal to 0.005 milligram per liter and the concentration of copper was less than or equal to 0.65 milligram per liter.

- (2) A public water system using surface water (or a combination of surface water and ground water) may reduce the monitoring frequency in paragraph (D)(1) of this rule to once during each nine-year compliance cycle (as that term is defined in rule 3745-81-01 of the Administrative Code) provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:
  - (a) The public water system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the director under paragraph (B)(4) of rule 3745-81-83 for at least three consecutive years; or
  - (b) The director has determined that source water treatment is not needed and the public water system demonstrates that, during at least three consecutive years, the concentration of lead in source water at the entry point to the distribution system was less than or equal to 0.005 milligram per liter and the concentration of copper at the entry point was less than or equal to 0.65 milligram per liter.
- (3) A public water system that uses a new source of water is not eligible for reduced monitoring for lead and/or copper until concentrations in samples collected from the new source during three consecutive monitoring periods are below the maximum permissible lead and copper concentrations specified by the director under paragraph (A)(5) of rule 3745-81-83 of the Administrative Code.

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Rule Amplifies: 6109.04

Prior Effective Dates: 09/13/93, 10/17/03

**3745-81-89      Analytical methods.**

- (A) Analyses for pH, conductivity, calcium, alkalinity, orthophosphate, silica and temperature shall be performed using analytical methods as specified in rule 3745-81-27 of the Administrative Code.
- (B) Analyses for lead and copper shall be performed using analytical methods as specified in rule 3745-81-27 of the Administrative Code and shall only be conducted by laboratories certified by the director and meet all requirements specified in rule 3745-89-03 of the Administrative Code. Laboratories performing these analyses shall do the following:
  - (1) Achieve the method detection limit (MDL) for lead of 0.001 milligrams per liter according to the procedures in rule 3745-89-03 of the Administrative Code. This need only be accomplished if the laboratory will be processing source water at the entry point to the distribution system composite samples under paragraph (A)(1)(d) of rule 3745-81-88 of the Administrative Code.
  - (2) Use the practical quantitation level (PQL) for lead of 0.005 milligrams per liter.
  - (3) Use the PQL for copper of 0.050 milligrams per liter.
  - (4) Complete analysis of lead or copper sample not later than thirty business days after receipt of the sample.
- (C) The director may allow the use of previously collected monitoring data for purposes of monitoring if the data were collected and analyzed in accordance with the requirements of this rule.
- (D) All lead and copper levels measured between the PQL and MDL, as specified in paragraph (B) of this rule, must be reported as measured. Any samples below the MDL shall be reported as zero.

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**3745-81-90 Control of lead and copper - reporting and record keeping requirements.**

All water systems shall report all of the following information to the director in accordance with this rule.

- (A) Reporting requirements for tap water monitoring for lead and copper and for water quality parameter monitoring.
- (1) Except as provided in paragraph (A)(1)(g) of this rule, a public water system shall report the information specified below for all tap water samples and all water quality parameter samples within ten days following the end of the month in which the system receives the sample results, as specified in rules 3745-81-86 and 3745-81-87 of the Administrative Code.
    - (a) The results from all tap samples for lead and copper including the location of each site and the criteria under paragraphs (A)(3) to (A)(7) of rule 3745-81-86 of the Administrative Code under which the site was selected for the public water system's sampling pool and the name and certification number of the laboratory which analyzed the samples.
    - (b) Documentation for each tap water lead or copper sample for which the public water system requests invalidation pursuant to paragraph (F)(2) of rule 3745-81-86 of the Administrative Code.
    - (c) The ninetieth percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period (calculated in accordance with paragraph (C)(3) of rule 3745-81-80 of the Administrative Code), unless the director calculates the system's ninetieth percentile lead and copper levels under paragraph (I) of this rule.
    - (d) With the exception of initial tap monitoring conducted pursuant to paragraph (D)(1) of rule 3745-81-86 of the Administrative Code, the public water system shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed.
    - (e) The results of all tap monitoring for pH and, where applicable, temperature, alkalinity, calcium, conductivity, and orthophosphate or silica collected under paragraphs (B) to (E) of rule 3745-81-87 of the Administrative Code.
    - (f) The results of all monitoring at the entry point(s) to the distribution system for applicable water quality parameters under paragraphs (B) to (E) of rule 3745-81-87 of the Administrative Code.
    - (g) A water system shall report the results of all water quality parameter samples collected under paragraphs (C) to (F) of rule 3745-81-87 of the Administrative Code during each six-month monitoring period specified in paragraph (D) of rule 3745-81-87 of the Administrative Code within ten days after the month in which the sample was analyzed, unless the director has specified a more frequent reporting requirement.
  - (2) For a nontransient noncommunity water system, or a community water system meeting the criteria of paragraphs (G)(8)(a) and (G)(8)(b) of rule 3745-81-85 of the Administrative Code, that does not have enough taps that can provide first-draw samples, the public water system shall do one of the following:
    - (a) Provide written documentation to the director identifying standing times and locations for enough non-first-draw samples to make up its sampling pool under paragraph (B)(5) of rule 3745-81-86 of the Administrative Code by the start of the first applicable monitoring period under paragraph (D) of rule 3745-81-86 of the Administrative Code that commences after April 11, 2000, unless the director has waived prior director approval of non-first-draw sample sites selected by the system

pursuant to paragraph (B)(5) of rule 3745-81-86 of the Administrative Code.

(b) If the director has waived prior approval of non-first-draw sample sites selected by the system, identify, in writing, each site that did not meet the six-hour minimum standing time and the length of standing time for that particular substitute sample collected pursuant to paragraph (B)(5) of rule 3745-81-86 of the Administrative Code and include this information with the lead and copper tap sample results required to be submitted pursuant to paragraph (A)(1)(b) of this rule.

(3) At a time specified by the director, or if no specific time is designated, then as early as possible, water systems shall notify the director of changes in water quality that could affect corrosion control treatment, in accordance with paragraph (F) of rule 3745-81-81 of the Administrative Code.

(4) Each ground water system that limits water quality parameter monitoring to a subset of entry points under paragraph (C)(3) of rule 3745-81-87 of the Administrative Code shall provide, by the commencement of such monitoring, written correspondence to the director that identifies the selected entry points and includes information sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(B) Reporting requirements for source water at the entry point to the distribution system.

(1) A public water system shall report the monitoring results for all samples of source water at the entry point to the distribution system collected in accordance with rule 3745-81-88 of the Administrative Code within the first ten days following the end of each entry-point water monitoring period (i.e., per six-month period, annually, per compliance period, per compliance cycle) for which a sample was collected as specified in rule 3745-81-88 of the Administrative Code.

(2) With the exception of the first round of source water at the entry point to the distribution system monitoring conducted pursuant to paragraph (B) of rule 3745-81-88 of the Administrative Code, the public water system shall specify any site which was not sampled during previous monitoring periods, and include an explanation of why the sampling point has changed.

(C) Corrosion control treatment reporting requirements. By the applicable dates under rule 3745-81-81 of the Administrative Code, public water systems shall report the following information:

(1) For systems demonstrating that they have already optimized corrosion control, information required in paragraph (B)(2) or (B)(3) of rule 3745-81-81 of the Administrative Code.

(2) For systems required to optimize corrosion control, their recommendation regarding optimal corrosion control treatment under paragraph (A) of rule 3745-81-82 of the Administrative Code.

(3) For systems required to evaluate the effectiveness of corrosion control treatments under paragraph (C) of rule 3745-81-82 of the Administrative Code, the information required by that paragraph.

(4) For systems required to install optimal corrosion control approved by the director under paragraph (D) of rule 3745-81-82 of the Administrative Code, a letter certifying that the system has completed installing that treatment.

(D) Source water treatment reporting requirements. By the applicable dates in rule 3745-81-83 of the Administrative Code, systems shall provide the following information to the director:

(1) If required under paragraph (B)(1) of rule 3745-81-83 of the Administrative Code, their recommendation regarding source water treatment.

- (2) For systems required to install source water treatment under paragraph (B)(2) of rule 3745-81-83 of the Administrative Code, a letter certifying that the system has completed installing the treatment approved by the director within twenty-four months after the director approved the treatment.
- (E) Lead service line replacement reporting requirements. Public water systems shall report the following information to the director to demonstrate compliance with the requirements of rule 3745-81-84 of the Administrative Code.
- (1) No later than twelve months after the end of a monitoring period in which a public water system exceeds the lead action level in monitoring referred to in paragraph (A) of rule 3745-81-84 of the Administrative Code, the system shall submit in written documentation to the director the material evaluation, conducted as required in paragraph (A) of rule 3745-81-86 of the Administrative Code, identify the initial number of lead service lines in its distribution system at the time the system exceeds the lead action level, and provide the system's schedule for annually replacing at least seven per cent of the initial number of lead service lines in the distribution system.
  - (2) No later than twelve months after the end of a monitoring period in which a system exceeds the lead action level in monitoring referred to in paragraph (A) of rule 3745-81-84 of the Administrative Code, and every twelve months thereafter, the system shall demonstrate to the director in writing that the system has replaced in the previous twelve months at least seven per cent of the initial lead service lines (or a greater number of lines specified by the director in accordance with rule 3745-81-84 of the Administrative Code) in the distribution system.
  - (3) The annual letter submitted to the director under paragraph (E)(2) of this rule shall contain the following information:
    - (a) The number of lead service lines scheduled to be replaced during the previous year of the system's replacement schedule.
    - (b) The number and location of each lead service line replaced during the previous year of the system's replacement schedule.
    - (c) If measured, the water lead concentration and location of each lead service line sampled, the sampling method, and the date of sampling.
  - (4) Any system which collects lead service line samples following partial lead service line replacement required by rule 3745-81-84 of the Administrative Code shall report the results to the director within two business days of receiving the laboratory results, or as specified by the director. The director has the discretion to eliminate this requirement to report these monitoring results. Systems shall also report any additional information as specified by the director, in a time and manner prescribed by the director, to verify that all lead service line replacement activities have taken place.
- (F) Reporting requirements for consumer notice and public notification.
- The water system shall certify to the director no later than five business days after receipt of the laboratory results that the system has complied with the requirements of paragraphs (A)(1), (A)(3)(a), (A)(3)(b), (C)(1), (C)(2) and (E) of rule 3745-81-85 of the Administrative Code, as applicable. Certification shall be submitted on a form and in a manner approved by the director.
- (G) Public education program reporting requirements.
- (1) Any public water system that is subject to the public education requirements in rule 3745-81-85 of the

Administrative Code shall, within five business days of delivering the public education in accordance with paragraph (G) of rule 3745-81-85 of the Administrative Code, send written documentation to the director that contains the following:

(a) A demonstration that the system has delivered the public education materials that meet the content requirements in paragraph (F) of rule 3745-81-85 of the Administrative Code and the delivery requirements in paragraph (G) of rule 3745-81-85 of the Administrative Code.

(b) A list of all the newspapers, radio stations, television stations, and facilities and organizations to which the system delivered public education materials during the period in which the system was required to perform public education tasks.

(2) Unless required by the director, a public water system that previously has submitted the information required by paragraph (G)(1)(b) of this rule need not resubmit the information required by paragraph (G)(1)(b) of this rule, as long as there have been no changes in the distribution list and the system certifies that the public education materials were distributed to the same list submitted previously.

(H) Reporting of additional monitoring data.

Any public water system which collects monitoring data in addition to that required by rules 3745-81-80 to 3745-81-88 of the Administrative Code shall report the results to the director within the first ten days following the end of the month in which the system receives the sample results, as specified in rules 3745-81-86 to 3745-81-88 of the Administrative Code.

(I) Reporting of ninetieth percentile lead and copper concentrations where the director calculates a system's ninetieth percentile concentrations.

A public water system is not required to report the ninetieth percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period, as required by paragraph (A)(1)(d) of this rule if the following occurs:

(1) The director has previously notified the water system that the director will calculate the water system's ninetieth percentile lead and copper concentrations, based on the lead and copper tap results submitted pursuant to paragraph (I)(2)(a) of this rule, and has specified a date before the end of the applicable monitoring period by which the public water system shall provide the results of lead and copper tap water samples.

(2) The public water system has provided the following information to the director by the date specified in paragraph (I)(1) of this rule:

(a) The results of all tap samples for lead and copper including the location of each site and the criteria in paragraphs (A)(3), (A)(4), (A)(5), (A)(6), and (A)(7) of rule 3745-81-86 of the Administrative Code under which the site was selected for the system's sampling pool, pursuant to paragraph (A)(1)(b) of this rule.

(b) An identification of sampling sites utilized during the current monitoring period that were not sampled during previous monitoring periods, and an explanation why sampling sites have changed.

(3) The director has provided the results of the ninetieth percentile lead and copper calculations, in writing, to the water system before the end of the monitoring period.

(J) Any public water system subject to the requirements of rules 3745-81-80 to 3745-81-89 of the Administrative

Code shall retain on the premises original records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, director's determinations, and any other information required by rules 3745-81-80 to 3745-81-89 of the Administrative Code. Each water system shall retain the records required by this rule for no fewer than twelve years.

Effective: 5/1/2018  
Five Year Review (FYR) Dates: 1/31/2018 and 05/01/2023

Promulgated Under: 119.03  
Statutory Authority: 6109.04, 6109.121  
Rule Amplifies: 6109.04, 6109.121  
Prior Effective Dates: 9/13/93, 10/17/03, 7/24/09

**3745-82-01      Definitions.**

As used in this chapter of the Administrative Code:

- (A) Except as otherwise noted, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter.
- (B) "Secondary maximum contaminant level" means the advisable maximum level of a contaminant in water which is delivered to the free-flowing outlet of the ultimate user of a public water system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

Effective Date: 10/01/2006

Five Year Review (FYR) Dates: 02/26/2016 and 02/26/2021

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.01, 6109.03, 6109.04  
Prior Effective Dates: 11/26/1980



**3745-82-02 Secondary maximum contaminant levels.**

The secondary maximum contaminant levels for public water systems are as follows

Contaminant	Level
Aluminum* . . . . .	0.05 to 0.2 mg/L
Chloride . . . . .	250 mg/L
Color . . . . .	15 color units
Corrosivity . . . . .	non-corrosive
Fluoride . . . . .	2.0 mg/L
Foaming Agents . . . . .	0.5 mg/L
Iron . . . . .	0.3 mg/L
Manganese . . . . .	0.05 mg/L
Odor . . . . .	3 threshold odor number
pH . . . . .	7.0-10.5
Silver . . . . .	0.1 mg/L
Sulfate . . . . .	250 mg/L
Total dissolved solids (TDS) . . . . .	500 mg/L
Zinc . . . . .	5 mg/L

\*The secondary maximum contaminant level for aluminum is a range, with the precise level applicable to each public water system to be determined by the director.

Effective: September 13, 1993

Promulgated under: RC Chapter 119

Rule amplifies: RC Section 6109.04

Prior effective dates: 11/26/80, 3/1/88

**3745-82-03    Monitoring for compliance with secondary maximum contaminant levels.**

The parameters in this chapter shall be monitored at the intervals prescribed in Chapters 3745-81 and 3745-82 of the Administrative Code or rule 3745-83-01 of the Administrative Code, except that, if the director prescribes in written notice to the affected system other intervals necessary to protect the public health or welfare, the parameters shall be monitored at the intervals prescribed in the written notice.

Replaces:	Replaces part of 3745-82-03
Effective:	08/05/2016
Five Year Review (FYR) Dates:	08/05/2021

Promulgated Under:	119.03
Statutory Authority:	6109.04
Rule Amplifies:	6109.03, 6109.04
Prior Effective Dates:	11/26/80, 03/29/88, 05/22/89, 10/01/06

**3745-82-04 Monitoring for compliance with the fluoride secondary maximum contaminant level.**

**(A) Public water systems that do not add supplemental fluoride.**

- (1) Monitoring and compliance determinations for the secondary maximum contaminant level (SMCL) for fluoride specified in rule 3745-82-02 of the Administrative Code shall be as follows:
  - (a) Public water systems may use the monitoring conducted for compliance with the maximum contaminant level (MCL) in paragraph (B) of rule 3745-81-11 of the Administrative Code to determine compliance with the SMCL for fluoride. The required monitoring to determine compliance with the MCL is specified in rule 3745-81-23 of the Administrative Code.
  - (b) If a public water system collects more than one sample per year, it shall be in compliance when the average of quarterly averages of all samples collected at each entry point to the distribution system during a calendar year does not exceed the SMCL for fluoride.
  - (c) Public water systems that collect one sample annually or less frequently shall be in compliance when the most recent sample does not exceed the SMCL for fluoride. When a public water system is required to take a confirmation sample under paragraph (F) of rule 3745-81-23 of the Administrative Code, the system shall be in compliance if the average of the initial and confirmation sample results does not exceed the SMCL for fluoride.

**(B) Public water systems that add supplemental fluoride.**

- (1) Monitoring and compliance determinations for the SMCL for fluoride specified in rule 3745-82-02 of the Administrative Code shall be as follows:
  - (a) Public water systems shall use the monitoring conducted for compliance with rule 3745-83-01 of the Administrative Code to determine compliance with the SMCL for fluoride.
  - (b) A public water system shall be in compliance when the running annual average of monthly averages of all samples collected at each entry point to the distribution system as determined monthly does not exceed the fluoride SMCL.
- (2) Public water systems adding fluoride shall maintain a fluoride range of 0.8 milligrams per liter to 1.3 milligrams per liter in their finished water pursuant to section 6109.20 of the Revised Code. Compliance shall be determined monthly at each entry point, based on the average of all daily samples collected for compliance with rule 3745-83-01 of the Administrative Code.

The monthly average fluoride content must be between 0.8 and 1.3 milligrams per liter at each entry point. A public water system shall notify Ohio EPA within forty-eight hours of any instance in which the daily average fluoride concentration is greater than 1.3 milligrams per liter. If a public water system has four or more days during a month in which the daily average fluoride concentration is outside a range of 0.7 milligrams per liter to 1.3 milligrams per liter, the public water system is in violation unless the system has approval from the director to perform a tracer study and the fluoride level in the distribution system does not exceed 2.0 milligrams per liter.

- (3) Public water systems that add supplemental fluoride shall keep a daily record of the amount of fluoride compound added, the quantity of water fluoridated, the calculated fluoride dosage, and the fluoride content of the water as delivered to their customers.
  - (4) Public water systems that lose their capability to accurately determine the fluoride content of their finished water due to laboratory equipment failure or malfunction, shall cease feeding all fluoride compounds and notify the Ohio EPA within forty-eight hours with a tentative schedule for re-establishing laboratory capabilities.
  - (5) Public water systems that lose their capability to feed fluoride shall notify Ohio EPA within forty-eight hours and provide a tentative schedule for resumption of acceptable fluoridation.
  - (6) A public water system determined to exceed 10.0 milligrams per liter due to over-feed events may be required to issue a no-use advisory.
- (C) A public water system determined to exceed the SMCL for fluoride under paragraph (A) or (B) of this rule shall notify the persons served by the public water system in accordance with paragraph (D) of rule 3745-81-32 of the Administrative Code.

Replaces:	Replaces part of 3745-82-03
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Statutory Authority:	6109.04
Rule Amplifies:	6109.03, 6109.04 and 6109.20
Prior Effective Dates:	11/26/80, 03/29/88, 05/22/89, 10/01/06

**3745-83-01 Operational requirements.**

- (A) Except as otherwise noted, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter.
- (B) Except as otherwise noted, analyses required by this rule shall be conducted in accordance with methods as specified in rule 3745-81-27 of the Administrative Code. In addition, analysis for parameters listed in the table in this paragraph shall be conducted in a laboratory certified in accordance with Chapter 3745-89 of the Administrative Code:

Parameter	Application
Total alkalinity	Precipitative softening or membrane technology; daily monitoring.
Phenol alkalinity	Precipitative softening; daily monitoring.
Stability	Precipitative softening or membrane technology; weekly monitoring.
Copper	All.
Fluoride	All.
Iron	For split sample or weekly analysis.
Manganese	For split sample or weekly analysis.
pH	Precipitative softening or membrane technology; daily monitoring. Surface water treatment plant; daily monitoring.
Total hardness	Precipitative softening or membrane technology; daily monitoring.
Total phosphorus	All.

**(C) Disinfection.**

- (1) Except as prescribed in rule 3745-81-72 of the Administrative Code, noncommunity public water systems serving a population of at least one thousand people and all community public water systems shall maintain a minimum chlorine residual of at least two-tenths milligram per liter free chlorine, or one milligram per liter combined chlorine measured at representative points throughout the distribution system. All other noncommunity public water systems that provide water treated with chlorine for disinfection purposes shall maintain the chlorine residual levels as described in this rule. The director may require higher residuals as necessary to compensate for pH, temperature, or other characteristics of the delivered water.

[Comment: Rule 3745-81-72 of the Administrative Code establishes similar but separate requirements for disinfection of systems using a surface water source. These two requirements are not inconsistent and failure to comply with either is considered a separate violation with different consequences. Contact your district

office representative if you have questions or require clarification.]

- (2) Noncommunity public water systems serving a population of at least one thousand people and all community public water systems shall install and place in operation equipment capable of meeting disinfection requirements of this rule.
  - (3) A system is exempt from maintaining a chlorine residual as required in paragraph (C)(1) of this rule if, with written approval of the director, it uses chlorine dioxide as a primary disinfectant in accordance with the terms of the approval.
  - (4) At times of actual or threatened outbreak of waterborne disease as defined in rule 3745-81-01 of the Administrative Code, or water supply emergency as determined by the director in accordance with section 6109.05 of the Revised Code, the director may require a public water system subject to paragraph (C)(1) of this rule to maintain a minimum chlorine residual of at least one milligram per liter free chlorine, or six milligrams per liter combined chlorine measured at representative points throughout the distribution system, despite possible resulting tastes or odors in the delivered water.
  - (5) "Finished water storage facilities," means a tank, reservoir, or other facility used to store water that will undergo no further treatment except residual disinfection, aeration or recirculation. Finished water storage facilities serving noncommunity water systems serving a population of at least one thousand people and all community water systems, prior to being placed into service or being returned to service after repairs, inspections, painting, cleaning, or other activities that might lead to contamination, shall complete the following:
    - (a) Meet the requirements of "American Water Works Association Standard C652-02 Disinfection of Water-Storage Facilities" (2002).
    - (b) Be monitored for chlorine residual and comply with the minimum chlorine residual established in paragraph (C)(1) of this rule and the MRDL established in paragraph (C) of rule 3745-81-10 of the Administrative Code.
  - (6) Water mains serving noncommunity water systems serving a population of at least one thousand people and all community water systems, prior to being placed into service or being returned to service after repairs, inspections, or other activities that might lead to contamination, unless a minimum pressure of twenty pounds per square inch gauge at ground level is maintained at all points in the distribution system, shall complete the following:
    - (a) Meet the requirements of "American Water Works Association Standard C651-14 Disinfecting Water Mains" (2014).
    - (b) Be monitored for chlorine residual and comply with the minimum chlorine residual established in paragraph (C)(1) of this rule and the MRDL established in paragraph (C) of rule 3745-81-10 of the Administrative Code.
- (D) Approval of chemicals and components. All chemicals, substances, and materials added



to or brought in contact with water in or intended to be used in a public water system or used for the purpose of treating, conditioning, altering, or modifying the characteristics of such water shall be shown by either the manufacturer, distributor, or purveyor to be non-toxic and harmless to humans when used in accordance with the formulation and concentration as specified by the manufacturer, and shall be certified as meeting the "American National Standards Institute/National Sanitation Foundation (ANSI/NSF)" standards in paragraphs (D)(1) to (D)(3) of this rule. Certification shall be from an "ANSI" accredited product certification organization.

- (1) All chemicals shall be certified as meeting the specification of "ANSI/NSF Standard 60 Drinking Water Treatment Chemicals - Health Effects (2009)."
  - (2) All components installed by a public water system shall be certified as meeting the specifications of "ANSI/NSF Standard 61 Drinking Water System Components - Health Effects (2010)." If certification to "ANSI/NSF Standard 61" is not available for a component, an alternate component with "ANSI/NSF Standard 61" certification must be used. In cases where no alternate "ANSI/NSF Standard 61" component exists, the director may accept another component on a case by case basis until the "ANSI/NSF Standard 61" certified component is available.
  - (3) Replacement of an existing component that is not certified to "ANSI/NSF Standard 61 Drinking Water System Components - Health Effects (2010)" may be required if the director determines the component may pose a risk to human health, safety or the environment.
- (E) Minimum pressure. Community water systems shall maintain a minimum pressure of twenty pounds per square inch gauge at ground level at all points in the distribution system under all conditions of flow other than conditions caused by line breaks, extreme fire flows, or other extraordinary circumstances.
- (F) Operational analyses.
- (1) Alkalinity.
    - (a) Total alkalinity.
      - (i) A public water system that provides precipitative softening as defined in rule 3745-7-01 of the Administrative Code or membrane technology to reduce hardness shall monitor for total alkalinity daily at each entry point to the distribution system.
      - (ii) A public water system that adjusts the alkalinity of the water for optimization of corrosion control pursuant to the lead and copper requirements in rules 3745-81-82 and 3745-81-87 of the Administrative Code shall monitor for total alkalinity at least once every two weeks at regular intervals at each entry point to the distribution system.

[Comment: In addition to the monitoring requirements above, public water systems exceeding the lead and copper action level that adjust the alkalinity of

the water for the purpose of providing optimal corrosion control treatment pursuant to rules 3745-81-82 and 3745-81-87 of the Administrative Code shall also monitor in accordance with the requirements of those rules.]

- (b) Phenolphthalein (or phenol) alkalinity. A public water system that provides precipitative softening as defined in rule 3745-7-01 of the Administrative Code shall monitor for phenolphthalein alkalinity daily at each entry point to the distribution system.
- (c) Stability. A public water system that provides precipitative softening as defined in rule 3745-7-01 of the Administrative Code or membrane technology to reduce hardness shall monitor for stability at least weekly at each entry point to the distribution system.

(2) Chlorine residual.

- (a) A public water system that provides water treated with chlorine shall monitor for free or combined chlorine at least once every day that water is available to the public at each entry point to the distribution system and a representative point or points in the distribution system. A noncommunity ground water system whose distribution system is solely interior plumbing in a single building only needs to collect one representative sample daily.
- (b) A public water system that uses chlorine solely for the oxidation of iron, manganese or hydrogen sulfide and is not required to maintain a residual in the distribution system does not have to perform the monitoring in paragraph (F)(2)(a) of this rule.

[Comment: In addition to the requirements in this paragraph, a public water system that uses a surface source, in whole or in part, shall also conduct disinfection monitoring in accordance with rule 3745-81-74 of the Administrative Code. A public water system that uses a ground water source and provides 4-log inactivation of viruses shall also conduct disinfection monitoring in accordance with rule 3745-81-43 of the Administrative Code.]

- (3) Copper. A public water system that intends to apply a copper compound to the water supply source shall notify the director of their intent to apply the compound, and monitor for copper at least weekly, at each entry point to the distribution system for at least one month after the compound has been applied.

(4) Fluoride.

- (a) A public water system that adds fluoride to the water supply shall monitor for fluoride in accordance with the following:
  - (i) At least once every day that water is available to the public at each entry point to the distribution system.
  - (ii) Prior to fluoridation at least once per month.

- (b) Samples shall be analyzed as soon as possible, but in no case later than forty-eight hours after the time of collection.

(5) Iron.

A community public water system that provides treatment to reduce iron shall monitor for iron at least at each entry point to the distribution system.

- (a) Community systems serving up to and including two hundred fifty persons shall monitor either of the following:
  - (i) Weekly with an in-house test kit in accordance with paragraph (F)(5)(c) of this rule and one split sample monthly by a state certified laboratory.
  - (ii) Weekly by a state certified laboratory.
- (b) Community systems serving greater than two hundred fifty persons shall monitor either of the following:
  - (i) A minimum of five days per week with an in-house test kit in accordance with paragraph (F)(5)(c) of this rule and one split sample monthly by a state certified laboratory.
  - (ii) Weekly by a state certified laboratory.
- (c) An iron test kit shall have a minimum detection level of 0.2 milligrams per liter. Furthermore, the deviation of the split sample shall not be greater than 0.2 milligrams per liter. If the deviation is greater, then the public water system shall cease monitoring with the test kit and substitute with weekly monitoring at a state certified laboratory. A public water system may resume monitoring with their test kit once the deviation of a split sample is no greater than 0.2 milligrams per liter. The director may accept an alternate collection frequency and deviation from in-house test kits for split sampling requirements.

(6) Manganese.

A community public water system that provides treatment to reduce manganese shall monitor for manganese at least at each entry point to the distribution system.

- (a) Community systems serving up to and including two hundred and fifty persons shall monitor either of the following:
  - (i) Weekly with an in-house test kit in accordance with paragraph (F)(6)(c) of this rule and one split sample monthly by a certified laboratory.
  - (ii) Weekly by a state certified laboratory.
- (b) Community systems serving greater than two hundred fifty persons shall monitor either of the following:
  - (i) A minimum of five days per week with an in-house test kit in accordance with

paragraph (F)(6)(c) of this rule and one split sample monthly by a certified laboratory.

(ii) Weekly by a state certified laboratory.

- (c) A manganese test kit shall have a minimum detection level of 0.02 milligrams per liter. Furthermore, the deviation of the split sample shall be no greater than 0.04 milligrams per liter. If it is greater, then the public water system shall cease monitoring with the test kit and substitute with weekly monitoring at a state certified laboratory. A public water system may resume monitoring with their test kit once a deviation of the split sample is no greater than 0.04 milligrams per liter. The director may accept an alternate collection frequency and deviation from in-house test kits for split sampling requirements.

(7) Orthophosphate.

- (a) A public water system that adds orthophosphate to the water for the purpose of providing corrosion control treatment for purposes other than compliance with the lead and copper rules shall monitor at least monthly at each entry point to the distribution system.
- (b) A public water system that adds orthophosphate to the water supply for optimization of corrosion control pursuant to the lead and copper requirements of rules 3745-81-82 and 3745-81-87 of the Administrative Code shall monitor for orthophosphate at least once every two weeks at regular intervals at each entry point to the distribution system.

[Comment: In addition to the monitoring requirements above, public water systems exceeding the lead and copper action level that add orthophosphate to the water for the purpose of providing optimal corrosion control treatment pursuant to rules 3745-81-82 and 3745-81-87 of the Administrative Code shall also monitor in accordance with the requirements of those rules.]

(8) pH.

- (a) A public water system that adjusts the pH of the water supply for stabilization shall monitor for pH at least once every day that water is available to the public at each entry point to the distribution system.
- (b) A public water system that employs precipitative softening as defined in rule 3745-7-01 of the Administrative Code or membrane technology to reduce hardness shall monitor for pH at least once every day that water is available to the public at each entry point to the distribution system.
- (c) A public water system that uses a surface water source, in whole or in part, shall also conduct pH monitoring in accordance with rule 3745-81-74 of the Administrative Code.
- (d) A public water system that adjusts the pH of the water for optimization of

corrosion control pursuant to the lead and copper requirements of rules 3745-81-82 and 3745-81-87 of the Administrative Code shall monitor for pH at least once every two weeks at regular intervals at each entry point to the distribution system.

[Comment: In addition to the monitoring requirements above, public water systems exceeding the lead and copper action level that adjust the pH of the water for the purposes of providing optimal corrosion control treatment pursuant to rules 3745-81-82 and 3745-81-87 of the Administrative Code shall also monitor in accordance with the requirements of those rules. A public water system that uses a ground water source and provides 4-log inactivation of viruses shall also conduct disinfection monitoring in accordance with rule 3745-81-43 of the Administrative Code.

(9) Total hardness.

- (a) A community public water system serving up to and including two hundred fifty persons that provides ion exchange treatment to reduce hardness shall monitor for total hardness at least monthly at each entry point to the distribution system.
- (b) A community public water system serving greater than two hundred fifty persons that provide ion exchange treatment to reduce hardness shall monitor for total hardness at least weekly at each entry point to the distribution system.
- (c) A public water system that provides precipitative softening treatment as defined in rule 3745-7-01 of the Administrative Code or that provides membrane technology to reduce hardness shall monitor for total hardness at least daily at each entry point to the distribution system.

(10) Total phosphorus. A public water system that adds phosphate to the water supply for purposes other than corrosion control, shall monitor for total phosphorus at least monthly at each entry point to the distribution system.

(G) The director may require additional monitoring as needed to assess operational performance than is otherwise specified in this rule, including but not limited to operational monitoring required to assess the effectiveness of treatment for contaminants regulated in Chapter 3745-81 of the Administrative Code. The director shall notify the public water system of additional monitoring required under this paragraph in writing or via plan approval issued in accordance with Chapter 3745-91 of the Administrative Code.

(H) Maintenance of facilities and equipment.

- (1) The owner and operator shall ensure that all facilities and equipment necessary for the treatment and distribution of water shall be maintained, at a minimum so as to function as intended.
- (2) In the event that the treatment facilities or equipment no longer function as intended, corrective action (which may include additional maintenance or modifications of the public water system) shall be taken by the owner.

- (3) The owner and operator shall document the completion of the above referenced maintenance in accordance with Chapter 3745-7 of the Administrative Code.

(I) Reports.

- (1) In addition to any other reporting requirement of Chapter 3745-81 of the Administrative Code, the owner or operator of a public water system required to monitor under paragraphs (F) and (G) of this rule shall prepare and submit an operation report for each month of operation on forms acceptable to the director and in accordance with instructions provided by the director. The director may require that the report include the following:
  - (a) General operation data, including but not limited to, identification of the operating source at a given time, number of hours of operation, filter run times, backwash duration, filter backwash recycle percentages, head loss, interruptions in treatment, equipment inspection/maintenance dates, minimum system pressure, pre and intermediate tap sampling results, and deviations from normal day-to-day operations.
  - (b) A summary of samples analyzed, including distribution system sampling and chlorine residual sampling.
  - (c) Information on daily water treatment and system pumpage.
  - (d) Information on chemical application, including but not limited to, chemical feed pump ranges, chemical dosages, chemical feed rates, pre, intermediate or post treatment application changes in chemical type, location, and dosage due to emergencies, and seasonal variations.
  - (e) Analysis of general parameters relating to the quality of the treated drinking water.
  - (f) Source water levels, including but not limited to, low and high levels in flowing in streams, lakes and reservoirs, static and drawdown levels in production and monitoring wells under any conditions including flooding and drought periods.
  - (g) Such other information as may be necessary or desirable for the director to carry out the director's duties under Chapter 6109. of the Revised Code.
- (2) The operation report shall be signed by the operator of record designated in accordance with rule 3745-7-02 of the Administrative Code. If an operator of record is not required by rule 3745-7-02 of the Administrative Code, the operation report shall be signed by an individual designated by the public water system owner.
- (3) The operation report shall be submitted electronically via a method acceptable to the director no later than the tenth of the month following the month for which the report was prepared.

- (4) The owner or operator shall report to the appropriate Ohio environmental protection agency district office as soon as possible, but within twenty-four hours, the discovery of any serious plant or distribution system breakdown or condition causing or likely to cause any of the following:
- (a) Any discharge of water not in accordance with Chapter 6109. of the Revised Code or the rules adopted thereunder.
  - (b) Any major interruption in service or disinfection.
  - (c) Any hazard for employees, consumers, the public or the environment.
- (5) Records of operation reports for each month of operation shall be kept for not less than ten years, except for lead and copper data which shall be kept for not less than twelve years.

[Comment: This rule incorporates the "American Water Works" standards C651-14 and C652-02 by reference. Copies may be obtained from the "AWWA Bookstore, 6666 West Quincy Avenue, Denver, Co, 80235, 1-800-926-7337, [www.awwa.org](http://www.awwa.org)." These standards are available for review at "Ohio EPA, Lazarus Government Center, 50 W. Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: This rule incorporates the ANSI/NSF standards 60 and 61 by reference. Copies may be obtained from "NSF International, 789 Dixboro Road, P.O. Box 130140, Ann Arbor, MI, 48113-0140, (734) 769-8010, [www.nsf.org](http://www.nsf.org)." These standards are available for review at "Ohio EPA, Lazarus Government Center, 50 W. Town Street, Suite 700, Columbus, OH, 43215."]

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10/01/06, 04/19/12



**3745-83-02 Water distribution system disruption of service.****(A) Definitions for this rule.**

For the purpose of this rule, the following terms shall be defined as follows:

- (1) "Affected area" means the portion of a distribution system where the pressure of the system has dropped below twenty pounds per square inch (psig) at ground level.
- (2) "Contamination intrusion" includes, but is not limited to sewage, unintended chemical waste or other waste in the pit or pipe, or muddy water or other unintended material entering the pipe.
- (3) "Positive pressure" means any continuous outflow of water above zero psig at ground level from the pipe on each side of the break.
- (4) "Special purpose total coliform samples" or "special purpose samples," means those samples taken to determine whether disinfection practices are sufficient following a disruption of service event.
- (5) "Type 1" event means a controlled pipe repair where positive pressure is continuously maintained during the repair, and there are no signs of contamination intrusion.
- (6) "Type 2" event means a controlled repair of a distribution system component where positive pressure is maintained until a controlled shutdown of the affected area can be completed, and there are no signs of contamination intrusion.
- (7) "Type 3" event means a disruption of service or water line repair where there is one or more of the following: a loss of positive pressure at the repair site and localized depressurization adjacent to the repair; an uncontrolled shutdown; or there are signs of possible contamination intrusion.
- (8) "Type 4" event means a catastrophic failure with widespread depressurization in the system or actual contamination intrusion.
- (9) "Repair" means any incident that requires the installation of pipe which does not exceed one section of pipe or twenty feet when dealing with fusible pipe material.
- (10) "Replacement" means any incident that requires installation of pipe which exceeds one section of pipe or twenty feet when dealing with fusible pipe material.

**(B)** In the event a public water system is unable to maintain a minimum pressure of twenty psig at ground level at all points in the distribution system the incident shall be deemed a disruption of service. Non-transient non-community systems with a population less than one thousand people and all transient non-community systems shall immediately provide bottled water or an equivalent remedy as determined by the director or authorized representative until such time as pressure is returned and E. coli samples are negative. Non-transient non-community systems serving a population of at least one thousand people and all community water systems shall comply with the following:

**(1) Monitoring.**

During a water line repair or other incident, pressure upstream and downstream of the area shall be monitored and recorded to determine if a disruption of service has occurred and the extent of the affected area. Methods of monitoring can be in-line pressure monitors, hydrant pressure recorders, storage tank or tower water level, or any other method approved by the director. Public water systems which maintain functioning and accurate hydraulic models may utilize these models to identify affected

area from a line break in lieu of using pressure gauges, storage tank water levels, or pump station records. Public water systems that use a hydraulic model for a particular event shall ensure personnel knowledgeable in running the model are available during all times of the particular event to ensure timely use of the models. In the event a water system chooses not to monitor pressure in accordance with this rule, the system shall treat the event as a Type 3 event and follow the response requirements in paragraph (B)(4) of this rule.

- (2) Type 1 event response. During this type of event, a boil advisory, sampling for total coliform and notification to the Ohio EPA are not required if the following criteria are met:
- (a) The pit is excavated to below the area to be repaired.
  - (b) The water level in the pit is maintained below the area to be repaired.
  - (c) The line is disinfected in accordance with American water works association (AWWA) standard C651-14, section 4.11.3.1.
  - (d) The line is repaired under positive pressure.
  - (e) After completion of repair, test or verify disinfectant presence by either conducting a chlorine residual analysis or comparing a 0.5 milligrams per liter (mg/L) free chlorine standard to an appropriately sized sample with free chlorine reagent added.
  - (f) The public water system shall document activities and events during the repair on a form approved by the director to demonstrate the public water system followed the Type 1 event response as established in this rule.
  - (g) If the public water system does not complete the Type 1 event response in accordance with this rule, the incident is elevated to a Type 2 event and the public water system shall comply with the requirements of paragraph (B)(3) of this rule.
- (3) Type 2 event response. During this type of event, a boil advisory, sampling for total coliform and notification to the Ohio EPA are not required if the following criteria are met:
- (a) The pit is excavated to below the area to be repaired.
  - (b) The water level in the pit is maintained below the area to be repaired.
  - (c) Critical users, as established in the contingency plan in accordance with rule 3745-85-01 of the Administrative Code, within the affected area shall be notified, if applicable, in accordance with the system's contingency plan as soon as possible, but within twenty-four hours. Efforts should be made to notify critical users in advance of beginning the repair.  
  
If the public water system does not have a contingency plan, the system shall notify customers who have a critical need of water as soon as possible, but within twenty-four hours.
  - (d) A controlled shutdown of the affected area is performed.
  - (e) The line is disinfected in accordance with AWWA standard C651-14 section 4.11.3.2.
  - (f) In affected areas that are known or are likely to contain lead service lines, public water systems shall follow the applicable notification requirements of paragraph (B)(6) of this rule.

- (g) The water line is repaired.
  - (h) The water line flushed in accordance with AWWA standard C651-14 section 4.11.3.2.
  - (i) After repair, test or verify disinfectant presence by either conducting a chlorine residual analysis or comparing a 0.5 mg/L free chlorine standard to an appropriately sized sample with free chlorine reagent added.
  - (j) The public water system shall document activities and events on a form approved by the director during the repair to demonstrate that the public water system followed the Type 2 event response as established in this rule.
  - (k) If the public water system does not complete the Type 2 event response in accordance with this rule, the incident is elevated to a Type 3 event and the system shall comply with the requirements of paragraph (B)(4) of this rule.
- (4) Type 3 event response. A public water system shall comply with the following:
- (a) Activate the notification procedures in the public water system's contingency plan.
  - (b) If the disruption affects greater than ten per cent of a public water system's customers or greater than one hundred service connections, whichever is least, the public water system shall notify the appropriate Ohio EPA district representative or the Ohio EPA's environmental response hotline in accordance with rule 3745-85-01 of the Administrative Code as soon as possible, but within twenty-four hours. During this type of response, the public water system shall ensure that they speak with a person. The use of email or voicemail will not satisfy this notification requirement.
  - (c) Document possible contamination.
  - (d) Issue a precautionary boil advisory or water use advisory to all potentially affected consumers as soon as possible but no later than twenty-four hours after the event.
  - (e) In affected areas that are known or are likely to contain lead service lines, public water systems shall follow the applicable notification requirements of paragraph (B)(6) of this rule.
  - (f) Disinfect, repair, and flush in accordance with AWWA standard C651-14 section 4.11.3.3.
  - (g) Test for chlorine residual and comply with the minimum chlorine residual established in paragraph (C)(1) of rule 3745-83-01 of the Administrative Code and the maximum residual disinfectant level (MRDL) established in paragraph (C) of rule 3745-81-10 of the Administrative Code.
  - (h) After repairs are made, pressure has been restored to twenty psig or above and the chlorine residual is within acceptable limits, the public water system shall collect special purpose total coliform samples at locations representative of the affected area in accordance with table 1 of this rule.
    - (i) If any special purpose sample is total coliform positive, consult with Ohio EPA and continue sampling until total coliform is not detected in representative samples.
    - (ii) If no special purpose samples are positive for E. coli, the boil advisory may be lifted.
    - (iii) If any special purpose sample is positive for E. coli, the event is to be considered an acute risk to human health and the boil advisory shall remain in effect until the public water system meets the requirements for removing the boil advisory established in rule 3745-81-32 of the

Administrative Code.

- (iv) A public water system shall consult with Ohio EPA to withdraw a water use advisory.
  - (i) During the event, document activities and events on a form approved by the director, to demonstrate the Type 3 event response was followed. The form shall be submitted to the district office in which the system is located within forty-eight hours or next business day, whichever is later, of the disruption of service being corrected.
  - (j) If the Type 3 event is no longer localized to the area adjacent to the repair, the incident is elevated to a Type 4 event and the public water system shall comply with the requirements of paragraph (B)(5) of this rule.
- (5) Type 4 event response. A public water system shall comply with the following criteria during this type of event:
- (a) Activate the notification process in the public water system's contingency plan.
  - (b) If the disruption affects greater than ten per cent of a public water system's customers or greater than one hundred service connections, whichever is least, the public water system shall notify the appropriate Ohio EPA district representative or the Ohio EPA's environmental response hotline in accordance with rule 3745-85-01 of the Administrative Code as soon as possible, but within twenty-four hours. During this type of response, the public water system shall ensure that they speak with a person. The use of email or voicemail will not satisfy this notification requirement.
  - (c) Document actual contamination.
  - (d) After consultation with Ohio EPA, issue a boil advisory or water use advisory to all customers in the affected area as soon as possible but no later than twenty-four hours after the disruption of service.
  - (e) In affected areas that are known or are likely to contain lead service lines, public water systems shall follow the applicable notification requirements of paragraph (B)(6) of this rule.
  - (f) Disinfect, repair, and flush in accordance with AWWA standard C651-14 section 4.11.3.3.
  - (g) Test for chlorine residual and comply with the minimum chlorine residual established in paragraph (C)(1) of rule 3745-83-01 of the Administrative Code and the MRDL established in paragraph (C) of rule 3745-81-10 of the Administrative Code.
  - (h) After repairs are made, pressure has been restored to twenty psig or above, and the chlorine residual is within acceptable limits, the public water system shall collect special purpose total coliform samples at locations representative of the affected area, in accordance with table 1 of this rule.
    - (i) If any special purpose samples are total coliform positive, consult with Ohio EPA and continue sampling until total coliform is not detected in representative samples.
    - (ii) If no special purpose samples are positive for E. coli, the boil advisory may be lifted.
    - (iii) If any special purpose sample is positive for E. coli, the event is to be considered an acute risk to human health and the boil advisory shall remain in effect until the public water system meets the requirements for removing the boil advisory established in rule 3745-81-32 of the Administrative Code.

- (iv) A public water system shall consult with Ohio EPA to withdraw a water use advisory.
- (i) During the event, document activities and events on a form approved by the director, to demonstrate the Type 4 event response was followed. The form shall be submitted to the district office in which the system is located within forty-eight hours or next business day, whichever is later, of the disruption of service being corrected.

Table 1

Service Connections Affected	Minimum Number of Total Coliform Samples Required
0 - 15	1
16 - 1,000	2
1,001 - 2,000	4
2,001 - 3,000	6
3,001 - 4,000	8
4,001 - 5,000	10
5,001 - 6,000	12
6,001 - 7,000	14
7,001 - 8,000	16
8,001 - 9,000	18
9,001 - 10,000 *	20

\*After ten thousand service connections, an additional two samples shall be added for every one thousand service connections up to the maximum one hundred samples. Public water systems that have multiple treatment plants may use a proportional sampling method if established in the contingency plan or in the initial distribution system evaluation.

- (6) In affected areas that are known or likely to contain lead service lines, that experience a disruption of service event, public water systems shall provide public notification as follows:
  - (a) In areas where repairs are conducted in Type 2, 3 and 4 events, the public water system shall provide a notice acceptable to the director.
  - (b) In areas where replacement is conducted, the public water system shall comply with provisions contained in rule 3745-81-84 of the Administrative Code.

[Comment: "AWWA Standard C651-14, Disinfecting Water Mains," effective date Feb. 1, 2015. This rule incorporates this standard or specification by reference. A copy may be obtained from "AWWA Bookstore 6666 W. Quincy Avenue, Denver, CO 80235," (303) 794-7711, [www.awwa.org](http://www.awwa.org). This standard is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215."]

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Rule Amplifies: 6109.04

### **3745-84-01 Definitions.**

Except as otherwise noted, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter.

- (A) "License to Operate" means the public water system license or license renewal required by section 6109.21 of the Revised Code and in accordance with this chapter.
- (B) "Number of wells supplying system" means those wells that are physically connected to the plumbing system serving the public water system.
- (C) "Population served" means the total number of individuals having access to the water supply during a twenty-four hour period averaged over at least sixty days during any calendar year.
- (D) "Service connection" means the number of active or inactive pipes, goosenecks, pigtails, and any other fittings connecting a water main to any building outlet.

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Rule Amplifies: 6109.21

Prior Effective Dates: 12/01/93, 01/01/99, 04/21/01, 08/03/04, 04/01/09, 03/17/2014

**3745-84-02    Application for a license to operate or maintain a public water system.**

- (A) Except as provided in section 6109.21 of the Revised Code, no person shall operate or maintain a public water system in the state of Ohio without a public water system license to operate issued by the director.
- (B) Any person proposing to operate or maintain a new public water system shall submit a pre-application, an application and the appropriate fee, as set forth in rule 3745-84-05 of the Administrative Code.
- (C) The pre-application for an initial public water system license to operate shall be on a form provided by the director, and the following information shall be provided or verified by the applicant within forty-five days of receipt of the form:
  - (1) Public water system identification number.
  - (2) Name, address and telephone number of the public water system.
  - (3) Name, address and telephone number of legal owner.
  - (4) Name, address and telephone number of lessee.
  - (5) Name, address and telephone number of financial contact.
  - (6) Name, address and telephone number of operator of record.
  - (7) Population served.
  - (8) Number of service connections.
  - (9) Source of water, including purchased and hauled water source.
  - (10) Number of wells supplying the public water system.
  - (11) Additional data which may be required by the director.
- (D) A completed application for an initial public water system license to operate along with the appropriate fee shall be submitted to the director not less than thirty days prior to operation of the public water system.
- (E) Within thirty days of receipt of both a completed application for a public water system license to operate under this rule and the applicable fee, the director shall act on the application by doing one of the following:
  - (1) Issuing the license to operate.
  - (2) Issuing the license to operate subject to terms and conditions in accordance with rule 3745-84-06 of the Administrative Code.
  - (3) Denying the license to operate in accordance with rule 3745-84-06 of the



Administrative Code.

- (F) Submission of a completed application and issuance of a license to operate shall allow the director or an authorized representative of Ohio EPA, upon the presentation of credentials and other documents as may be required by law, to do the following:
- (1) Enter upon the premises where a regulated facility or activity is located or conducted or where records must be kept to comply with drinking water requirements under Chapter 6109. of the Revised Code and the rules adopted thereunder.
  - (2) Access and copy at reasonable times, any records that must be kept to comply with drinking water requirements under Chapter 6109. of the Revised Code and the rules adopted thereunder.
  - (3) Inspect at reasonable times any facilities or equipment.

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**3745-84-03    Expiration and renewal of license to operate or maintain a public water system.**

- (A) A public water system license to operate, issued pursuant to section 6109.21 of the Revised Code and in accordance with this chapter, shall expire on the thirtieth day of January in the year following of its issuance.
- (B) A person holding a public water system license to operate issued by the director under section 6109.21 of the Revised Code, who is proposing to continue operating the public water system, shall submit a pre-application, an application and the appropriate fee, as set forth in rule 3745-84-05 of the Administrative Code.
- (C) The pre-application for a public water system license to operate shall be on a form provided by the director, and the information required in paragraph (C) of rule 3745-84-02 of the Administrative Code reflecting the current conditions of the public water system shall be provided or verified by the applicant within forty-five days of receipt of the form.
- (D) A completed application for a public water system license to operate along with the appropriate fee shall be submitted to the director not less than thirty days prior to the expiration date of the license to operate.
- (E) Except as otherwise noted in paragraph (F) of section 6109.21 of the Revised Code, within thirty days of receipt of a completed application for a public water system license to operate under this rule and the applicable fee, both submitted timely, the director shall act on the application by doing one of the following:
  - (1) Issuing the license to operate.
  - (2) Issuing the license to operate subject to terms and conditions in accordance with rule 3745-84-06 of the Administrative Code.
  - (3) Denying the license to operate in accordance with rule 3745-84-06 of the Administrative Code.
- (F) The director shall not act on an application submitted by any public water system with a license to operate under a period of denial, suspension or revocation.
- (G) Submission of a completed application and issuance of a license to operate shall allow the director or an authorized representative of Ohio EPA, upon the presentation of credentials and other documents as may be required by law, to do the following:
  - (1) Enter upon the premises where a regulated facility or activity is located or conducted or where records must be kept to comply with drinking water requirements under Chapter 6109. of the Revised Code and the rules adopted thereunder.
  - (2) Access and copy at reasonable times, any records that must be kept to comply

with drinking water requirements under Chapter 6109. of the Revised Code and the rules adopted thereunder.

(3) Inspect at reasonable times any facilities or equipment.

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**3745-84-04     Format and display of license to operate or maintain a public water system.**

- (A) A public water system license to operate issued by the director pursuant to this chapter is the property of the state of Ohio.
- (B) A public water system shall return a revoked or suspended license to operate to the director by certified mail within seven days of the effective date of revocation or suspension.
- (C) A color-coded license to operate or sign shall be issued by the director representing the status of the license to operate, as follows:
  - (1) A green license to operate shall be issued to a public water system licensed without conditions.
  - (2) A yellow license to operate shall be issued to a public water system licensed with conditions.
  - (3) A red sign shall be issued to a public water system not licensed due to denial, suspension or revocation of the license to operate.
- (D) The color-coded license to operate or red sign shall be prominently displayed by the public water system.
  - (1) Community public water systems shall display the license to operate or red sign at the office of the public water system and notify its customers of the status of its license to operate in the consumer confidence report (CCR) in accordance with Chapter 3745-96 of the Administrative Code. Additionally, community public water systems with a denied, suspended or revoked license to operate shall notify its customers of the status of its license to operate by issuing a tier 1 public notice in accordance with rule 3745-81-32 of the Administrative Code.
  - (2) Noncommunity public water systems shall display the license to operate or red sign so as to be clearly visible to the general public and to any person entering the facility.

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**3745-84-05 Fees for operating or maintaining a public water system.**

- (A) Pursuant to section 3745.11 of the Revised Code, a person applying for a public water system license to operate or maintain a public water system under section 6109.21 of the Revised Code and this chapter shall pay the appropriate fee according to the schedule set forth in division (M) of section 3745.11 of the Revised Code at the time of submission of the application to the director.
- (B) Failure to submit the application by the due date or failure to pay the appropriate fee required by division (M) of section 3745.11 of the Revised Code at the time of submission of application for a public water system license to operate, as set forth in paragraph (D) of rules 3745-84-03 and 3745-84-02 of the Administrative Code, shall require payment of an additional amount equal to ten per cent of the appropriate fee.
- (C) Failure to pay the appropriate fee required by division (M) of section 3745.11 of the Revised Code shall render an application for a public water system license to operate incomplete. The director shall not act on an incomplete application for a public water system license to operate.
- (D) Payment of fees required by division (M) of section 3745.11 of the Revised Code shall be made by tendering payment, in a form acceptable to the director, to the treasurer of the state of Ohio. The director shall transmit all fees collected under this rule to the treasurer of the state for deposit into the drinking water protection fund created in section 6109.30 of the Revised Code.
- (E) For public water systems that are community water systems as defined in rule 3745-81-01 of the Administrative Code, the fees for a license to operate, required under this chapter, shall be as set forth in division (M)(1) of section 3745.11 of the Revised Code. The public water system may determine its means for obtaining fees, including the assessment of additional user fees which may be assessed on a volumetric basis.
- (F) For public water systems that are nontransient noncommunity water systems as defined in rule 3745-81-01 of the Administrative Code, the fees for a license to operate, required by this chapter, shall be as set forth in division (M)(2) of section 3745.11 of the Revised Code.
- (G) For public water systems that are transient noncommunity water systems as defined in rule 3745-81-01 of the Administrative Code, the fees for a license to operate, required by this chapter, shall be as set forth in division (M)(3) of section 3745.11 of the Revised Code.
- (H) A public water system designated as using a surface water source shall pay a fee of seven hundred ninety-two dollars or the amount calculated under division (M)(1) or (M)(2) of section 3745.11 of the Revised Code, whichever is greater.
- (I) For a public water system to operate for any portion of a license year, the entire fee required by division (M) of section 3745.11 of the Revised Code shall be paid,

except as provided for new systems under division (M)(5) of section 3745.11 of the Revised Code.

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**3745-84-06    Conditioning, denial, suspension and revocation of a license to operate or maintain a public water system.**

- (A) In accordance with divisions (F) and (G) of section 6109.21 of the Revised Code, the director may condition, deny, suspend or revoke a license to operate or maintain a public water system issued under this chapter, which may include any other license to operate a public water system issued to such person by the director, for violations of Chapter 6109. of the Revised Code and the administrative rules adopted thereunder. In conditioning, denying, suspending, or revoking a license to operate, the director shall act in accordance with the provisions of Chapters 119., 3745., and 6109. of the Revised Code.
- (1) The director may condition a license to operate at any time to require correction of violations of Chapter 6109. of the Revised Code and the administrative rules adopted thereunder.
  - (2) The director may deny a license to operate if public health is subject to immediate threat, the public water system has violated an order of the director or a condition of a license, or the public water system has failed to fulfill the requirements of a reinstatement of a suspended license.
  - (3) The director may at any time suspend or revoke a license to operate if the public water system has violated an order of the director or failed to meet the requirements of a conditioned license.
  - (4) The director may suspend or revoke a license to operate, immediately, without prior orders or conditioning of a license if the public water system's violations threaten the public health through the threat of imminent or confirmed contamination, the operation of the public water system has degraded to create an imminent health threat, or violations that pose an acute risk to human health remain unaddressed.
- (B) Suspension of a license to operate shall be for a time period specified by the director, but no less than six months and no more than one year, depending on the severity of the violations or the amount of corrective action necessary to bring the system into compliance. Before the license to operate may be reinstated or renewed, the public water system shall submit a written certification indicating that the violations upon which the license to operate was suspended have been corrected and the terms and conditions of the suspension have been satisfied. If reinstatement is for a subsequent year, an application and appropriate fee shall be submitted in accordance with rule 3745-84-03 of the Administrative Code. Failure to correct the violations upon which the suspension was based will prohibit reinstatement of the license to operate. If the public water system fails to fulfill the requirements of the suspension, the director may deny the license to operate application or may revoke the license to operate.
- (C) Revocation or denial of a license to operate shall be for a time period specified by the director, but no less than one year and no more than five years. A public water

system which has had a license to operate revoked or denied may, after the period of revocation or denial has expired, submit an application for renewal of the license to operate and the appropriate fee in accordance with rule 3745-84-03 of the Administrative Code. The application for renewal shall include a written certification indicating that the violations upon which the license to operate was denied or revoked have been corrected and the terms and conditions of the denial or revocation have been satisfied.

- (D) Failure to apply for a license to operate does not limit the director's ability to administer and enforce Chapter 6109. of the Revised Code and rules adopted thereunder.
- (E) In conditioning, suspending or revoking a license to operate, the director may assess a penalty for past violations in accordance with the administrative penalty authority of section 6109.23 of the Revised Code and rule 3745-81-04 of the Administrative Code.
- (F) No person shall receive a refund when the director acts on a license to operate under this rule.
- (G) No person shall operate a public water system with an expired, denied or revoked license to operate. A public water system with an expired, denied or revoked license to operate is prohibited from producing water for human consumption as defined in rule 3745-81-01 of the Administrative Code. A public water system with a suspended license to operate may only operate as authorized by the director.

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**3745-85-01      Contingency plans.**

- (A) Except as otherwise noted, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter.
- (B) Each community water system and wholesale system shall prepare and maintain a written contingency plan. When routine methods of delivery or treatment are compromised, the contingency plan shall provide for the protection of public health to the extent possible, through actions including but not limited to the notification of users, including the direct notification of critical users, the provision of alternate sources of water and the restoration of service.
- (C) Location of copies of contingency plan.
  - (1) One copy of the contingency plan shall be kept at an accessible, secure location at the water treatment plant and be available to the operator of record or any designated staff. If there is no plant, the operator of record shall keep a copy of the plan in an accessible, secure location. This copy of the contingency plan shall be available onsite for twenty-four hour inspection by representatives of the director or emergency response personnel.
  - (2) One copy shall be kept in the public water system administrator's office, if applicable.
  - (3) Public water systems serving a population of more than two hundred fifty shall also supply a copy of the plan to the county emergency management agency (EMA).
  - (4) Within five days of a request by the Ohio EPA, a copy of the contingency plan shall be submitted in a format acceptable to Ohio EPA.

(D) Contents of contingency plan.

The contingency plan shall contain the following:

- (1) A map of the distribution system, detailed locations for each valve in the system, including references that will aid in location of valves, and a map of the well field, surface water intakes and emergency connections as applicable.
- (2) A statement of amounts budgeted for emergency use, along with a statement showing who can authorize these expenditures and under what conditions the authorization and expenditure can occur. A public water system shall ensure that they have funds available and immediately accessible for emergency use.
- (3) A determination of the most likely circumstances that will affect the public water system and a description of the procedures to be followed and actions necessary to maintain or restore service to customers. The procedures shall address response and recovery activities such as sampling plans, treatment options and notifications to the public and

government agencies. Public water systems shall ensure protocols are specified in their contingency plan to identify appropriate and accessible sampling points or to describe how a sampling point may be selected in a particular situation. The director may require the public water system to include additional circumstances when the director determines that there is a threat to human health.

- (4) At a minimum, all public water systems shall address the following circumstances:
  - (a) Short term power failure (time of interruption is less than two hours).
  - (b) Extended power failure (two or more hours).
  - (c) Pump or motor failure.
  - (d) Loss of water from a well or other water source.
  - (e) Line breaks that affect the routine delivery or treatment of water.
  - (f) Natural disaster (e.g. tornado, flood and drought).
  - (g) Unplanned absence of operator.
  - (h) Contamination of source water including, but not limited to, releases of oil and hazardous substances.
  - (i) Exceedances of a maximum contaminant level (MCL) or an action level (ALE).
  - (j) Violation of a treatment technique.
- (5) Public water systems that use automation to monitor or control the systems shall include plans to manually operate the public water system in the event of loss of automation. A portion of these plans shall be exercised monthly in such a way as to not jeopardize the system, and to the extent possible, different sections of the plan should be exercised each month. Documentation of the exercises shall be included in the public water system's operation and maintenance records.
- (6) Public water systems that have auxiliary power shall include plans to operate the public water system on auxiliary power in the event of a loss of power. A portion of these plans shall be exercised monthly in such a way as to not jeopardize the system, and to the extent possible, different sections of the plan should be exercised each month. Documentation of the exercises shall be included in the public water system's operation and maintenance records.
- (7) A description of the process that the public water system will use to provide water from an alternate source. The description shall include the following:
  - (a) The process that will be used to obtain and transport water from the alternate source.

- (b) Three or more possible alternate sources of water.
- (c) A description of the source, which may include an interconnection to another public water system and the method of disinfection that will be used for each source.

Sources selected shall independently or as a whole supply water of sufficient quality and quantity to support the drinking water needs (a minimum of one gallon per person per day) for all of the public water system's customers in the event of an emergency.

- (8) A description of a process for the provision of water to support the drinking water needs (a minimum of one gallon per person per day) of affected persons within twenty-four hours of an incident where the public water system is not capable of providing water through its distribution system.
- (9) A list of water users having critical needs for a continuous supply of water (e.g., hospitals, dialysis centers and nursing homes). This list shall include contact information that ensures a representative can be contacted at any time of the day.
- (10) A description of the process used to determine the list of critical users.
- (11) A list of consecutive systems which includes contact information that ensures a representative can be contacted at any time of the day.
- (12) Public water systems shall identify the method and timing of notification of water users, Ohio EPA, local health departments and local EMAs for each circumstance identified in paragraphs (D)(3) and (D)(4) of this rule, as applicable. The notification shall communicate that an emergency affecting the ability of the public water system to provide potable water exists.
- (13) In the event that notifications are made in accordance with paragraph (D)(12) of this rule, the public water system shall maintain records documenting the time and method of notification.
- (14) If depressurization due to physical disruptions (e.g., line breaks, valve repairs, new construction, etc.) or operational disruptions (e.g., pump failure, power outages, telemetry failure, extreme fire flows, etc.) has occurred, the procedure that will be used to return the public water system to normal service.
- (15) Twenty-four hour telephone numbers for the following:
  - (a) Ohio EPA, division of drinking and ground waters (DDAGW) and Ohio EPA environmental response hotline.
  - (b) Police.
  - (c) Fire.

- (d) The county EMA director.
- (e) All water supply personnel.
- (f) Administrative personnel.
- (g) Contractors for line breaks, "first call" and "second call".
- (h) Electric power supplier.
- (i) Electricians, "first call" and "second call".
- (j) Well drilling and pump service contractors, "first call" and "second call".
- (k) Plant mechanical contractors, "first call" and "second call".
- (l) All suppliers of equipment and chemicals normally used, "first call" and "second call".
- (m) Hospital, emergency squad and medical assistance.
- (n) Laboratories certified by Ohio EPA.
- (o) Local health districts.
- (p) Individuals who are able to authorize expenditures under the contingency plan.

(E) Exercise contingency plan.

- (1) At least annually, public water systems shall exercise the responses to one or more of the circumstances identified in the plan. The exercise may be discussion-based, tabletop or live. Exercises do not need to be conducted outside of normal business operations. Each circumstance identified by the plan shall be included in an exercise at least once every five years. An exercise may include more than one of the circumstances identified by the plan.
- (2) Community public water systems shall consult with the county EMA regarding participation in a hazardous spill exercise.
- (3) Documentation of exercise participation shall be maintained at the public water system and made available upon request. Documentation shall include information regarding the topic of the exercise, outcomes of the exercise and a discussion of items that went well and improvements that are needed.

(F) Revision to contingency plan.

- (1) The contingency plan required by this chapter of the Administrative Code shall be reviewed and updated as necessary, but at least annually.

- (2) The contact information listed in paragraphs (D)(9), (D)(11) and (D)(15) of this rule shall be confirmed during the annual review of the contingency plan and updated when necessary.
  - (3) Copies of the revised pages of the plan shall be promptly distributed to holders of the plan, as described in paragraph (C) of this rule.
  - (4) In the event the plan is deemed inadequate or incomplete by Ohio EPA, the public water system shall revise the plan in accordance with a schedule acceptable to the director.
- (G) If a circumstance triggers the activation of the contingency plan, public water systems shall do the following:
- (1) Follow the contingency plan to the extent the circumstances allow.
  - (2) Notify Ohio EPA immediately, but no later than twenty-four hours from the beginning of the situation requiring activation of the contingency plan.
  - (3) Develop and maintain a written after-action report that includes an assessment of the plan's effectiveness and any changes that have been or should be made to the plan as a result of the assessment. In the event of frequently occurring incidents, this report may be as simple as a short statement indicating that the plan was used, was effective and no changes are necessary at this time.
- (H) Contingency plans submitted in accordance with paragraphs (A) and (B) of this rule are not public records in accordance with section 149.433 of the Revised Code.
- (I) Beginning with the first license to operate inventory form after the effective date of this rule and on an annual basis thereafter, each public water system shall supply, on a form approved by the director, emergency contact information for the public water system that will ensure a response from a public water system representative within thirty minutes. In the event that emergency contact information changes, the owner, operator and operator of record of the facility shall be individually and jointly responsible for notifying Ohio EPA of the changes within three days of the change.

Effective: 12/23/2016

Five Year Review (FYR) Dates: 09/19/2016 and 12/23/2021

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.01, 6109.03, 6109.04  
Prior Effective Dates: 11/26/80, 04/21/01

**3745-86-01 Emergency loans.**

- (A) Except as otherwise noted, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter.
  - (1) "Fund" means the drinking water protection fund created by section 6109.30 of the Revised Code.
  - (2) "Fiscal year" means the state of Ohio fiscal year which commences on July first.
  - (3) "Owner or operator of a public water system" means the person to which a license to operate a public water system has been issued pursuant to Chapter 3745-84 of the Administrative Code.
  - (4) "Threat of contamination" means anything that prevents a public water system from supplying adequate quantities of safe, potable water to its existing water users.
- (B) Application for loans for emergency remediation of threats of contamination to public water systems.
  - (1) The owner or operator of a public water system whose license to operate a public water system has not expired nor been suspended or revoked may apply to the director for an emergency loan from the fund for the purpose of remediating a threat of contamination to that system.
  - (2) Application for an emergency loan shall be made on a form provided by the director and shall contain all information the director deems necessary.
  - (3) All emergency loan applications shall be signed as follows.
    - (a) Corporations: loan applications shall be signed by a principal executive officer of at least the level of vice president.
    - (b) Partnerships: loan applications shall be signed by a general partner.
    - (c) Sole proprietorships: loan applications shall be signed by the proprietor.
    - (d) Municipal, state, federal, or other public agencies: loan applications shall be signed by a principal executive or other ranking elected official.

- (4) Signatures on emergency loan applications shall be notarized.
  - (5) Incomplete emergency loan applications shall be returned and no further action shall be taken by the director.
- (C) Terms of emergency loans from the fund.
  - (1) The director shall not loan more than twenty-five thousand dollars to the owner or operator of any single public water system from the fund.
  - (2) The owner or operator of a public water system that receives an emergency loan from the fund shall repay that loan not later than twelve months after the receipt of the loan. Repayment shall be made by tendering a certified check in the amount of the loan drawn to the treasurer of the state of Ohio and submitted to the fiscal administrator, Ohio environmental protection agency.
  - (3) The director shall not accept or consider any application for an emergency loan from the fund in any fiscal year in which two hundred thousand dollars in emergency loans have already been granted.
  - (4) The director's decisions regarding applications for emergency loans from the fund shall be final actions of the director.



3745-86-01

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Replaces: Part of 3745-86-01, part of 3745-86-02, former 3745-86-03

Effective Date: April 21, 2001

Five Year Review (FYR) Dates: 02/26/2016 and 02/26/2021

Promulgated Under:	119.03
Statutory Authority:	6109.04
Rule Amplifies:	6109.30
Prior Effective Dates:	1/20/95

3745-87-01

**Asset management definitions.**

Except as otherwise noted, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter.

**(A)**

- (1) "Asset" means a component of a facility with an independent physical and functional identity and age as defined by the water system. This includes items of substantial value and critical to the delivery of potable water.
- (2) "Asset management program" means the development of a program that demonstrates the managerial, technical, and financial capability of a public water system, by the implementation of the tracking documents, programs or systems that will assist with the management and replacement of infrastructure assets to achieve metrics at the least cost and risk to the water system.

**(B) [Reserved.]****(C)**

- (1) "Capability screening" means an evaluation of the technical, managerial, and financial capability of a public water system.
- (2) "Capital improvement plan" or "CIP" means a financial plan based on a three to five-year planning period for all individual capital improvement projects.
- (3) "Capital improvement project" means a unique construction project that aims to install, repair, rehabilitate, replace, or expand existing infrastructure, not including regularly incurred operation and maintenance costs.
- (4) "Critical infrastructure" means assets, systems and networks, whether physical or virtual, that are vital for a public water system to operate, or whose inoperability would have a debilitating effect on the ability of the water system to operate as intended or would create a public health risk.
- (5) "Criticality" means an asset prioritization measure used to determine assets on which to focus, based on potential consequences of failure, and is used to determine higher priority assets for risk management activity.

**(D) [Reserved.]****(E) [Reserved.]****(F) [Reserved.]**

(G) [Reserved.]

(H) [Reserved.]

(I) [Reserved.]

(J) [Reserved.]

(K) [Reserved.]

(L) [Reserved.]

(M) "Metric" means a qualitative or quantitative measure of actual performance against a standard or other target.

(N)

(1) "Non-publicly owned" means public water systems not owned by a governmental entity.

(2) "Non-revenue water" means the distributed volume of water that is not reflected in customer billings.

(O) "Operating ratio" means a ratio comparing the system's operating expenses divided by its operating revenue (or net sales).

(P)

(1) "Pro-forma" means projected or estimated financial statement that attempts to present a reasonably accurate idea of what a water system's financial situation would be if the present trends continue or certain assumptions hold true.

(2) "Publicly owned" means public water systems owned by a governmental entity.

(Q) [Reserved.]

(R) "Reserve funds" means funds used for addressing expense situations of a capital nature that were not expected nor anticipated.

(S) "Succession planning" means the process for identifying and developing new or current personnel who can replace personnel when vacancies occur

(T) [Reserved.]

(U) "Useful life" means the average amount of time in years, that a new system component is estimated to function when installed.

(V) "Vertical asset" means an asset within a building or facility often comprised of multiple components, also known as an above-ground asset. In the context of the water industry, this typically refers to assets within pump stations, treatment plants, and may include other facilities, such as storage facilities.

(W) [Reserved.]

Replaces:	3745-87-01
Effective:	11/8/2018
Five Year Review (FYR) Dates:	11/08/2023

CERTIFIED ELECTRONICALLY

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Certification

10/29/2018

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Date

Promulgated Under:	119.03
Statutory Authority:	6109.04
Rule Amplifies:	6109.24
Prior Effective Dates:	10/01/1999

3745-87-02**Applicability and general requirements.**

In order to ensure the long-term viability of public water systems, all public water systems shall demonstrate the managerial, technical, and financial capability of the public water system to comply with this chapter and rules adopted thereunder. Demonstration of capability shall be made through a written description of an asset management program that is acceptable to the director.

(A) A public water system shall submit a written description of the public water system's asset management program description and supporting documents in accordance with the following:

(1) New public water systems shall submit an outline describing what the asset management program will entail prior to operation. Thereafter, the public water system shall submit a written description and supporting documents upon request of the director in accordance with rule 3745-87-04 of the Administrative Code and in accordance with any schedule prescribed by the director.

(2) For existing public water systems other than those receiving a loan, the director may require public water systems to make the asset management program available for review based on enforcement proceedings, compliance history including violations and deficiencies identified as part of the sanitary survey or limited scope site visits, or on the results of a capability screening. A written description of the asset management program meeting all of the requirements of this rule, shall be submitted in accordance with a schedule prescribed by the director.

(B) Public water systems applying for a water supply revolving loan account (WSRLA) loan shall demonstrate an acceptable asset management program prior to receiving a WSRLA loan. The asset management program shall address any deficiencies noted in a capability screening.

(C) A written description of an asset management program and all supporting documents provided to the director by a public water system that demonstrates the asset management program shall be treated as an infrastructure and security record and be exempt from the public record provisions of Chapter 149.43 and 149.433 of the Revised Code and is not subject to mandatory release or disclosure under that section.

Replaces:	3745-87-02
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Five Year Review (FYR) Dates:	11/08/2023

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Statutory Authority:	6109.04
Rule Amplifies:	6109.24
Prior Effective Dates:	10/01/1999

3745-87-03

**Contents of an asset management program.**

(A) In order to demonstrate adequate managerial capacity, personnel commitments that are needed to provide for effective management, operation and financials of the public water system shall be proven with documentation. The asset management program shall include, but is not limited to, the following:

- (1) Demonstration of ownership accountability, which includes the legal authority to take the measures necessary for construction, operation, and maintenance of the system, including maintaining staffing skills, resources, and prioritizing continuous improvements of the water system.
- (2) Demonstration that the owner has committed to proper operation and management of the public water system in accordance with Agency 3745. of the Administrative Code, as applicable.
- (3) Demonstration to ensure continued, proper operation of the public water system through succession planning, such as having a continuity plan in place for critical personnel.
- (4) The owner or operator of the public water system shall include at least the following information in the asset management program:
  - (a) A brief, non-technical description of the water system, including major components, source type, number of service connections, and number and type of customers.
  - (b) An operating plan defining the tasks to be performed in managing and operating the public water system, which shall consist of at least the following:
    - (i) A high-level table of organization that identifies critical personnel including the operator, manager and supervisor responsible for operations, maintenance, treatment, and distribution. The table shall include clearly defined job classifications/titles and the individuals within those job classifications/titles. The table shall include differentiation between a property owner and business owner or lessee, if applicable.
    - (ii) If cited with significant deficiencies, the director may require fiscal and managerial training for water systems governing bodies and responsible management, and documentation of governing bodies and employees attending appropriate water system fiscal and management training.



(iii) An operation and maintenance program as described in paragraph (B)(4) of this rule.

(c) Demonstration of the owner's ability to address violations of applicable portions of the Revised Code and the Administrative Code. The demonstration shall include an explanation of how the water system will establish and maintain effective communications and relationships between the water systems management, its customers, professional service providers and any applicable regulatory agencies.

(d) An inventory of external contacts and resources necessary for proper operation of the system, including a description of how the contacts and resources will be effectively utilized.

(e) Description of internal contracting and purchasing procedures to accomplish routine and emergency repairs and replacements.

(f) Supporting documentation on the following, if applicable:

(i) Security.

(ii) Use of system equipment.

(iii) Billing practices and revenue collections.

(iv) Purchasing authority.

(B) In order to demonstrate adequate technical capacity, the asset management program shall include, but is not limited to, the following:

(1) Schematic of water source, treatment, storage and distribution.

(2) Inventory of assets, including the following:

(a) Asset name.

(b) Known purchase or installation date, or estimated age of asset if different.

(c) Status of asset (e.g. in use, available for use, needs repaired, etc.) as identified by the water system.

(d) Locations of assets, including up-to-date maps.

(3) Evaluation of assets, including the following:

- (a) Condition (e.g. excellent, good, fair, poor, needs replacement).
- (b) History of maintenance and repair.
- (c) Estimated remaining useful life based upon condition and performance
- (d) A prioritization of assets based on criticality and condition assessment.

(4) Operation and maintenance programs.

- (a) Standard operating procedures for daily operation of the facility.
- (b) Maintenance schedules or supporting documentation of the maintenance performed for each of the following as applicable:
  - (i) Wells, all raw-water reservoirs and intakes.
  - (ii) Pump stations.
  - (iii) Electrical equipment and controls.
  - (iv) Water treatment facilities.
  - (v) Water storage tanks and/or hydropneumatic tanks.
  - (vi) Distribution system components, including hydrants and valves.
  - (vii) Auxiliary power.
- (c) Demonstration of an adequate maintenance log.

(5) Emergency preparedness and contingency planning program.

- (a) Community public water systems shall prepare a written contingency plan meeting the requirements of Chapter 3745-85 of the Administrative Code.
- (b) Non-community public water systems shall prepare a written contingency plan in accordance with paragraphs (B), (C)(1), (C)(2), (C)(4), (D)(3), (D)(4)(c), (D)(4)(d), (D)(4)(e), (D)(4)(g), (D)(4)(h), (D)(4)(i), (D)(4)(j), (D)(12), (D)(13), (D)(14), (G)(1) and (G)(2) of rule 3745-85-01 of the Administrative Code.

(6) Source water protection.

- (a) The public water system shall review the source water assessment annually and every five years shall evaluate the assessment to determine if revisions are necessary.

If revisions are deemed necessary, the public water system shall request, in writing, a consultation with Ohio EPA on any suggested revisions. If Ohio EPA determines that re-assessment is necessary, the re-assessment shall be conducted by Ohio EPA or under guidance provided by Ohio EPA.

- (b) Community and non-transient non-community public water systems that have an endorsed drinking water source protection plan, shall review the protection plan as stated in the plan and revise the plan as necessary.

- (c) Community and non-transient non-community public water systems that have an endorsed drinking water source protection plan that does not include a review schedule, shall review the protection plan every three years and revise it as necessary.

- (d) Public water systems that have a drinking water source protection checklist that has been submitted and accepted by Ohio EPA, the water system shall review and update the checklist every five years.

- (e) A revised drinking water source protection plan or checklist shall be submitted to Ohio EPA within sixty days of making the revisions.

(7) Approved capacity projections, including.

- (a) Written approved capacities of small public water systems using only ground water (such as factories, mobile home parks, office buildings, restaurants, condominiums, and the like) will be established in accordance with Ohio EPA's "Guidelines for Design of Small Public Water Systems". Written approved capacity projections for all other water systems shall meet the requirements of Ohio EPA's "Planning and Design Criteria for Establishing Approved Capacity for: 1) Surface Water And Ground Water Supply Sources, 2) Drinking Water Treatment Plants (WTPs), and 3) Source/WTP Systems".

- (b) Identification of infrastructure needed to meet written approved capacity projections.

(8) Criteria and timelines for infrastructure rehabilitation and replacement.

- (a) Identification of, and a schedule for needed repair, rehabilitation, replacement and expansion of existing assets and prioritized to address the most critical needs.
- (b) Identification of funds that will be collected or set aside for repair, rehabilitation, replacement or expansion of existing assets.

(9) Capital improvement plan (CIP).

- (a) A CIP shall include annual projections for a three to five-year planning period with detailed expenditures in each of those time frames.
- (b) The projects should be listed by the year in which they are planned and include, at a minimum, the following information:
  - (i) Description of the project.
  - (ii) Need for, and benefits of, the project.
  - (iii) Estimate of project cost, including engineering design and construction.
  - (iv) Funding sources.
- (c) A description and estimated cost of significant projected projects for the next five to twenty years.

(C) In order to demonstrate adequate financial capacity, water systems shall include a long-term funding strategy to support asset management plan implementation, including, but not limited to, the identification of sources and amounts of funds to finance the needed repair, rehabilitation, replacement or expansion of assets, including debt service.

- (1) New publicly owned public water systems shall include a five year pro forma statement of the next five years of operation, which includes the following:
  - (a) An income statement, balance sheet, and statement of cash flow pertaining to the water operating fund.
  - (b) An amortization schedule of all water system debt including terms of all outstanding debt.
  - (c) Capitalization terms of long term debt anticipated to be incurred in the next five years of operation.

- (d) The current water rate ordinance in effect including any planned periodic increases of the rate, as applicable.
  - (e) Documentation of triennial water rate evaluation, as applicable.
  - (f) Documentation of all customers being billed for water usage, as applicable.
  - (g) Any existing information demonstrating bond or credit rating.
- (2) Existing publicly-owned public water systems shall include all of the following:
  - (a) All the items listed in paragraph (C)(1) of this rule.
  - (b) The most recent five years of annual financial reports, as required by section 117.38 of the Revised Code, or substantively equivalent documents which describe the performance of the owner and the water system.
- (3) New non-publicly owned public water systems shall include all of the following:
  - (a) A demonstration of the cost of the water treatment components and the conveyance system including capitalization terms or lump sum debt retirement option if selected.
  - (b) A demonstration of an adequate budget and revenue sources to support the annual operation and maintenance costs of the system for the next five years of operation including the following:
    - (i) Cost of required level certified operator coverage.
    - (ii) Capitalization terms of anticipated long-term debt incurred in the next five years of operation.
- (4) Existing non-publicly owned public water systems shall include all of the following:
  - (a) All the items shown in paragraph (C)(1) of this rule.
  - (b) Type of business organization and historical origination date; including the legal document establishing the corporate structure.
  - (c) The most recent five years of annual financial statement documentation which describe all assets, liabilities, income, expenditures, balances and equity of the water system.

[Comment: "Guidelines for Design of Small Public Water Systems (2015)" can be found at <http://epa.ohio.gov/ddagw/Engineering#176079933-standards-policies-guidance-and-white-papers> and "Planning and Design Criteria for Establishing Approved Capacity for: 1) Surface Water And Ground Water Supply Sources, 2) Drinking Water Treatment Plants (WTPs), and 3) Source/WTP Systems (March 2010)" can be found at <http://epa.ohio.gov/ddagw/Engineering#176079935-approved-capacity> ]

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10/29/2018

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Date

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.24

3745-87-04**Evaluation criteria.**

- (A) The written description of the asset management program and all supporting documents shall be available for inspections by representatives of the director.
- (B) The director may request a public water system to submit a written description of the public water system's asset management program. The public water system shall submit the written description within thirty days of the request.
- (C) If a public water system's written description of the asset management program does not comply with the requirements of this chapter, the director may require the owner or operator to revise and resubmit the written description of the asset management program.
- (D) The director may only grant acceptance of the asset management program at the time of review if the program meets the requirements set forth in this chapter.



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Rule Amplifies: 6109.24

3745-87-05**Long-term implementation.**

- (A) The water system shall annually review and update the asset management program.
- (B) Metrics shall be kept onsite and available for review at the discretion of the director. Metrics shall be reviewed and documented annually by the public water system, unless otherwise required by the director. The following operational metrics will be required for the specified system type:
- (1) Community public water systems.
- (a) Operating ratio.
  - (b) Operating cost to produce water per service connection.
  - (c) Breaks per ten miles of distribution pipe.
  - (d) Non-revenue water (percentage loss).
  - (e) Maintenance tasks per year (planned vs. unplanned) on vertical assets.
  - (f) One additional customer service metric to be tracked shall be determined by the water system.
- (2) Noncommunity public water systems.
- (a) Documentation of instances where system pressure was not maintained in accordance with Chapter 3745-83 of the Administrative Code.
  - (b) Repair, rehabilitation or replacement tasks per year (emergency versus planned).
  - (c) Reserve funds.
  - (d) Number of days unable to serve water.

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Rule Amplifies: 6109.24

**Definitions.**

Except as otherwise provided in this rule, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter.

- (A) "Applicant" means an entity referenced in paragraphs (E)(1) to (E)(4) of this rule that has submitted an application for disadvantaged community designation.
- (B) "Application for loan assistance" means the application and any additional information necessary to award financial assistance from the water supply revolving loan account in accordance with section 6109.22 of the Revised Code.
- (C) "Application for designation as a disadvantaged community" means the application submitted to determine whether an applicant meets the criteria established by the director for disadvantaged communities.
- (D) "Disadvantaged assistance" means a loan to a disadvantaged community from the water supply revolving loan account with a term greater than twenty years and not to exceed thirty years or the expected design life of the project, whichever is less. The terms and conditions of all disadvantaged assistance shall be determined by the director.
- (E) "Disadvantaged community" means the service area, or portion thereof, of one of the following entities that applies for and is eligible, or that the director expects to become eligible as a result of its loan project, for loan assistance under this chapter of the Administrative Code pursuant to the affordability criteria established by the director:
  - (1) A nonprofit public water system that operates or provides water to a community water system;
  - (2) A public water system that is regulated by the public utilities commission of Ohio ("PUCO") and that operates or provides water to a community water system;
  - (3) A political subdivision, as defined by division (B) of section 6119.011 of the Revised Code, that operates or provides water to a community water system; or
  - (4) A nonprofit noncommunity public water system.
- (F) "Economic affordability" means the relative cost of drinking water and wastewater treatment in the applicant's service area as compared to

statewide benchmarks. It is determined by comparing the annual cost per household of drinking water and wastewater treatment with the most current median household income data from the U.S. census bureau. The director may use data from an annual survey of water and sewer rates if the water and sewer rates for the applicant's service area cannot be obtained.

- (G) "Household income" is as defined by the U.S. census bureau and means the sum of money income received in a calendar year by all household members fifteen years old and over, including household members not related to the householder, people living alone, and other non-family household members.
- (H) "Median" means the middle value in a distribution of values, above and below which lie an equal number of values.
- (I) "Poverty rate" means the per cent of people who were in poverty in a calendar year as defined by the U.S. census bureau.
- (J) "Pre-application" means the application submitted to determine eligibility for inclusion on the project priority list.
- (K) "Program year" means a "state fiscal year" defined as July first of the preceding year through June thirtieth of the given year. For example, the 2007 program year runs from July 1, 2006 to June 30, 2007.
- (L) "Project priority list" means the list of all eligible projects for which a pre-application for a loan from the water supply revolving loan account has been submitted, arranged in order of priority points awarded to each project.
- (M) "Subsidy" means forgiveness of principal or negative interest rate for loans to disadvantaged communities from the water supply revolving loan account, as determined by the director.
- (N) "Water supply revolving loan account" means the account of the drinking water assistance fund from which loans for improvements to qualifying drinking water systems are made. The drinking water assistance fund is authorized under section 6109.22 of the Revised Code.

[The survey referenced in paragraph (F) of this rule is the annual Ohio EPA "Sewer and Water Rate Survey." It can be obtained from the "Ohio EPA, Office of Fiscal Administration, Economic Analysis Unit, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215, (614) 644-2339" or [www.epa.state.oh.us/ofa](http://www.epa.state.oh.us/ofa).]

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Prior Effective Dates: 10/01/2006

**Disadvantaged community loans.****(A) Applications**

- (1) Requirements. To be eligible for disadvantaged community loan assistance for a given program year, an applicant must:
  - (a) Be on the project priority list or have submitted a pre-application to be on the project priority list by the pre-application deadline specified by the director; and
  - (b) Submit a complete application for designation as a disadvantaged community on a form acceptable by the director by the application deadline specified by the director.

**(B) Determination criteria for disadvantaged communities**

- (1) After receipt and review of application for designation as a disadvantaged community, the director may designate an applicant as a disadvantaged community for the purposes of this chapter based on consideration of at least the criteria set forth in paragraphs (B)(1)(a) to (B)(1)(e) of this rule. Fulfillment of any one criterion does not guarantee designation as a disadvantaged community.
  - (a) Economic affordability. To be eligible for designation, applicants shall serve communities or populations with costs per user for water and sewer services that are greater than the statewide values.
  - (b) Health related issues. To be eligible for designation, an applicant shall demonstrate the presence of indicators of serious public health risks. Applicants with more serious public health risks are more likely to be designated than those with less serious health risks.
  - (c) Median household income in the area served by the applicant as determined by the most recent final and released U.S. census. Applicants serving communities or populations with median household incomes less than the statewide median household income are more likely to be designated than those serving communities or populations with median household incomes equal to or higher than the statewide median household income.
  - (d) Population. Applicants serving relatively small populations are more likely to be designated than those serving larger populations.

- (e) Poverty rate in the area served by the applicant as determined by the most recent final and released U.S. census. Applicants serving communities or populations with a poverty rate greater than the statewide poverty rate will be more likely to be designated than those serving populations with lower poverty rates.

[For further reference see the "State of Ohio Drinking Water Assistance Fund Program Management and Intended Use Plan" submitted by the agency to the United States environmental protection agency each program year. The draft and final versions for each program year can be obtained from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215, (614) 644-2752" or [www.epa.state.oh.us/ddagw](http://www.epa.state.oh.us/ddagw).]

- (2) The director may also consider other factors such as unemployment, population growth, age distribution of population, and other socio-economic factors in making determinations under this rule.

(C) Loan issuance to disadvantaged communities

- (1) Applicants designated as disadvantaged communities shall submit an application for loan assistance on the form required by the director in order to be considered for disadvantaged assistance from the water supply revolving loan account in accordance with section 6109.22 of the Revised Code.
- (2) Following receipt and review of an application for loan assistance, the director may award financial assistance from the water supply revolving loan account to an eligible disadvantaged community upon a determination that the application meets the current requirements established by the director under section 6109.22 of the Revised Code and the improvements are necessary for the public water system to operate in compliance with Chapter 6109. of the Revised Code.
- (3) No more than thirty per cent of each capitalization grant may be made available to provide subsidies to disadvantaged communities. Each amount identified for disadvantaged assistance and subsidies shall be available to be obligated for qualifying projects within the time period allowed for in the applicable capitalization grant.
- (4) Designation as a disadvantaged community shall be made on an annual basis, for the program year for which the applicant is seeking disadvantaged assistance or subsidy. Applicants may reapply and may be designated by the director as a disadvantaged community in accordance with this chapter annually.



(D) Loan assistance for disadvantaged communities

- (1) The amount, form, and duration of each award of disadvantaged assistance or subsidy to a disadvantaged community shall be based on the director's determination of the necessity for the disadvantaged assistance or subsidy in relation to the ability of the eligible disadvantaged community to comply with rule 3745-87-02 of the Administrative Code, comply with Chapter 6109. of the Revised Code, and the availability of funding for this purpose.

(E) Duty to comply

- (1) The failure or inability of a disadvantaged community to obtain disadvantaged assistance or subsidy under this chapter of the Administrative Code in no way alters the obligation of the public water system serving a disadvantaged community to comply with all applicable Administrative Code rules governing public water systems.

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3745-89-01      **Laboratory certification definitions.**

Except as follows, the definitions of "director," "gross alpha particle activity," "gross beta particle activity," "total trihalomethanes," and all other terms defined in rules 3745-81-01 and 3745-90-01 of the Administrative Code shall apply to this chapter.

(A) [Reserved.]

(B) [Reserved.]

(C) "Certificate" means a document identifying an individual approved to perform specific drinking water analyses at a specific laboratory. The certificate indicates the effective period and is non-transferable to another laboratory or another analyst.

(D) "Deviation" means any non-compliance with laboratory certification requirements, which cover the physical facility, testing equipment, analytical method, reporting, and all quality control requirements whether they are in the method, the laboratory certification manual or the Ohio Administrative Code.

(E) [Reserved.]

(F) [Reserved.]

(G) [Reserved.]

(H) [Reserved.]

(I)

(1) "Interim authorization for plant control tests or MMO-MUG (SM 9223)" means granting an analyst operational approval to conduct certain plant control tests for those parameters defined in rule 3745-89-09 of the Administrative Code pending an on-site survey approval.

(2) "Interim authorization for new contaminants and new methods" means granting a laboratory certification to perform drinking water analyses using new methods or for new contaminants pending implementation of new or amended regulations.

(J) [Reserved.]

(K) [Reserved.]

(L) [Reserved.]

(M)

(1) "Media" means nutrient and mineral complexes used in the growth and identification of microorganisms.

(2) "Method detection limit" or "MDL" means the minimum concentration of a substance that can be measured and reported with ninety-nine per cent confidence that the

analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

(N) [Reserved.]

(O)

- (1) "Operational certification" means certification granted by the director for an analyst to perform one or more of the plant control tests for alkalinity, alkalinity stability, chloride, chlorine, chlorite, chlorine dioxide, fluoride, hardness, pH, or turbidity, including daily calibration and standardization, but neither including the preparation of standards or reagents nor the required monthly or quarterly calibration and standardization.
- (2) "On-site survey" means a scheduled or unannounced on-location evaluation and review of a laboratory and its personnel to determine compliance with this chapter.

(P)

- (1) "Plant control test" means measurement of any or all of the following parameters that are used to monitor or control drinking water plant treatment processes: alkalinity; alkalinity stability; chloride, chlorine, chlorite, chlorine dioxide and other disinfectants; fluoride; hardness; pH; total phosphorus; total dissolved solids; turbidity; copper; iron; manganese; and nitrate.
- (2) "Proficiency test" (PT) means a sample or a group of samples provided to a laboratory by an approved provider of the national environmental laboratory accreditation program (NELAP), used for the purpose of determining the ability of a laboratory and its analysts to successfully perform analyses within acceptable limits specified by the United States environmental protection agency. The director may designate other acceptable providers of proficiency test samples for analysis to meet this requirement.

(Q) [Reserved.]

(R) "Reporting limit" means the numerical value at and above which a laboratory is required to quantify a contaminant.

(S)

- (1) "Standard operating procedure" or "SOP" means a document written by a laboratory that details the prescribed techniques and steps necessary for the performance of a specific method by that laboratory.
- (2) "State Principal Laboratory" means the laboratory designated by the director as required by the United States environmental protection agency under 40 C.F.R. 142.10 (10/13/2005 edition) and certified by the United States environmental protection agency.
- (3) "Subcontract" means an arrangement whereby a laboratory or facility obtains drinking

water samples from a public water system and directly provides the samples to a laboratory that is certified to perform the required analyses.

(T) [Reserved.]

(U) "Unacceptable data" means data that does not meet quality control acceptance limits referenced in each approved analytical method or as referenced in the "Ohio EPA Laboratory Manual for the Microbiological Analyses of Public Drinking Water 2014" and the "Ohio EPA Laboratory Manual for the Chemical Analyses of Public Drinking Water 2014."

(V) [Reserved.]

(W) "Water quality parameters" means the following parameters measured in accordance with rule 3745-81-87 of the Administrative Code: pH, water temperature, alkalinity, conductivity, calcium, orthophosphate and silica.

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06/18/04, 10/13/08, 05/04/15

**3745-89-02      Analyses requiring laboratory certification.**

For the purpose of determining compliance with Chapters 3745-81, 3745-82 and 3745-90, and rules 3745-91-06 and 3745-9-09 of the Administrative Code, and as specified by paragraph (B) of rule 3745-83-01 of the Administrative Code, including plant control tests but excluding water quality parameter determinations, or for other analyses required by the director, only those analyses may be acceptable to the director that are performed in one of the following:

- (A) A laboratory located in the state of Ohio and holding a valid and unexpired laboratory certification under this chapter, and by an individual conducting analyses as designated on the laboratory certificate.
- (B) "The State Principal Laboratory."
- (C) A laboratory located outside the state of Ohio and owned or operated by a public water system supplying drinking water in the state of Ohio, holding a valid and unexpired laboratory certification under this chapter, and by an individual conducting analyses as designated on the laboratory certificate.
- (D) A laboratory certified by the United States environmental protection agency, the national environmental laboratory accreditation program (NELAP), or by another state to perform required analyses for drinking water contaminants, but only if any of the conditions in paragraphs (D)(1) to (D)(4) of this rule apply. Out of state laboratories shall meet the analytical and reporting requirements of this chapter in order for those analyses to be acceptable to the director.
  - (1) For those contaminants and during those times for which no Ohio laboratory is certified under this chapter of the Administrative Code for the analyses.
  - (2) During those times when the director determines there is insufficient laboratory capacity.
  - (3) For parameters which Ohio has determined not to certify laboratories.
  - (4) For samples collected from a public water system located outside the state of Ohio which provides water to a consecutive water system located in the state of Ohio.

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05/04/15

3745-89-03      **Procedure for laboratory certification.**

(A) General requirements. Laboratories applying for certification to perform analyses to determine compliance with Chapters 3745-81, 3745-82 and 3745-90, and rules 3745-91-06 and 3745-9-09, and as specified by paragraph (B) of rule 3745-83-01 of the Administrative Code, and with plant control tests for one or more public water systems, shall meet the following:

- (1) The laboratory shall submit, for approval by the director, a detailed laboratory plan which includes the following:
  - (a) The analyses for which certification is sought and the number of individuals proposed to perform each analysis.
  - (b) Plans meeting the facility requirements as defined in the "Ohio EPA Laboratory Manual for the Microbiological Analyses of Public Drinking Water 2014" and the "Ohio EPA Laboratory Manual for the Chemical Analyses of Public Drinking Water 2014."
  - (c) The equipment proposed to be used in the laboratory, including specifications or names, descriptions, manufacturers, and model numbers for each type of equipment.
  - (d) The inventory of standards, reagents and media to be used in analyses for which certification is sought.
- (2) The laboratory shall submit a quality assurance plan acceptable to the director when certification is sought for drinking water analysis. The "Ohio EPA Laboratory Manual for the Microbiological Analyses of Public Drinking Water 2014" and the "Ohio EPA Laboratory Manual for the Chemical Analyses of Public Drinking Water 2014" may be used by laboratories seeking certification for plant control and microbiological testing. Otherwise, an acceptable quality assurance plan shall be developed by the laboratory as described in the United States environmental protection agency's "Manual for the Certification of Laboratories Analyzing Drinking Water" fifth edition, dated January 2005 (designated "EPA 815-R-05-004"), as supplemented in both June 2008 (designated "EPA 815-F-08-006") and November 2012 (designated "EPA 815-F-12-006") by "the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, Cincinnati, OH 45268." The quality assurance plan shall include at least the following parts:
  - (a) Table of laboratory organization which delineates the responsibilities of all laboratory personnel associated with drinking water analyses and designates the individuals responsible for quality assurance of drinking water analyses in the laboratory.
  - (b) Standard operating procedures including identification of the reference methods used to perform the drinking water analyses approved by the United States environmental protection agency.



- (c) Sample handling procedures, including the following:
  - (i) Directions for maintaining the integrity of the samples by tracking samples from receipt to testing to disposal.
  - (ii) Directions for sample preservation, dechlorination, etc. as required by the reference method and the documentation used by the laboratory to verify that proper sample treatment is done.
  - (iii) Directions to ensure that adequate sample information is obtained to allow the proper analysis and reporting of results.
  - (iv) Chain of custody forms, where applicable.
  - (v) Directions for rejecting samples that do not meet shipping, minimum reporting information, holding time or preservation requirements and for notifying a public water system which submitted a sample that is rejected.
- (d) Routine practices to maintain the precision and accuracy of data as specified by the director or required by each method of analysis.
- (e) Corrective action procedures taken when unacceptable results are obtained from the analysis of performance evaluation samples or quality control checks.
- (f) Preventative maintenance procedures including directions and scheduling for instrumentation servicing.
- (g) Documentation of the preparation and expiration of drinking water standards and reagents.
- (h) Reporting procedures including directions followed to ensure that reporting is completed as specified in rule 3745-89-08 of the Administrative Code.
- (3) The laboratory shall submit to the director an application for certification for drinking water analyses required of public water systems, on a form provided by the director. The application shall include the following parts:
  - (a) The name, address and telephone number of the laboratory and of the individuals responsible for the laboratory.
  - (b) A list of analyses for which certification is sought. This list shall designate which analytical methods in rule 3745-81-27 or 3745-90-04 of the Administrative Code shall be used for each analysis and shall include the name of each individual who shall perform each analysis.
  - (c) Documentation that the laboratory plan in paragraph (A)(1) of this rule has been accepted by the director.
  - (d) Documentation that the laboratory has obtained acceptable results described in paragraph (B) of this rule and within the acceptance limits described in appendix C to this rule for analyses performed on all appropriate proficiency test samples

provided by a proficiency testing provider accredited by a provider of PT samples accredited by a proficiency testing provider accreditor meeting the "National Environmental Laboratory Accreditation Program requirement (NELAP)", and documentation that proficiency test samples were analyzed at least once during each consecutive twelve month period by each method for which the laboratory desires certification. The director may designate other acceptable providers of proficiency test samples for analyses to meet this requirement.

- (e) Payment of the appropriate laboratory survey fee established in accordance with section 3745.11 of the Revised Code. Fees for these surveys shall be paid via a method acceptable to the director. For the purposes of this rule, fees are as follows:
  - (i) The "organic chemicals" fee covers all surveys necessary to obtain laboratory certification for the analysis of drinking water for either of the following:
    - (A) Total trihalomethanes, haloacetic acids, or volatile organic chemicals.
    - (B) Pesticides and other organic chemicals.
  - (ii) The "trace metals" fee covers all surveys necessary to obtain laboratory certification for the analysis of drinking water for all metals identified by the United States environmental protection agency as primary contaminants, secondary contaminants and contaminants with action levels.
  - (iii) The "standard chemistry" fee covers all surveys necessary to obtain laboratory certification for the analysis of drinking water for bromate, chlorite, cyanide, fluoride, nitrate, nitrate-nitrite, nitrite, sulfate, total dissolved solids and plant control tests.
  - (iv) The "limited chemistry" fee covers all surveys necessary to obtain laboratory certification for the analysis of drinking water for the following:
    - (A) Any three of the analyses included in standard chemistry.
    - (B) Any two of the analyses included in trace metals.
    - (C) Asbestos.
    - (D) Radioactivity and radioactive chemicals.
    - (E) Beginning one year from the effective date of this rule, total microcystins and cyanobacteria screening.
  - (v) The "microbiological" fee covers all surveys necessary to obtain laboratory certification for the analysis of drinking water for one of the following:
    - (A) MMO-MUG.
    - (B) MF.

(C) MMO-MUG and MF.

- (4) The director shall return any application which is not filed in accordance with paragraph (A)(3) of this rule.
- (5) Upon the laboratory's successful completion of the requirements of paragraphs (A)(1), (A)(2) and (A)(3) of this rule, the laboratory shall demonstrate acceptable levels of performance during the initial and subsequent on-site surveys, including the following:
  - (a) Conformance by the laboratory to the "Ohio EPA Laboratory Manual for the Microbiological Analyses of Public Drinking Water 2014" and the "Ohio EPA Laboratory Manual for the Chemical Analyses of Public Drinking Water 2014."
  - (b) Proficiency in appropriate analytical procedures, methodologies, techniques, and use of equipment by analysts participating in the on-site survey.
  - (c) Analysis of proficiency test samples.
  - (d) Maintenance of laboratory records for at least thirty days prior to the scheduled on-site survey, with the records documenting the following:
    - (i) All appropriate laboratory equipment and auxiliary equipment is operational within prescribed limits.
    - (ii) Sufficient practice analyses have been conducted by each analyst participating in the on-site survey to demonstrate the analyst's proficiency.
    - (iii) An acceptable quality assurance plan has been documented and implemented, as required by paragraph (A)(2) of this rule.
    - (iv) The analyses, quality control procedures, and preparation of standards were correctly performed by each analyst participating in the on-site survey, except for analysts to be designated for operational certification.
    - (v) Acceptable method detection limit studies have been completed as required by the director for each method and instrument in accordance with the procedures in appendix A to this rule.
  - (e) Conformance by the laboratory to the laboratory plan as approved by the director.
  - (f) Conformance by the laboratory to the analytical reporting limits listed in tables 1, 2, 3, 4 and 5 in appendix B to this rule. Laboratories shall report at a minimum level that they can consistently quantify but shall not have a minimum reporting limit any higher than the level in appendix B to this rule. Unless stated in this rule, the detection limits listed and defined in Chapter 3745-81 of the Administrative Code shall also be used as reporting limits.
  - (g) Correction of deviations noted in previous survey reports.
- (6) The survey report shall be issued to the applicant by the Ohio environmental protection

agency within forty-five days of any on-site survey, shall indicate the acceptability of the applicant's performance during the survey, and shall state deviations that are required to be corrected prior to certification of the laboratory. If the survey report notes deviations the director may deny, suspend, or revoke certification in accordance with rule 3745-89-06 of the Administrative Code.

(B) Particular requirements. Each laboratory applying for certification to perform particular drinking water analyses to determine compliance with Chapters 3745-81 and 3745-82, rules 3745-91-06 and 3745-9-09, and as specified by paragraph (B) of rule 3745-83-01 of the Administrative Code, as well as plant control tests shall, in addition to the requirements of paragraph (A) of this rule, include with the application the appropriate required reports as follows:

- (1) Inorganic chemicals. Applicants for laboratory certification to perform analyses for inorganic chemicals to determine compliance with Chapter 3745-81 of the Administrative Code shall report antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, thallium, bromate, chlorite, cyanide, fluoride, nitrate, nitrate-nitrite, and nitrite in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results.
- (2) Total trihalomethanes. Applicants for laboratory certification to perform analyses for total trihalomethanes to determine compliance with rules 3745-81-12 and 3745-81-24 of the Administrative Code shall report bromodichloromethane, bromoform, chloroform and dibromochloromethane analysis in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results. Total trihalomethanes analysis requires reporting all of the compounds established in the definition of total trihalomethanes in rule 3745-81-01 of the Administrative Code.
- (3) Volatile organic chemicals. Applicants for laboratory certification to perform analyses for volatile organic chemicals to determine compliance with rules 3745-81-12 and 3745-81-24 of the Administrative Code shall report analyses for volatile organic chemicals with maximum contaminant levels (except vinyl chloride) in accordance with paragraph (A)(3)(d) of this rule, with not more than twenty per cent unacceptable results, and shall achieve a method detection limit of 0.0005 milligrams per liter for each of these volatile organic chemicals according to the procedures in appendix A to this rule.
- (4) Pesticides and other organic chemicals. Applicants for laboratory certification to perform analyses for pesticides and other organic chemicals to determine compliance with rules 3745-81-12 and 3745-81-24 of the Administrative Code shall report analysis for pesticides and other organic chemicals in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results.
- (5) Microbiological contaminants. Applicants for laboratory certification to perform analyses for microbiological contaminants to determine compliance with rules 3745-81-14, 3745-81-21, and 3745-81-41 to 3745-81-45 of the Administrative Code shall report microbiological contaminants analyses in accordance with paragraph (A)(3)(d) of this rule with no more than one unacceptable total coliform result, no

more than one unacceptable fecal coliform/E. coli result, and no false negative reported values.

- (6) Gross alpha particle activity. Applicants for laboratory certification to perform analyses for gross alpha particle activity to determine compliance with rules 3745-81-15 and 3745-81-26 of the Administrative Code shall report to the director, within thirty days after receipt, results of the most recent proficiency test for gross alpha particle activity analysis in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results.
- (7) Radium-226 and radium-228 radioactivity. Applicants for laboratory certification to perform analyses for radium-226 and radium-228 radioactivity to determine compliance with rules 3745-81-15 and 3745-81-26 of the Administrative Code shall report to the director, within thirty days after receipt, results of the most recent proficiency test for radium-226 and radium-228 analyses in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results, and shall hold laboratory certification under this rule to perform gross alpha particle activity analysis.
- (8) Gross beta particle activity. Applicants for laboratory certification to perform analyses for gross beta particle activity to determine compliance with rules 3745-81-15 and 3745-81-26 of the Administrative Code shall report to the director, within thirty days after receipt, results of the most recent proficiency test for gross beta particle activity analyses in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results, and shall hold laboratory certification under this rule to perform gross alpha particle activity analysis.
- (9) Strontium-89 and strontium-90 radioactivity. Applicants for laboratory certification to perform analyses for strontium-89 and strontium-90 radioactivity to determine compliance with rules 3745-81-15 and 3745-81-26 of the Administrative Code shall report to the director, within thirty days of receipt, results of the most recent proficiency test for strontium-89 and strontium-90 analyses in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results, and shall hold laboratory certification under this rule to perform gross beta particle activity analyses.
- (10) Iodine-131 radioactivity. Applicants for laboratory certification to perform analyses for iodine-131 radioactivity to determine compliance with rules 3745-81-15 and 3745-81-26 of the Administrative Code shall report to the director, within thirty days of receipt, results of the most recent proficiency test for iodine-131 radioactivity analysis in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results, and shall hold laboratory certification under this rule to perform gross beta particle activity analysis.
- (11) Tritium. Applicants for laboratory certification to perform analyses for tritium to determine compliance with rules 3745-81-15 and 3745-81-26 of the Administrative Code shall report to the director, within thirty days of receipt, results of the most recent proficiency test for tritium analysis in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results, and shall hold laboratory certification under

this rule for the performance of gross beta particle activity analysis.

- (12) Radioactivity from photon emitters (excluding iodine-131). Applicants for laboratory certification to perform analyses for radioactivity from photon emitters (excluding iodine-131) to determine compliance with rules 3745-81-15 and 3745-81-26 of the Administrative Code shall report to the director, within thirty days after receipt, results of the most recent proficiency test for radioactivity from photon emitters (excluding iodine-131) analysis in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results, and shall hold a laboratory certification under this rule to perform gross beta particle activity analysis.
  - (13) Haloacetic acids (five). Applicants for laboratory certification to perform analyses for haloacetic acids (five) to determine compliance with rules 3745-81-12 and 3745-81-24 of the Administrative Code shall report haloacetic acids (five) analysis in accordance with paragraph (A)(3)(d) of this rule with no more than one unacceptable result. Haloacetic acids (five) analysis requires reporting all of the compounds listed in the definition of haloacetic acids (five) in rule 3745-81-01 of the Administrative Code.
  - (14) Bromate. Applicants for laboratory certification to perform analyses for bromate to determine compliance with paragraph (C) of rule 3745-81-11 and rule 3745-81-23 of the Administrative Code shall report bromate analysis in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results.
  - (15) Chlorite. Applicants for laboratory certification to perform analyses for chlorite to determine compliance with paragraph (D) of rule 3745-81-11 and rule 3745-81-23 of the Administrative Code shall report chlorite analysis in accordance with paragraph (A)(3)(d) of this rule with no unacceptable results.
  - (16) Plant control tests. Applicants for laboratory certification to perform plant control tests (except chlorine residual) required to be reported by rule 3745-83-01 of the Administrative Code may designate individuals for operational certification. If any individual is designated for operational certification, the application shall also designate an individual responsible for preparation of standards and reagents and for the required monthly and quarterly calibrations and standardizations.
- (C) The director may issue, deny, suspend or revoke a laboratory certificate in accordance with rule 3745-89-06 of the Administrative Code.

[Comment: This rule incorporates the "Ohio EPA Laboratory Manual for the Microbiological Analyses of Drinking Water 2014" and "Ohio EPA Laboratory Manual for the Chemical Analyses of Public Drinking Water 2014" by reference. Copies are available at [www.epa.ohio.gov/ddagw/labcert.aspx](http://www.epa.ohio.gov/ddagw/labcert.aspx) and at the "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215." Copies can also be obtained by contacting the laboratory certification office at 614-644-4245.]

[Comment: This rule incorporates the United States environmental protection agency's "Manual for Certification of Laboratories Analyzing Drinking Water" fifth edition, dated January 2005 (designated "EPA 815-R-05-004"), as supplemented in both June 2008

(designated "EPA 815-F-08-006") and November 2012 (designated "EPA 815-F-12-006") by the United States environmental protection agency, office of ground water and drinking water, Cincinnati, OH 45268 by reference. Copies are available at <http://www.epa.gov/dwlabcert> and also at the "Water Resource Center (RC-4100), United States Environmental Protection Agency, 1200 Pennsylvania Avenue NW, Washington, D.C., 20460, (202) 566-1729." Copies can also be obtained by contacting the "Safe Drinking Water Hotline" at 1-800-426-4791. This document is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

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### Definition

The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

### Scope and Application

This procedure is designed for applicability to a wide variety of sample types ranging from reagent (blank) water containing analyte to wastewater containing analyte. The MDL for an analytical procedure may vary as a function of sample type. The procedure requires a complete, specific, and well defined analytical method. It is essential that all sample processing steps of the analytical method be included in the determination of the method detection limit.

The MDL obtained by this procedure is used to judge the significance of a single measurement of a future sample.

The MDL procedure was designed for applicability to a broad variety of physical and chemical methods. To accomplish this, the procedure was made device- or instrument-independent.

1. Make an estimate of the detection limit using one of the following:

(a) The concentration value that corresponds to an instrument signal/noise in the range 2.5 to 5.

(b) The concentration equivalent of three times the standard deviation of replicate instrumental measurements of the analyte in reagent water.

(c) That region of the standard curve where there is a significant change in sensitivity, i.e., a break in the slope of the standard curve.

(d) Instrumental limitations.

It is recognized that the experience of the analyst is important to this process. However, the analyst must include the above considerations in the initial estimate of the detection limit.

2. Prepare reagent (blank) water that is as free of the analyte as possible. Reagent or interference-free water is defined as a water sample in which analyte and interferent concentrations are not detected at the method detection limit of each analyte of interest. Interferences are defined as systematic errors in the measured analytical signal of an established procedure caused by the presence of interfering species (interferent). The interferent concentration is presupposed to be normally distributed in representative samples of a given matrix.

3. (a) If the MDL is to be determined in reagent (blank)

water, prepare a laboratory standard (analyte in reagent water) at a concentration which is at least equal to or in the same concentration range as the estimated method detection limit. (Recommend between 1 and 5 times the estimated method detection limit.) Proceed to Step 4.

(b) If the MDL is to be determined in another sample matrix, analyze the sample. If the measured level of the analyte is in the recommended range of one to five times the estimated detection limit, proceed to Step 4.

If the measured level of analyte is less than the estimated detection limit, add a known amount of analyte to bring the level of analyte between one and five times the estimated detection limit.

If the measured level of analyte is greater than five times the estimated detection limit, there are two options:

(1) Obtain another sample with a lower level of analyte in the same matrix, if possible.

(2) The sample may be used as is for determining the method detection limit if the analyte level does not exceed 10 times the MDL of the analyte in reagent water. The variance of the analytical method changes as the analyte concentration increases from the MDL, hence the MDL determined under these circumstances may not truly reflect method variance at lower analyte concentrations.

4. (a) Take a minimum of seven aliquots of the sample to be used to calculate the method detection limit and process each through the entire analytical method. Make all computations according to the defined method with final results in the method reporting units. If a blank measurement is required to calculate the measured level of analyte, obtain a separate blank measurement for each sample aliquot analyzed. The average blank measurement is subtracted from the respective sample measurements.

(b) It may be economically and technically desirable to evaluate the estimated method detection limit before proceeding with 4a. This will: (1) Prevent repeating this entire procedure when the costs of analyses are high and (2) insure that the procedure is being conducted at the correct concentration. It is quite possible that an inflated MDL will be calculated from data obtained at many times the real MDL even though the level of analyte is less than five times the calculated method detection limit. To insure that the estimate of the method detection limit is a good estimate, it is necessary to determine that a lower concentration of analyte will not result in a significantly lower method detection limit. Take two aliquots of the sample to be used to calculate the method detection limit and process each through the entire method, including blank measurements as described above in 4a. Evaluate these data:

(1) If these measurements indicate the sample is in desirable range for determination of the MDL, take five additional aliquots and proceed. Use all seven measurements for calculation of the MDL.

(2) If these measurements indicate the sample is not in correct range, reestimate the MDL, obtain new sample as in 3, and repeat either 4a or 4b.

5. Calculate the variance (S2) and standard deviation (S) of the replicate measurements, as follows:

$$S^2 = \frac{1}{n-1} \left[ \sum_{i=1}^n X_i^2 - \frac{\left( \sum_{i=1}^n X_i \right)^2}{n} \right]$$

where:

$X_i$ ,  $i = 1$  to  $n$ , are the analytical results in the final method reporting units obtained from the  $n$  sample aliquots and  $\Sigma$  refers to the sum of the  $X$  values from  $i = 1$  to  $n$ .

6. (a) Compute the MDL as follows:

$$MDL = t(n-1, 1-\alpha = 0.99) (S)$$

where:

MDL = the method detection limit

$t(n-1, 1-\alpha = 0.99)$  = the student's  $t$  value appropriate for a 99% confidence level and a standard deviation estimate with  $n - 1$  degrees of freedom. See Table.

$S$  = standard deviation of the replicate analyses.

(b) The 95% confidence interval estimates for the MDL derived in 6(a) are computed according to the following equations derived from percentiles of the chi square over degrees of freedom distribution ( $\chi^2/df$ ).

$$LCL = 0.64 MDL$$

$$UCL = 2.20 MDL$$

where:

LCL and UCL are the lower and upper 95% confidence limits respectively based on seven aliquots.

7. Optional iterative procedure to verify the reasonableness of the estimate of the MDL and subsequent MDL determinations.

(a) If this is the initial attempt to compute MDL based on the estimate of MDL formulated in Step 1, take the MDL as calculated in Step 6, spike the matrix at this calculated MDL and proceed through the procedure starting with Step 4.

(b) If this is the second or later iteration of the MDL calculation, use  $S_2$  from the current MDL calculation and  $S_2$  from the previous MDL calculation to compute the F-ratio. The F-ratio is calculated by substituting the larger  $S_2$  into the numerator  $S_{2A}$  and the other into the denominator  $S_{2B}$ . The computed F-ratio is then compared with the F-ratio found in the table which is 3.05 as follows: if  $S_{2A}/S_{2B} < 3.05$ , then compute the pooled standard deviation by the following equation:

$$S_{\text{pooled}} = \left[ \frac{6S_{2A}^2 + 6S_{2B}^2}{12} \right]^{1/2}$$

If  $S_{2A}^2/S_{2B}^2 > 3.05$ , respike at the most recent calculated

MDL and process the samples through the procedure starting with Step 4. If the most recent calculated MDL does not permit qualitative identification when samples are spiked at that level, report the MDL as a concentration between the current and previous MDL which permits qualitative identification.

(c) Use the  $S_{\text{pooled}}$  as calculated in 7(b) to compute the final MDL according to the following equation:

$$MDL = 2.681 (S_{\text{pooled}})$$

where 2.681 is equal to  $t_{(12, 1-\alpha = 0.99)}$ .

(d) The 95% confidence limits for MDL derived in 7c are computed according to the following equations derived from percentiles of the chi squared over degrees of freedom distribution.

$$LCL = 0.72 MDL$$

$$UCL = 1.65 MDL$$

where LCL and UCL are the lower and upper 95% confidence limits respectively based on 14 aliquots.

TABLES OF STUDENTS'  $t$  VALUES AT THE 99 PERCENT CONFIDENCE LEVEL

Number of replicates (n)	Degrees of freedom (n-1)	$t_{(n-1, 0.99)}$
7 .....	6	3.143
8 .....	7	2.998
9 .....	8	2.896
10 .....	9	2.821
11 .....	10	2.764
16 .....	15	2.602
21 .....	20	2.528
26 .....	25	2.485
31 .....	30	2.457
61 .....	60	2.390
$\infty$ .....	$\infty$	2.326

#### Reporting

The analytical method used must be specifically identified by number or title and the MDL for each analyte expressed in the appropriate method reporting units. If the analytical method permits options which affect the method detection limit, these conditions must be specified with the MDL value. The sample matrix used to determine the MDL must also be identified with MDL value. Report the mean analyte level with the MDL and indicate if the MDL procedure was iterated. If a laboratory standard or a sample that contained a known amount analyte was used for this determination, also report the mean recovery.

If the level of analyte in the sample was below the determined MDL or exceeds 10 times the MDL of the analyte in reagent water, do not report a value for the MDL.

[49 FR 43430, Oct. 26, 1984; 50 FR 694, 696, Jan. 4, 1985, as amended at 51 FR 23703, June 30, 1986.]

Table 1. Reporting Limits for Analysis of Inorganics	
Analyte	Reporting limit--micrograms/liter (µg/L) except where otherwise noted
antimony	4.0
arsenic	3.0
asbestos	0.2 million fibers/liter (mf/L)
barium	300.0
beryllium	1.0
bromate <sup>*4,5</sup>	5.0 or 1.0
cadmium	1.0
chlorine dioxide <sup>**</sup>	500
chlorine (total) <sup>**</sup>	100
chlorite (ion chromatography) <sup>*1,4</sup>	20
chlorite (amperometric titration) <sup>*2</sup>	500
chromium	10.0
copper	50.0
cyanide	20
fluoride	0.5 milligrams/liter (mg/L)
lead	5.0
mercury	0.5
nickel	20.0
nitrate	0.5 mg/L
nitrite	0.1 mg/L
nitrate-nitrite (as N)	0.5 mg/L
selenium	5.0
thallium	1.5

\* disinfection byproduct

\*\* disinfectant residual

Table 2. Reporting Limits for Analysis of Volatile Organic Compounds	
Analyte	Reporting limit--micrograms/liter (µg/L)
benzene	0.5
bromodichloromethane* <sup>3,4</sup>	0.5
bromoform* <sup>3,4</sup>	0.5
carbon tetrachloride	0.5
chloroform* <sup>3,4</sup>	0.5
dibromochloromethane* <sup>3,4</sup>	0.5
o-dichlorobenzene	0.5
p-dichlorobenzene	0.5
1,2-dichloroethane	0.5
1,1-dichloroethylene	0.5
cis-1,2-dichloroethylene	0.5
trans-1,2-dichloroethylene	0.5
dichloromethane	0.5
1,2-dichloropropane	0.5
ethylbenzene	0.5
monochlorobenzene	0.5
styrene	0.5
tetrachloroethylene	0.5
toluene	0.5
total trihalomethanes* <sup>3,4</sup>	2.0
1,2,4-trichlorobenzene	0.5
1,1,1-trichloroethane	0.5
1,1,2-trichloroethane	0.5
trichloroethylene	0.5
vinyl chloride	0.5
xylene (total)	0.5

\* disinfection byproduct

Table 3. Reporting Limits for Analysis of Semivolatile Organic Compounds	
Analyte	Reporting limit--micrograms/liter (µg/L)
alachlor	0.2
atrazine	0.3
benzo(a)pyrene	0.1
carbofuran	0.9
chlordane - total	0.2
dalapon	5.0
dibromoacetic acid <sup>*3,4</sup>	1.0
dibromochloropropane (DBCP)	0.02
dichloroacetic acid <sup>*3,4</sup>	1.0
di(2-ethylhexyl)adipate	0.6
di(2-ethylhexyl)phthalate	0.6
2,4-D	1.0
dinoseb	1.0
diquat	2.0
endothall	9.0
endrin	0.1
ethylene dibromide (EDB)	0.01
glyphosate	30.0
haloacetic acids (five) <sup>*3,4</sup>	6.0
heptachlor	0.2
heptachlor epoxide	0.1
hexachlorobenzene	0.1
hexachlorocyclopentadiene	0.5
lindane	0.1
methoxychlor	0.1
monobromoacetic acid <sup>*3,4</sup>	1.0
monochloroacetic acid <sup>*3,4</sup>	2.0
oxamyl (vydate)	2.0
pentachlorophenol	0.4
picloram	1.0
polychlorinated biphenyls (PCBs) - total	0.1
simazine	0.35
2,3,7,8-TCDD (dioxin)	5 x 10 <sup>-6</sup>
toxaphene	1.0
trichloroacetic acid <sup>*3,4</sup>	1.0
2,4,5-TP (Silvex)	1.0

\* disinfection byproduct

Table 4. Reporting Limits for Radionuclide Analysis	
Analyte	Reporting limit--picocuries/liter (pCi/L) except where otherwise noted
cesium-134	10
gross alpha	3
gross beta	4
iodine-131	1
radium 226	1
radium 228	1
strontium-89	10
strontium-90	2
tritium	1,000
uranium	1 micrograms/liter (µg/L)
other radionuclides	1/10th of the applicable limit

Table 5. Reporting Limits for Analysis of Cyanotoxins	
Analyte	Reporting limit--micrograms/liter (µg/L)
microcystins (total)	0.3

<sup>1</sup> Applicable to monitoring as prescribed in paragraphs (M)(2) to (M)(5) of rule 3745-81-23 of the Administrative Code.

<sup>2</sup> Reporting limit applicable to operational use only.

<sup>3</sup> When adding individual trihalomethane or haloacetic acid concentrations to calculate total trihalomethane or haloacetic acid, five concentrations, respectively, a zero is used for any analytical result that is less than the minimum reporting limit concentration for the disinfection byproduct.

<sup>4</sup> The calibration curve must encompass the regulatory minimum reporting level (MRL) concentration. Data may be reported for concentrations lower than the regulatory MRL as long as the precision and accuracy criteria are met by analyzing an MRL check standard at the lowest reporting limit chosen by the laboratory. The laboratory must verify the accuracy of the calibration curve at the MRL concentration by analyzing an MRL check standard with a concentration less than or equal to 110% of the MRL with each batch of samples. The measured concentration for the MRL check standard must be  $\pm 50\%$  of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL. Method requirements to analyze higher concentration check standards and meet tighter acceptance criteria for them must be met in addition to the MRL check standard requirement.

<sup>5</sup> Laboratories that use EPA Methods 317.0 Revision 2.0, 326.0 or 321.8 must meet a 1.0 µg/L MRL for bromate.

## Acceptance Limits for Proficiency Test Samples

Table 1. Acceptance Limits for Inorganic Contaminants

Contaminant	Acceptance limit
Antimony	±30% at $\geq 0.006$ mg/L
Arsenic	±30% at $\geq 0.003$ mg/L
Asbestos	2 standard deviations based on study statistics
Barium	±15% at $\geq 0.15$ mg/L
Beryllium	±15% at $\geq 0.001$ mg/L
Cadmium	±20% at $\geq 0.002$ mg/L
Chromium	±15% at $\geq 0.01$ mg/L
Cyanide	±25% at $\geq 0.1$ mg/L
Fluoride	±10% at $\geq 1$ to 10 mg/L
Mercury	±30% at $\geq 0.0005$ mg/L
Nickel	±15% at $\geq 0.01$ mg/L
Nitrate	±10% at $\geq 0.4$ mg/L
Nitrite	±15% at $\geq 0.4$ mg/L
Selenium	±20% at $\geq 0.01$ mg/L
Thallium	±30% at $\geq 0.002$ mg/L

Table 2. Acceptance Limits for Disinfection Byproducts

Contaminant	Acceptance limit	Comments
TTHM		Laboratory must meet all 4 individual THM acceptance limits in order to successfully pass a proficiency test for TTHM
Chloroform	±20%	
Bromodichloromethane	±20%	
Dibromochloromethane	±20%	
Bromoform	±20%	
HAA5		Laboratory must meet the acceptance limits for 4 out of 5 of the HAA5 compounds in order to successfully pass a proficiency test for HAA5
Monochloroacetic Acid	±40%	
Dichloroacetic Acid	±40%	
Trichloroacetic Acid	±40%	
Monobromoacetic Acid	±40%	
Dibromoacetic Acid	±40%	
Chlorite	±30%	
Bromate	±30%	

Table 3. Acceptance Limits for Lead and Copper

Contaminant	Acceptance limit
Lead	±30% at $\geq 0.005$ mg/L
Copper	±10% at $\geq 0.050$ mg/L

Table 4. Acceptance Limits for Organic Contaminants

Contaminant	Acceptance limit
DBCP	±40%
EDB	±40%
Alachlor	±45%
Atrazine	±45%
Benzo[a]pyrene	2 standard deviations
Carbofuran	±45%
Chlordane	±45%
Dalapon	2 standard deviations
Di(2-ethylhexyl)adipate	2 standard deviations
Di(2-ethylhexyl)phthalate	2 standard deviations
Dinoseb	2 standard deviations
Diquat	2 standard deviations
Endothall	2 standard deviations
Endrin	±30%
Glyphosate	2 standard deviations
Heptachlor	±45%
Heptachlor epoxide	±45%
Hexachlorobenzene	2 standard deviations
Hexachloro-cyclopentadiene	2 standard deviations
Lindane	±45%
Methoxychlor	±45%
Oxamyl	2 standard deviations
PCBs (as Decachlorobiphenyl)	0–200%
Picloram	2 standard deviations
Simazine	2 standard deviations
Toxaphene	±45%
Aldicarb	2 standard deviations
Aldicarb sulfoxide	2 standard deviations
Aldicarb sulfone	2 standard deviations
Pentachlorophenol	±50%
2,3,7,8-TCDD (Dioxin)	2 standard deviations
2,4-D	±50%
2,4,5-TP (Silvex)	±50%



3745-89-04      **Renewal of laboratory certification.**

(A) The director may renew a laboratory certification for analysis of drinking water upon the laboratory's successful completion of the following:

- (1) The laboratory shall maintain a valid and unexpired laboratory certification under rule 3745-89-05 of the Administrative Code for the analyses for which renewal is sought.
- (2) The laboratory shall submit to the director a completed application for renewal, including the parts described in paragraphs (A)(2) and (A)(3)(a) to (A)(3)(e) of rule 3745-89-03 of the Administrative Code, no sooner than one hundred twenty days and no later than thirty days prior to the expiration date of the currently valid certification. When applications are submitted in accordance with this rule and deemed complete, the laboratory certification will be extended until such time as an onsite survey is completed.
- (3) If the applicable laboratory survey fee is not already paid, the laboratory shall submit the appropriate laboratory survey fee in accordance with section 3745.11 of the Revised Code. For the purposes of this rule, fees are as follows:
  - (a) The "organic chemicals" fee covers all surveys necessary to obtain laboratory certification for the analysis of drinking water for (i) total trihalomethanes, haloacetic acids and volatile organic chemicals, or for (ii) pesticides and other organic chemicals.
  - (b) The "trace metals" fee covers all surveys necessary to obtain laboratory certification for the analysis of drinking water for all metals identified by the United States environmental protection agency as primary contaminants, secondary contaminants and contaminants with action levels.
  - (c) The "standard chemistry" fee covers all surveys necessary to obtain laboratory certification for the analysis of drinking water for bromate, chlorite, cyanide, fluoride, nitrate, nitrate-nitrite, nitrite, sulfate, total dissolved solids and plant control tests.
  - (d) The "limited chemistry" fee covers all surveys necessary to obtain laboratory certification for the analysis of drinking water for the following:
    - (i) Any three of the analyses included in standard chemistry.
    - (ii) Any two of the analyses included in trace metals.
    - (iii) Asbestos.
    - (iv) Radioactivity and radioactive chemicals.
    - (v) Beginning one year from the effective date of this rule, total microcystins and cyanobacteria screening.
  - (e) The "microbiological" fee covers all surveys necessary to obtain laboratory

certification for the analysis of drinking water for one of the following:

- (i) MMO-MUG.
- (ii) MF.
- (iii) MMO-MUG and MF.

Fees for these surveys shall be paid via a method acceptable to the director.

- (4) The laboratory shall demonstrate an acceptable level of performance, by all persons to be included in renewal of laboratory certification, during an on-site survey as described in paragraph (A)(5) of rule 3745-89-03 of the Administrative Code. An on-site survey shall also include an evaluation of the maintenance of laboratory data. Microbiological records shall be maintained for at least five years; chemical records shall be maintained for at least ten years; lead and copper records shall be maintained for at least twelve years; and, all other records shall be maintained for at least ten years.
- (5) The laboratory shall maintain documentation that the quality assurance plan required in paragraph (A)(2) of rule 3745-89-03 of the Administrative Code is reviewed annually. The director may request the documentation be submitted with the laboratory's application for renewal.
- (B) When a valid certification for analysis of drinking water is not renewed in accordance with paragraph (A) of this rule, the certification expires and analyses by the laboratory shall not satisfy the requirements of Chapters 3745-81, 3745-82 and 3745-90, and rules 3745-91-06 and 3745-9-09, and as specified by paragraph (B) of rule 3745-83-01 of the Administrative Code. If the laboratory wishes to be recertified for drinking water analysis, it may apply for certification as required by rule 3745-89-03 of the Administrative Code. Where the physical facility of the laboratory conforms to a laboratory plan which has been previously approved, the requirements of paragraph (A)(1) of rule 3745-89-03 of the Administrative Code may be considered to be satisfied.
- (C) The director may approve or deny an application for renewal in accordance with rule 3745-89-06 of the Administrative Code.

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Five Year Review (FYR) Dates: 05/04/2020

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Statutory Authority: 3745.11, 6109.04

Rule Amplifies: 3745.11, 6109.04, 3745.50

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3745-89-05      **Maintenance of a laboratory certification.**

(A) The requirements for maintaining laboratory certification include each of the following:

- (1) Conformance by the laboratory to the "Ohio EPA Laboratory Manual for the Microbiological Analyses of Public Drinking Water 2014" and the "Ohio EPA Laboratory Manual for the Chemical Analyses of Public Drinking Water 2014."
- (2) Documentation that all analysts designated on the laboratory certificates have participated proportionally in drinking water analyses for which they are certified.
- (3) Documentation that only individuals who have interim authorization or have participated acceptably in a recent on-site survey for a laboratory certification or are listed on a laboratory certificate have performed drinking water analyses and reported results thereof for the purpose of determining compliance with plant control tests or MMO-MUG (SM 9223) tests, and Chapters 3745-81, 3745-82 and 3745-90, and rules 3745-91-06 and 3745-9-09, and as specified by paragraph (B) of rule 3745-83-01 of the Administrative Code.
- (4) Documentation that drinking water analyses required for the purpose of determining compliance with plant control tests and Chapters 3745-81, 3745-82 and 3745-90, and rules 3745-91-06 and 3745-9-09, and as specified by paragraph (B) of rule 3745-83-01 of the Administrative Code, are performed in accordance with the analytical methods which the laboratory has been certified to use.
- (5) Obtaining written approval from the director prior to making any changes in the analytical methodologies or procedures which the laboratory has been certified to use.
- (6) Documentation that the laboratory and equipment therein conform to the laboratory plan approved by the director, and that all necessary laboratory equipment is operational.
- (7) Notification to the director in writing of any change in personnel or equipment which may affect the laboratory's ability to accurately perform drinking water analyses.
- (8) Submitting revised plans and obtaining approval from the director prior to any proposed laboratory remodeling or relocation. During any remodeling or relocation, the director may refuse to accept drinking water analytical results for the purpose of determining compliance with plant control tests and Chapters 3745-81, 3745-82 and 3745-90, and rules 3745-91-06 and 3745-9-09, and as specified by paragraph (B) of rule 3745-83-01 of the Administrative Code. Upon completion of said remodeling or relocation the laboratory shall notify the director in writing.
- (9) Documentation that an acceptable quality assurance plan as described in rule 3745-89-03 of the Administrative Code is being followed.
- (10) Maintenance of an acceptable quality assurance plan for drinking water analyses and submittal of revisions to the director prior to implementation of any revisions.
- (11) An acceptable level of performance for the reporting of analytical data as described in

rule 3745-89-08 of the Administrative Code, including an absence of any falsification in the reports, as well as reporting analytical results in accordance with the reporting limits established in appendix B to rule 3745-89-03 of the Administrative Code.

- (12) Obtaining acceptable results within the past twelve months in at least one proficiency test for each regulated contaminant that the laboratory has certification.
  - (13) Satisfactory performance for analyses included in interlaboratory comparison and verification studies, if such are required by the director.
  - (14) Allowing on-site surveys of the laboratory by certification personnel, including unannounced on-site surveys.
  - (15) Acceptable performance as described in paragraph (A)(5) of rule 3745-89-03 of the Administrative Code during each on-site survey, including unannounced on-site surveys.
  - (16) Correction of deviations noted in survey reports, as set forth in paragraph (A)(6) of rule 3745-89-03 of the Administrative Code, within the time frame specified by the director. The corrections shall be reported to the director in writing, satisfactorily addressing each individual deviation.
- (B) The laboratory may be required to issue notification to its customers, within a specified period of time, explaining deviations noted in the survey. The laboratory may also be required to notify affected customers of unacceptable data, which may include, but not be limited to, a clear, accurate and easily understood explanation of why the results were unacceptable.
- (C) In addition to paragraph (A) of this rule, laboratories holding a valid and unexpired laboratory certification for gross alpha particle activity, radium-226 and radium-228 radioactivity, gross beta particle activity, strontium-89 and strontium-90 radioactivity, tritium, or radioactivity from photon emitters (excluding iodine-131), shall participate in all quality control samples and proficiency test samples. Satisfactory performance in appropriate analyses as described in rule 3745-89-03 of the Administrative Code shall be obtained in at least one proficiency test study per year.
- (D) Failure to maintain certification in accordance with this rule may result in suspension or revocation of a laboratory's certification in accordance with rule 3745-89-06 of the Administrative Code.

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05/04/15

3745-89-06      **Director's actions for laboratory certification.**

- (A) The director shall issue or renew a laboratory certification provided the laboratory has met the laboratory certification requirements as described in this chapter of the Administrative Code.
  - (1) Laboratory certification shall expire within three years from the effective date of certification. Laboratory certification shall expire within one year from the effective date of certification if the laboratory certification meets one of the following:
    - (a) Is an initial certification under rule 3745-89-03 of the Administrative Code.
    - (b) Directly follows a period of revocation or denial of a former certification under this rule.
  - (2) The period and provisions of each laboratory certification are summarized on a laboratory certificate, which is issued to the laboratory as a record of the certification and its details.
- (B) The director may deny, suspend or revoke a laboratory certification, or all such certifications issued to a laboratory under this chapter, in accordance with Chapters 3745-47 and 3745-49 of the Administrative Code, upon any finding of the following:
  - (1) The laboratory or any laboratory personnel has falsified laboratory data.
  - (2) The laboratory failed to meet laboratory certification requirements as described in rules 3745-89-03 to 3745-89-05 of the Administrative Code or submitted unacceptable data.
  - (3) The laboratory failed to meet the reporting requirements in rule 3745-89-08 of the Administrative Code.
  - (4) The laboratory has submitted unacceptable data.
  - (5) The laboratory has submitted a proficiency test sample to another laboratory for analysis and reported the data as its own.
  - (6) A person not named on a valid laboratory certificate performed analysis of a water proficiency test sample for purposes of retaining a valid laboratory certification.
  - (7) The laboratory or any laboratory personnel has performed, reported, or failed to report drinking water analyses in such a manner as to threaten public health or welfare.
  - (8) The laboratory failed to satisfactorily correct deviations.
- (C) The director may deny, suspend or revoke an individual's certification to perform laboratory analyses issued under this chapter if the individual is an operator certified under Chapter 3745-7 of the Administrative Code and said certification is suspended or revoked for any reason other than falsification.
- (D) The director shall revoke an individual's certification to perform laboratory analyses issued

under this chapter if the individual is an operator certified under Chapter 3745-7 of the Administrative Code and said certification is suspended or revoked for actions related to falsification.

- (E) During the pendency of an action to suspend or revoke a laboratory certification, the results of performances on a proficiency test shall not be considered by the director in making a determination to suspend or revoke the certification.
- (F) The results of drinking water analyses shall not be acceptable for determining compliance with Chapters 3745-81, 3745-82 and 3745-90, and rules 3745-91-06 and 3745-9-09, or as specified by paragraph (B) of rule 3745-83-01 of the Administrative Code, or for other analyses required by the director, if the results are obtained in violation of rule 3745-81-27 of the Administrative Code or this chapter during the pendency of an action to suspend or revoke a laboratory certification.
- (G) Suspension of a laboratory certification shall be for a time period specified by the director, but no less than thirty days and no more than six months, provided a correction statement is submitted in writing to the director addressing each individual deviation within the time period specified by the director and is acceptable to the director in accordance with paragraph (I) of this rule.
- (H) The director may notify or require a laboratory to notify customers, within a specific period of time, of the suspended or revoked certification.
- (I) The laboratory shall demonstrate in a manner acceptable to the director that deviations have been addressed to cease suspended certification. The demonstration shall be in writing and may include, but not be limited to, on-site surveys or other means as determined by the director. If the deviations are not satisfactorily addressed within the specified time period, the certificate may remain suspended or be revoked.
- (J) Revocation or denial of a new or renewed laboratory certification shall remain in effect for a time period specified by the director of not less than ninety days and not more than one year. Laboratories shall not reapply for certification until the period of denial or revocation expires. After such time, the laboratory may apply for certification as specified in rule 3745-89-03 of the Administrative Code.
- (K) All actions under this rule affecting the status of a laboratory's certification shall be in accordance with Chapters 3745-47 and 3745-49 of the Administrative Code. The director shall notify the laboratory of any action to deny, suspend or revoke certification. An action taken by the director under this rule does not preclude the director from pursuing additional civil or criminal enforcement. Suspension or revocation may include any or all laboratory certifications issued by the director under this chapter.



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Five Year Review (FYR) Dates: 05/04/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.04, 3745.50

Prior Effective Dates: 11/26/80, 04/09/90, 04/01/99, 06/18/04, 09/14/09,  
05/04/15

3745-89-07      **Laboratory certificate property of state; display.**

A laboratory certificate issued under this chapter remains the property of the state and shall be surrendered to the director upon revocation. The certificate shall be displayed at all times in a prominent location in the laboratory for which it was issued.

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Statutory Authority: 6109.03, 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 11/26/80, 4/9/90

**3745-89-08 Analysis and Reporting.**

Analysis and reporting for samples used to determine compliance with Chapters 3745-81, 3745-82 and 3745-90, and rules 3745-9-09 and 3745-91-06 of the Administrative Code shall be completed by a laboratory certified by the director to perform drinking water testing, or by a facility acceptable to the director, including out of state laboratories that meet paragraph (D) of rule 3745-89-02 of the Administrative Code, as follows:

- (A) Beginning October 1, 2018, a complete analysis, including quality control, shall be performed no later than thirty business days after receipt of the sample. For radiological chemicals, a complete analysis, including quality control, shall be performed no later than sixty business days after receipt of the sample.
- (B) Except as provided for in paragraph (C) of this rule, results shall be reported to the director and to public water systems by the tenth day following the date the analyses are completed. All reports required under this rule shall be submitted electronically via a method acceptable to the director.
- (C) The following results shall be reported by no later than the end of the next business day after the analysis is completed:
  - (1) All positive and all repeat sample results required by rules 3745-81-14 and 3745-81-21 of the Administrative Code, and all microbial monitoring results required by rule 3745-81-42 of the Administrative Code.
  - (2) All results at or above any maximum contaminant level specified in rule 3745-81-11, 3745-81-12, or 3745-81-15 of the Administrative Code, and all resample results to confirm MCL exceedances.
  - (3) All detections of total microcystins in raw and finished water samples required by Chapter 3745-90 of the Administrative Code, all results of microcystins samples collected in response to an exceedance of the microcystins action level established in paragraph (A)(1) or (A)(2) of rule 3745-90-02 of the Administrative Code, and all results of cyanobacteria screening that indicate the potential for production of cylindrospermopsin, saxitoxins or anatoxin-a.
  - (4) Results of lead and copper tap water sample analysis and all identifying information about where the sample was collected to the water system and the director.
  - (5) All startup sample results for seasonal public water systems required by rule 3745-81-51 of the Administrative Code.
- (D) All results required to be reported under paragraph (C) of this rule must be reported as follows:
  - (1) To the director electronically via a method acceptable to the director.
  - (2) To public water systems either by fax, electronically via a method acceptable to the director, or by overnight mail delivery.
- (E) Reports required under this rule shall be submitted on forms or in a form acceptable to the director and shall be complete and correct. Each report shall include at least the analytical data, the name and certification number of the laboratory performing or reporting the analysis, the analytical method type, the dates that the sample was collected and received as well as the date the analysis was completed, the sample identification number as separately assigned by the laboratory for each sample, the analyst number of the laboratory analyst who performed the analyses, the sample collector's identification information, and complete sample and public water system identification information including sample location description, sample monitoring

point and sample type. Additional information may be required based on contaminant.

- (F) The director may establish reporting limits for any approved analytical method for contaminants listed in Chapters 3745-81 and 3745-90 of the Administrative Code. Laboratories shall report analytical results in accordance with the reporting limits established in appendix B to rule 3745-89-03 of the Administrative Code.
- (G) Failure by a laboratory to file appropriate, complete, correct, and timely reports of analytical results required by this rule may be considered by the director as failure to meet an acceptable level of performance and as failure to successfully meet the requirements for renewal of a laboratory certification. Out of state laboratories and in state facilities that fail to meet the requirements of this rule may be removed from the list of acceptable analytical laboratories and reporting facilities by the director.
- (H) Analytical results required by rules 3745-81-73 to 3745-81-75, and 3745-83-01 and Chapter 3745-82 of the Administrative Code, except for paragraph (G)(1) of rule 3745-81-75 of the Administrative Code, shall be reported to the director only when requested by the director.
- (I) A laboratory or a facility that subcontracts, as defined in rule 3745-89-01 of the Administrative Code, is responsible for meeting the reporting requirements in this rule. A laboratory or facility may arrange with a subcontracted laboratory to perform this reporting; however, the laboratory retains the ultimate responsibility for these reporting requirements.

Effective: 5/1/2018

Five Year Review (FYR) Dates: 1/31/2018 and 05/01/2023

Promulgated Under: 119.03

Statutory Authority: 6109.04, 6109.121

Rule Amplifies: 6109.04, 6109.121, 3745.50

Prior Effective Dates: 10/1/95, 4/1/99, 6/28/03, 6/18/09, 9/14/09, 10/31/10,  
5/4/15, 6/1/2016

**3745-89-09     Interim authorization for plant control tests or MMO-MUG (SM 9223) tests.**

- (A) A laboratory with a valid and unexpired certification under this chapter may request that the director grant an individual interim authorization to perform for the laboratory one or more of the plant control tests for pH, turbidity, alkalinity, stability, hardness, fluoride, chloride, chlorine dioxide, chlorite and chlorine, or MMO-MUG (SM 9223) tests according to the following:
- (1) The director shall grant interim authorization only to an individual(s) who has performed acceptably during parallel testing defined in paragraph (A)(3)(d) or (A)(3)(e) of this rule. Acceptable performance is defined as obtaining results within plus or minus ten per cent of the certified analyst for plant control test, and no false negatives and no more than one false positive in the parallel testing set for MMO-MUG (SM 9223) tests.
  - (2) The number of individuals requested for interim authorization by the laboratory may not be more than two.
  - (3) A laboratory shall submit an application for interim authorization to the director on a form provided by the director. The application shall include the following information:
    - (a) The name, address and telephone number of the laboratory and of the individual responsible for the laboratory.
    - (b) The list of analysts specified on the laboratory's applicable certificates and the plant control tests which each analyst currently performs.
    - (c) The list of individuals and the plant control tests or MMO-MUG (SM 9223) tests for which interim authorization is sought.
    - (d) Documentation for each individual on each plant control test requested for interim authorization of at least twenty days of analytical results generated in parallel testing with an analyst included on a certificate for those same plant control tests. The previous certification of an individual to perform plant control tests may be considered for satisfying this requirement.
    - (e) Documentation for each individual requesting interim authorization for MMO-MUG (SM 9223) must include seven samples per day totaling at least twenty-one samples, including the required quality control samples, with results generated in parallel testing with an analyst included on a certificate for MMO-MUG (SM 9223) tests. The previous certification of an individual to perform MMO-MUG (SM 9223) tests may be considered for satisfying this requirement.
- (B) In order for an individual to be granted interim authorization for any plant control test or MMO-MUG (SM 9223) tests, the analytical results required by paragraphs (A)(3)(d) and (A)(3)(e) of this rule shall indicate the individual has an acceptable

performance as defined in paragraph (A)(1) of this rule.

- (C) The analytical results produced by the individual with interim authorization shall be independently reviewed by an analyst included on a certificate for the same tests as those granted for interim authorization.
- (D) Within six months of an interim authorization, an on-site survey will be scheduled. Interim authorization shall remain in effect for a period not to exceed six months, unless an extension is granted or, if an on-site survey is scheduled or has been conducted, until the on-site survey report is issued.
- (E) The laboratory shall demonstrate an acceptable level of performance, by all individuals for which interim authorization is sought, during an on-site survey as described in paragraph (A)(5) of rule 3745-89-03 of the Administrative Code.

Effective: 05/04/2015

R.C. 106.03 review dates: 01/05/2015 and 05/04/2020

Promulgated Under: 119.03

Statutory Authority: 6109.03, 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 4/1/99, 6/18/04

**3745-89-10      Interim authorization for new contaminants and new methods.**

The director may grant interim authorization, as defined in rule 3745-89-01 of the Administrative Code, for certified laboratories to perform drinking water analyses by using new methods, for new contaminants, or both, during a transition period necessary for implementation of new or amended regulations. Such authorization shall follow the following procedures:

- (A) The director shall notify certified laboratories of the availability of interim authorization and the drinking water analyses to be included.
- (B) Interim authorization shall only be available to laboratories which currently have valid certification under this chapter for the same type of drinking water analysis (microbiological contaminants, inorganic, trace metals, etc.) as the drinking water analyses to be included in the interim authorization.
- (C) In order to be considered for interim authorization, the laboratory shall submit to the director an application for interim authorization, on a form provided by the director. The application shall include the following information:
  - (1) The name, address and telephone number of the laboratory and of the individuals responsible for the laboratory.
  - (2) Statement of the drinking water analyses and methods for which interim authorization is sought and the analysts to be included in the interim authorization to perform the analyses. The analysts shall be individuals already identified on a valid certificate of approval for the laboratory for performing similar analyses or for analyzing the same type of contaminant.
  - (3) Documentation that the laboratory obtained acceptable results within the past twelve months for at least one proficiency test provided by a proficiency test provider for each drinking water analysis to be included in the interim authorization.
  - (4) Documentation that method detection limit (MDL) studies have been completed by the laboratory for each drinking water chemistry analysis to be included in the interim authorization, with the MDL studies indicating that the laboratory is capable of meeting any specified analytical reporting requirements.
  - (5) Documentation that the laboratory has successfully passed one microbiological proficiency test set from a "National Environmental Laboratory Accreditation Program (NELAP)" approved proficiency test supplier with the method not approved by the Ohio environmental protection agency. The test data shall be sent directly to the state proficiency test coordinator from the proficiency test provider. The laboratory shall pass the proficiency test study with the method for which interim authorization is being sought.
- (D) When granted, interim authorization shall state the individuals and drinking water analyses included in the interim authorization and the length of time that the interim



authorization will remain in effect.

- (E) An on-site survey shall be scheduled to verify acceptable performance by the laboratory granted interim authorization. Interim authorization shall remain in effect for the length of time specified by the director or until the on-site survey is completed and certification is granted under rule 3745-89-06 of the Administrative Code, whichever occurs first.

Effective: 05/04/2015

R.C. 106.03 review dates: 01/05/2015 and 05/04/2020

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Statutory Authority: 6109.03, 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 4/1/99, 6/18/04

**3745-89-11      Certified laboratories for the "Long Term 2 Enhanced Surface Water Treatment Rule".**

- (A) Cryptosporidium. Systems shall have Cryptosporidium samples analyzed in accordance with procedures identified in rule 3745-81-27 of the Administrative Code by a laboratory that is certified by the United States environmental protection agency, the "National Environmental Laboratory Accreditation Program (NELAP)," or by another state program, which is acceptable to the director, to perform the required analyses.
- (B) E. coli. Systems shall have E. coli samples analyzed by a laboratory that is certified by the United States environmental protection agency or the "National Environmental Laboratory Accreditation Program (NELAP)" for E. coli analysis in accordance with 40 C.F.R. 141.74 or a laboratory certified by the Ohio environmental protection agency in accordance with procedures identified in rule 3745-81-27 of the Administrative Code, provided that the laboratory obtains acceptable results on a source water proficiency test sample.
- (C) Turbidity. Measurements of turbidity shall be made in accordance with paragraph (C)(3) of rule 3745-81-27 of the Administrative Code.

[Comment: The 40 C.F.R. 141.74 refers to "Analytical and monitoring requirements" published on February 13, 2013. A copy of this code may be obtained from the "U.S. Government Bookstore" toll-free at (866) 512-1800 or <http://bookstore.gpo.gov>, or from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215," (614) 644-2752. The code is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215."]

Replaces: 3745-89-11

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R.C. 106.03 review dates: 05/04/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 1/8/10

3745-90-01      **Harmful algal blooms - definitions.**

Except as follows, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter:

- (A) "Action level," for the purposes of this chapter, is the concentration of a cyanotoxin which, if exceeded, will require additional monitoring, and potentially other actions as described in this chapter of the Administrative Code.
- (B) [Reserved.]
- (C)
  - (1) "Cyanobacteria" means photosynthesizing bacteria, also called blue-green algae, which naturally occur in marine and fresh water ecosystems, and may produce cyanotoxins which at sufficiently high concentrations can pose a risk to public health.
  - (2) "Cyanobacteria screening" means quantitative polymerase chain reaction (qPCR) for the detection of genes unique to cyanobacteria and genes associated with the production of cyanotoxins, or a method for phytoplankton identification acceptable to the director.
  - (3) "Cyanotoxin" means a toxin (such as microcystins) produced by cyanobacteria, which include liver toxins, nerve toxins and skin toxins.
- (D)
  - (1) "Detected" or "detection" means an analytical result that is equal to or greater than the reporting limit for the analytical method being used.
  - (2) "Distribution sampling points" means representative points in the distribution system.
- (E) [Reserved.]
- (F) "Finished water sampling point" means each entry point to the distribution system which is representative of the water intended for distribution and consumption without further treatment, except as necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals.)
- (G) [Reserved.]
- (H) [Reserved.]
- (I) [Reserved.]
- (J) [Reserved.]
- (K) [Reserved.]
- (L) [Reserved.]
- (M) "Microcystins" means total microcystins: the combination of all the variants of the

cyanotoxin microcystin, which is produced by a number of cyanobacteria.

(N) [Reserved.]

(O) [Reserved.]

(P) "Phytoplankton" means free-floating photosynthesizing microscopic organisms that inhabit almost all bodies of water, and include cyanobacteria, diatoms, green algae and dinoflagellates.

(Q) [Reserved.]

(R) "Raw water sampling point" means each plant intake in use prior to any treatment, or another raw water sampling point acceptable to the director.

(S) [Reserved.]

(T) [Reserved.]

(U) [Reserved.]

(V) [Reserved.]

(W)

(1) "Week" means a period of seven days beginning with Sunday and ending with Saturday.

(2) "Weekly" means once during the period of seven days beginning with Sunday and ending with Saturday.

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Statutory Authority: 3745.50, 6109.04  
Rule Amplifies: 3745.50, 6109.04

3745-90-02      **Harmful algal blooms - applicability and action levels.**

- (A) The following action levels for microcystins are based, in part, on the United States environmental protection agency's "Drinking Water Health Advisory for the Cyanobacterial Microcystin Toxins," dated June, 2015 and apply to all public water systems, including consecutive water systems:
- (1) 0.3 micrograms per liter (ug/L) for people under the age of six, pregnant women, nursing mothers, those receiving dialysis treatment and those with pre-existing liver conditions.
  - (2) 1.6 ug/L for all individuals.
- (B) Exceedance of these action levels in samples collected at a finished water sampling point or a distribution sampling point will require additional monitoring, and potentially other actions as described in this chapter of the Administrative Code.

[Comment: This rule references the United States environmental protection agency's "Drinking Water Health Advisory for the Cyanobacterial Microcystin Toxins, " dated June, 2015 (designated "EPA 820R15100"). This document may be obtained from the "National Service Center for Environmental Publications (NSCEP)" by mail at "U.S. EPA/NSCEP, P.O. Box 42419, Cincinnati, OH, 45242-0419," by telephone at (800) 490-9198, or online at <http://www2.epa.gov/nscep>. This document is also available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215" or by contacting the division of drinking and ground waters at (614) 644-2752.]

[Comment: The United States environmental protection agency's health advisory levels describe concentrations of drinking water at or below which adverse health effects are not expected to occur if consuming water containing microcystins at this concentration for up to ten days.]

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Statutory Authority: 3745.50, 6109.04  
Rule Amplifies: 3745.50, 6109.04

3745-90-03      **Harmful algal blooms - monitoring.**

This rule applies to all surface water systems and consecutive water systems receiving water from a surface water source. Seasonal systems shall monitor in accordance with this rule during the system's operating season.

(A) Surface water systems.

(1) Cyanobacteria screening.

Surface water systems shall monitor with a minimum of one sample from each raw water sampling point at least once every two weeks for cyanobacteria screening. Cyanobacteria samples shall be collected at the same time as the routine microcystins sample.

(2) Routine microcystins monitoring.

(a) Routine microcystins monitoring requirements between May first and October thirty-first.

Surface water systems shall monitor with a minimum of one sample from each raw water sampling point and one sample from each finished water sampling point at least weekly for microcystins analysis.

(b) Routine microcystins monitoring requirements between November first and April thirtieth.

(i) Surface water systems shall continue to monitor in accordance with paragraph (A)(2)(a) of this rule unless microcystins are not detected in at least two consecutive weekly samples from both the raw water sampling point and the finished water sampling point, then the microcystins monitoring frequency is reduced to a minimum of one sample from each raw water sampling point at least once every two weeks.

(ii) If microcystins are detected at a raw water sampling point, weekly monitoring at that raw water sampling point and the finished water sampling point shall be conducted beginning no later than twenty-four hours following the detection. When microcystins are not detected in at least two consecutive weekly samples from both the raw water sampling point and the finished water sampling point, then monitoring once every two weeks may resume in accordance with paragraph (A)(2)(b)(i) of this rule.

(c) Increased routine microcystin monitoring (three days per week).

The frequency of monitoring at both raw water sampling points and finished water sampling points shall be increased to three days a week, beginning no later than the following week, if microcystins exceed five micrograms per liter (ug/L) at the raw water sampling point, unless an alternate frequency has been established as part of the approved cyanotoxin general plan in accordance with rule 3745-90-05 of the Administrative Code.



Routine monitoring in accordance with paragraphs (A)(2)(a) and (A)(2)(b) of this rule may resume once the following occur:

- (i) Microcystins concentrations are equal to or less than five ug/L in two consecutive samples from the raw water sampling point that are collected at least one day apart.
  - (ii) Microcystins concentration is non-detect at finished water sampling points.
  - (iii) If samples were collected at distribution sampling points in accordance with this rule, microcystins are not detected at any distribution sampling point.
- (d) Increased routine microcystins monitoring (daily).

The frequency of monitoring at both raw water sampling points and finished water sampling points shall be increased to daily if microcystins are detected at finished water sampling points collected in accordance with this rule, or distribution sampling points collected in accordance with this rule. Daily monitoring shall include analysis within twenty-four hours of sample collection.

Routine monitoring may resume in accordance with paragraphs (A)(2)(a) and (A)(2)(b) of this rule if the two most recent consecutive daily samples from the raw water sampling point are equal to or less than five ug/L, or in accordance with paragraph (A)(2)(c) of this rule if either of the two most recent consecutive daily samples from the raw water sampling point are greater than five ug/L, once the following occur:

- (i) Microcystins are not detected in two consecutive daily samples collected at the finished water sampling point.
- (ii) If samples were collected at distribution sampling points in accordance with this rule, microcystins are below the action level at distribution sampling points.

(3) Revised cyanobacteria screening or routine microcystins monitoring frequency.

The cyanobacteria screening or routine microcystins monitoring frequency may be revised (decreased, increased or discontinued) at the discretion of the director. When establishing the revised schedule, the director may consider cyanobacteria screening data collected in accordance with this rule, microcystins data, and other information provided by the public water system including data from other screening tools (such as phycocyanin sensors or phytoplankton enumeration) and treatment information. Surface water systems shall monitor in accordance with the revised cyanobacteria screening or routine microcystins monitoring schedule established by the director.

(4) Response to microcystins action level exceedance.

If microcystins exceed an action level established in paragraph (A)(1) or (A)(2) of rule 3745-90-02 of the Administrative Code in routine samples collected at the finished water sampling point, the public water system shall do the following:

- (a) As soon as possible, but no later than twenty-four hours after receiving the results of the initial action level exceedance, collect one resample from each raw water sampling point and one resample from each finished water sampling point. Analysis of resamples must be completed within twenty-four hours of collection. These resamples satisfy the requirement for daily samples as set forth in paragraph (A)(2)(d) of this rule.
  - (b) Within twenty-four hours of collecting the resamples, collect one repeat sample from each raw water sampling point and one repeat sample from each finished water sampling point. Analysis of repeat samples must be completed within twenty-four hours of collection. These repeat samples satisfy the requirement for daily samples as set forth in paragraph (A)(2)(d) of this rule.
  - (c) If the microcystins concentration exceeds the action level in the resample or repeat sample collected at any finished water sampling point in accordance with paragraph (A)(4)(a) or (A)(4)(b) of this rule, as soon as practical but no later than three hours after receiving the resample or repeat sample results, the surface water system shall notify all consecutive systems served by the water system. The surface water system with the action level exceedance, and all consecutive water systems served by the water system, shall within twenty-four hours of receiving the resample or repeat sample results, collect samples at representative distribution sampling points in accordance with the contingency plan required by rule 3745-85-01 of the Administrative Code. Additional distribution system monitoring may be required by the director based on sampling results and other relevant circumstances. Analysis of distribution samples must be completed within twenty-four hours of collection.
  - (d) Conduct routine daily monitoring in accordance with paragraph (A)(2)(d) of this rule.
- (B) Consecutive water systems receiving water from an in-state surface water system.
- Within twenty-four hours of receiving notification of an action level exceedance in accordance with paragraph (A)(4)(c) or (C)(2)(c) of this rule, the consecutive water system shall collect samples at representative distribution sampling points in accordance with the contingency plan required by rule 3745-85-01 of the Administrative Code. Additional distribution system monitoring may be required by the director based on sampling results and other relevant circumstances. Analysis of distribution samples must be completed within twenty-four hours of collection.
- (C) Consecutive water systems receiving water from an out-of-state surface water source.
- (1) Routine microcystins monitoring.
    - (a) Routine microcystins monitoring requirements between May first and October thirty-first.

Consecutive water systems receiving water from an out-of-state surface water source shall monitor with a minimum of one sample from each finished water

sampling point at least weekly for microcystins analysis.

- (b) Routine microcystins monitoring requirements between November first and April thirtieth.

Consecutive water systems receiving water from an out-of-state surface water source shall monitor with a minimum of one sample from each finished water sampling point at least once every two weeks for microcystins analysis.

- (c) Increased routine microcystins monitoring (daily).

The frequency of monitoring at finished water sampling points shall be increased to daily if microcystins are detected at finished water sampling points collected in accordance with this rule, or distribution sampling points collected in accordance with this rule. Daily monitoring shall include analysis within twenty-four hours of sample collection.

Routine monitoring may resume in accordance with paragraph (C)(1)(a) or (C)(1)(b) of this rule once the following occur:

- (i) Microcystins are not detected in two consecutive daily samples collected at the finished water sampling point.
- (ii) If samples were collected at distribution sampling points in accordance with this rule, microcystins are below the action level at distribution sampling points.

- (d) Revised routine microcystins monitoring frequency.

The routine microcystins monitoring frequency may be revised (decreased, increased or discontinued) at the discretion of the director. When establishing the revised schedule, the director may consider microcystins data, and other information provided by the public water system including data from screening tools (such as phycocyanin sensors or phytoplankton enumeration) and treatment information. Consecutive water systems shall monitor in accordance with the revised routine microcystins monitoring schedule established by the director.

- (2) Response to microcystins action level exceedance.

If microcystins exceed an action level established in paragraph (A)(1) or (A)(2) of rule 3745-90-02 of the Administrative Code in routine samples collected at the finished water sampling point, the public water system shall do the following:

- (a) As soon as possible, but no later than twenty-four hours after receiving the results of the initial action level exceedance, collect one resample from each finished water sampling point. Analysis of resamples must be completed within twenty-four hours of collection. This resample satisfies the requirement for daily samples as set forth in paragraph (C)(1)(c) of this rule.
- (b) Within twenty-four hours of collecting the resamples, collect one repeat sample

from each finished water sampling point. Analysis of repeat samples must be completed within twenty-four hours of collection. This repeat sample satisfies the requirement for daily samples as set forth in paragraph (C)(1)(c) of this rule.

- (c) If the microcystins concentration exceeds the action level in the resample or repeat sample collected at any finished water sampling point in accordance with paragraph (C)(2)(a) or (C)(2)(b) of this rule, as soon as practical but no later than three hours after receiving the resample or repeat sample results, the public water system shall notify all consecutive systems served by the water system. The public water system with the action level exceedance, and all consecutive water systems served by the water system, shall within twenty-four hours of receiving the resample or repeat sample results, collect samples at representative distribution sampling points in accordance with the contingency plan required by rule 3745-85-01 of the Administrative Code. Additional distribution system monitoring may be required by the director based on sampling results and other relevant circumstances. Analysis of distribution samples must be completed within twenty-four hours of collection.

- (d) Conduct routine daily monitoring in accordance with paragraph (C)(1)(c) of this rule.

(D) Monitoring extension.

Upon a request from a public water system, the director may agree to extend the twenty-four hour monitoring requirement for daily, resample, repeat or distribution samples required pursuant to this rule on a case-by-case basis when the public water system has a logistical problem collecting samples within twenty-four hours or analyzing samples in accordance with the requirements of this chapter. When an extension is agreed to by the director, the director shall specify in writing how much time the public water system has to monitor. Examples of potential logistical problems include, but are not limited to:

- (1) Extreme weather conditions create unsafe travel or on-site conditions for the person collecting the sample.
- (2) Limited certified laboratory capacity on weekends and holidays.

(E) Violations.

Failure to comply with routine and distribution monitoring requirements in paragraph (A)(1), (A)(2), (A)(3), (A)(4)(c), (B), (C)(1) or (C)(2)(c) of this rule is a monitoring violation and requires the public water system to provide Tier 3 public notification in accordance with rule 3745-81-32 of the Administrative Code. Failure to comply with resample and repeat sample requirements in paragraph (A)(4)(a), (A)(4)(b), (C)(2)(a) or (C)(2)(b) of this rule is a monitoring violation and requires the public water system to provide a tier 1 public notification in accordance with rule 3745-81-32 of the Administrative Code.

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Rule Amplifies: 3745.50, 6109.04

3745-90-04      **Harmful algal blooms - analytical methods and reporting.**

- (A) Until one year after the effective date of this rule, microcystins analysis shall be performed by a laboratory found to be acceptable to the Ohio environmental protection agency. Beginning one year from the effective date of this rule, microcystins analysis shall be performed by a laboratory certified by the director pursuant to Chapter 3745-89 of the Administrative Code. However, if a laboratory found to be acceptable submits a complete application for certification in accordance with rule 3745-89-04 of the Administrative Code, the laboratory may continue to perform microcystins analysis until action is taken on the application.
- (B) Until the director determines there is sufficient certified laboratory capacity for cyanobacteria screening and no earlier than one year after the effective date of this rule, the Ohio environmental protection agency division of environmental services will perform cyanobacteria screening. After the director determines there is sufficient certified laboratory capacity for cyanobacteria screening, cyanobacteria screening required by this chapter shall be performed by a laboratory certified by the director pursuant to Chapter 3745-89 of the Administrative Code.
- (C) In addition, analysis required by this chapter shall be conducted in accordance with the following analytical methods and time frames:
  - (1) Cyanobacteria screening: qPCR method accepted by the director or another method accepted by the director in writing. Samples must be analyzed within seven days of collection.
  - (2) Microcystins: "Ohio EPA DES method 701.0, Ohio EPA Total (Extracellular and Intracellular) Microcystins - ADDA by ELISA Analytical Methodology" version 2.2 (November 2015) or another method accepted by the director in writing. Except where otherwise noted in this chapter and notwithstanding the holding time specified in the method, samples must be analyzed within five days of collection.
- (D) Reporting of analytical data for determining compliance with this chapter shall be completed in accordance with rule 3745-89-08 of the Administrative Code.
- (E) Failure to meet paragraph (D) of this rule is a reporting violation and requires the public water system to provide tier 3 public notification in accordance with rule 3745-81-32 of the Administrative Code.

[Comment: This rule incorporates the "Ohio EPA DES method 701.0, Ohio EPA Total (Extracellular and Intracellular) Microcystins - ADDA by ELISA Analytical Methodology" version 2.2 (November 2015) by reference. Copies are available at [www.epa.ohio.gov/ddagw/HAB.aspx](http://www.epa.ohio.gov/ddagw/HAB.aspx) and from the "Ohio EPA Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215." Copies can also be obtained by contacting the laboratory certification office at (614) 644-4245.]

Effective: 06/01/2016

Five Year Review (FYR) Dates: 06/01/2021

Promulgated Under: 119.03

Statutory Authority: 3745.50, 6109.04

Rule Amplifies: 3745.50, 6109.04

3745-90-05      **Harmful algal blooms - treatment techniques.**

This rule applies to all public water systems except consecutive water systems.

- (A) A public water system shall develop and submit to the director written treatment optimization protocols when microcystins are detected in a sample collected at a raw water sampling point or a finished water sampling point. The protocols shall include treatment adjustments that will be made under various raw and finished water conditions. In developing the protocols, the public water system shall review and optimize existing treatment for microcystins, considering effective strategies for cyanotoxin treatment such as avoiding lysing cyanobacterial cells, optimizing removal of intact cells, optimizing barriers for extracellular cyanotoxin removal or destruction, optimizing sludge removal and discontinuing or minimizing backwash recycling. The treatment optimization protocols shall be submitted to the director in accordance with the following timelines:
  - (1) Within thirty days of the effective date of this rule, for public water systems which have detected microcystins in a sample collected between July 16, 2015 and the effective date of this rule.
  - (2) If a public water system was not required to submit written treatment optimization protocols under paragraph (A)(1) of this rule, then within thirty days of a detection of microcystins in a sample collected after the effective date of this rule.
- (B) A public water system shall comply with all of the following when monitoring conducted in accordance with rule 3745-90-03 of the Administrative Code indicates microcystins concentrations exceed 1.6 micrograms per liter in a sample collected at the raw water sampling point more than once within a consecutive twelve-month period, or when microcystins are detected in a sample collected at a finished water sampling point or a distribution sampling point:
  - (1) Within one hundred and twenty days, the public water system shall submit a cyanotoxin general plan to the director for approval in accordance with paragraph (C) of rule 3745-91-02 of the Administrative Code. The cyanotoxin general plan shall include both short-term and long-term actions to prevent exceedances of the microcystins action levels established in paragraph (A)(1) or (A)(2) of rule 3745-90-02 of the Administrative Code in finished water. The cyanotoxin general plan may include one or a combination of source water protection activities, avoidance strategies, reservoir management and in-plant treatment technologies. The cyanotoxin general plan shall include a schedule for implementation or a demonstration that existing practices are sufficient to prevent exceedances of the microcystins action levels established in paragraph (A)(1) or (A)(2) of rule 3745-90-02 of the Administrative Code in finished water. The cyanotoxin general plan may be approved by the director with or without conditions or disapproved in accordance with the provisions of Chapter 3745-91 of the Administrative Code.
  - (2) Implement the approved cyanotoxin general plan in accordance with the approved schedule.
  - (3) Continue to monitor for microcystins in accordance with rule 3745-90-03 of the



Administrative Code to demonstrate treatment effectiveness.

- (C) If the system does not comply with paragraph (A), (B)(1) or (B)(2) of this rule, the public water system is in violation of the treatment technique requirements of this rule and shall issue tier 2 public notification in accordance with rule 3745-81-32 of the Administrative Code using the standard health effects language in paragraph (C) of rule 3745-90-06 of the Administrative Code.
- (D) Written treatment protocols and cyanotoxin general plans submitted under paragraphs (A) and (B) of this rule are not public records pursuant to section 149.433 of the Revised Code.

Effective: 06/01/2016

Five Year Review (FYR) Dates: 06/01/2021

Promulgated Under: 119.03

Statutory Authority: 3745.50, 6109.04

Rule Amplifies: 3745.50, 6109.04

**3745-90-06      Harmful algal blooms - tier 1 public notification and consumer confidence reports.**

This rule applies to all public water systems, including consecutive water systems.

**(A) Tier 1 public notification.**

- (1) A public water system shall issue tier 1 public notification in accordance with rule 3745-81-32 of the Administrative Code when any of the following occur:
  - (a) A microcystins action level established paragraph (A)(1) or (A)(2) in rule 3745-90-02 of the Administrative Code is exceeded in a repeat sample collected at the finished water sampling point in accordance with rule 3745-90-03 of the Administrative Code, unless the director agrees in writing that the timeline for notification may be extended or public notification is not necessary, based on extenuating circumstances, until additional results are received.
  - (b) If required by the director based on the results of resamples, distribution system samples or daily samples collected in accordance with paragraph (A)(4), (B) or (C)(2) of rule 3745-90-03 of the Administrative Code.
  - (c) Failure to conduct resampling or repeat sampling in accordance with paragraph (A)(4)(a), (A)(4)(b), (C)(2)(a) or (C)(2)(b) of rule 3745-90-03 of the Administrative Code, unless the director agrees in writing that the timeline for notification may be extended or public notification is not necessary.
- (2) The public notification shall include applicable content in accordance with paragraph (E) of rule 3745-81-32 of the Administrative Code, the action level exceeded and the standard health effects language in paragraph (C) of this rule.
- (3) The director may allow the system to limit distribution of the public notice in accordance with paragraph (A)(2) of rule 3745-81-32 of the Administrative Code.
- (4) Unless otherwise specified by the director based on public health and safety considerations, tier 1 public notification shall remain in effect until the following occur:
  - (a) Microcystins concentrations are below the action level in two consecutive samples collected a minimum of twenty-four hours apart at the finished water sampling point.
  - (b) Microcystins concentrations are below the action level in one set of samples collected at the distribution sampling points.

**(B) Consumer confidence report.**

Each community public water system which exceeds a microcystins action level established in paragraph (A)(1) or (A)(2) of rule 3745-90-02 of the Administrative Code in a sample collected at a finished water sampling point in a daily, resample or repeat sample, or a distribution sampling point collected within their own community water

system in accordance with rule 3745-90-03 of the Administrative Code shall include the following in the consumer confidence report required by Chapter 3745-96 of the Administrative Code:

- (1) The microcystins action level.
  - (2) The range of levels detected and highest single measurement of microcystins concentration in samples collected at finished water sampling points and distribution sampling points.
  - (3) Information regarding the major source of the contaminant: "Produced by some naturally occurring cyanobacteria, also known as blue-green algae, which under certain conditions (i.e., high nutrient concentration and high light intensity) may produce microcystins."
  - (4) Standard health effects language in paragraph (C) of this rule.
- (C) Standard health effects language.

The following standard health effects language shall be used in public notification and consumer confidence reports: "Consuming water containing concentrations of microcystins over the action level may result in abnormal liver function, diarrhea, vomiting, nausea, numbness or dizziness. Children younger than school age, pregnant women, nursing mothers, the elderly, immune-compromised individuals, those with pre-existing liver conditions and those receiving dialysis treatment may be more susceptible than the general population to the health effects of microcystins."

Effective: 06/01/2016

Five Year Review (FYR) Dates: 06/01/2021

Promulgated Under: 119.03

Statutory Authority: 3745.50, 6109.04

Rule Amplifies: 3745.50, 6109.04

3745-90-07      **Harmful algal blooms - recordkeeping.**

- (A) Any owner or operator of a public water system shall retain, on its premises or at a convenient location near its premises, records of cyanobacteria screening and microcystins analyses made pursuant to this chapter for not less than ten years.

Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

- (1) The date, place and time of sampling, and the name of the person who collected the sample.
  - (2) Identification of the sample as to whether it was a routine, resample or repeat sample and whether it was collected at a raw, finished or distribution sampling point.
  - (3) Date of analysis.
  - (4) Laboratory and person responsible for performing analysis.
  - (5) The analytical technique and method used.
  - (6) The results of the analysis.
- (B) Any owner or operator of a public water system shall retain, on its premises or at a convenient location near its premises, records of treatment optimization protocols and cyanotoxin general plans developed and approved in accordance with this chapter, public notices issued in accordance with this chapter and rule 3745-81-32 of the Administrative Code, and consumer confidence reports issued in accordance with this chapter and Chapter 3745-96 of the Administrative Code, for not less than ten years.

Effective: 06/01/2016

Five Year Review (FYR) Dates: 06/01/2021

Promulgated Under: 119.03

Statutory Authority: 3745.50, 6109.04

Rule Amplifies: 3745.50, 6109.04

Except for definitions contained in this rule, the definitions in rule 3745-81-01 of the Administrative Code shall apply to this chapter. As used in this chapter of the Administrative Code:

- (A) "Applicant" means the person who signs the submittal letter specified by rule 3745-91-07 of the Administrative Code.
- (B) "Like-kind replacement" means replacement of equipment or components that meet the design criteria specified in the plans approved by the director.
- (C) "Substantial change" means any change that affects isolation, capacity, flows, water quality, source, distribution or treatment.

(1) Substantial change shall include but not be limited to the following:

- (a) For distribution systems: new waterlines; replacement waterlines that change in size, alignment or material; new tanks; modification in storage; new booster stations; changes in pump capacity and auxiliary power;
- (b) For water sources: any new source or alteration in source, including connection to another source or distribution system; any alteration in collection facilities or equipment; or
- (c) For treatment facilities: new treatment processes, including facilities, equipment or chemicals; changes in chemical feed capacity, feeder type, application points or sequence; modifications to or removal of treatment processes, equipment or chemicals.

(2) Substantial change shall not include the following:

- (a) For distribution systems: waterline cleaning, re-lining, repairs, or like-kind replacement; service connections; and tank maintenance;
- (b) For water sources: like-kind pump replacement; and
- (c) For treatment facilities: like-kind replacement of components.



Replaces: Former 3745-91-01

Effective: 12/31/2006

Five Year Review (FYR) Dates: 10/26/2015 and 10/26/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.01, 6109.03, 6109.04, 6109.07

Prior Effective Dates: 11/26/80, 01/01/02

**3745-91-02      Application for approval of plans.**

- (A) No person shall begin construction or installation of a public water system, or make a substantial change in a public water system, until plans therefor have been approved by the director of environmental protection, unless exempted pursuant to paragraphs (D) to (F) of this rule. An application for approval of plans for such construction, installation or substantial change in a public water system, as required by section 6109.07 of the Revised Code, shall be submitted to the district office and shall consist of all of the following:
- (1) Three copies of plan drawings as specified by rule 3745-91-03 of the Administrative Code (two copies if the facility is or will be owned by a public entity).
  - (2) One copy of specifications as specified by rule 3745-91-04 of the Administrative Code.
  - (3) One copy of a data sheet as specified by rule 3745-91-05 of the Administrative Code.
  - (4) One copy of supporting information as specified by rule 3745-91-06 of the Administrative Code.
  - (5) A submittal letter as specified by rule 3745-91-07 of the Administrative Code.
- (B) A person applying for plan approval for a public water system under section 6109.07 of the Revised Code shall pay a fee pursuant to section 3745.11 of the Revised Code. The fee shall be paid at the time the application is submitted, by tendering a check payable to the treasurer of the state of Ohio.
- (C) General plans containing preliminary information concerning proposed source, treatment and distribution may be submitted for approval or for comment. The director may require submittal of general plans for conditional approval prior to submittal of an application under this rule for projects with a high degree of complexity, non-standard technology, unusual features, phased implementation, compliance schedules or deviations from standards and guidelines used by the agency.
- (1) General plans submitted for conditional approval shall be submitted in three copies.
  - (2) General plans concerning proposed wells shall include the following:
    - (a) Proposed drilling method.
    - (b) Anticipated well casing diameter.
    - (c) Anticipated well casing depth.
    - (d) Anticipated total well depth.
    - (e) Screen, if applicable.
    - (f) Anticipated pump design rate.

- (g) Anticipated pumping test rate and duration.
  - (h) Proposed grout type.
  - (i) Driller name.
  - (j) Registration number.
- (D) Public water systems are exempted from obtaining prior plan approval for replacement waterlines provided the following conditions are met:
- (1) The increase in main size for pipe less than four inches in diameter is not greater than two inches in diameter and the increase in main size for pipe four inches in diameter or greater is not greater than four inches in diameter.
  - (2) The replacement of the waterline complies with the requirements of sections 8.0 through 8.12 of "The Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers' Recommended Standards for Water Works" (2012), except if the sanitary isolation requirements of section 8.8 cannot be met, the replacement results in a greater sanitary isolation radius than was previously in place.
  - (3) The public water system has appropriately investigated to ensure pipe replacement does not take place in an area of known water or soil contamination.
  - (4) The public water system submits an annual project summary to the district office on or before January fifteenth that includes each exempted replacement waterline project completed that year.
    - (a) Each project summary shall identify the following items:
      - (i) On an updated distribution map, the locations of the exempted replacement waterlines.
      - (ii) Type and size of pipe replaced.
      - (iii) Type and size of pipe installed.
      - (iv) Length of pipe installed.
      - (v) Any unusual conditions encountered during waterline replacement.
    - (b) The project summary must be signed by a professional engineer licensed by the state of Ohio who certifies that the exempted waterline project or projects described in the project summary met paragraph (D) of this rule.
- (E) Hauled water systems are exempt from obtaining prior plan approval if all the conditions specified in rule 3745-81-02 of the Administrative Code are met and an acceptable hauled water system application is submitted containing the following information:
- (1) Location, material and size of tank.

- (2) Proposed treatment and abandonment of any existing equipment.
  - (3) Information on abandonment of the existing water source; if abandonment is not planned, how the plumbing will be separated and labeled to prevent cross-connections.
  - (4) Source of hauled water.
  - (5) Schedule for installation and completion of the replacement system.
- (F) Ground water noncommunity public water systems serving less than two hundred and fifty persons are exempt from obtaining prior plan approval for the installation of ion exchange softeners and cartridge filters if the following conditions are met:
- (1) The components comply with rule 3745-83-01 of the Administrative Code.
  - (2) The public water system submits the following information:
    - (a) For ion exchange softeners, the number and size of units, the system well capacities, the loading rate, the blending information and the method of brine disposal.
    - (b) For cartridge filters, the number of units, the system well capacities, the manufacturer and model number, whether the units are cleanable or disposable, and the manufacturer's capacity recommendation.
  - (3) The system does not have a raw water nitrate result greater than five milligrams per liter or an inorganic result of greater than eighty per cent of the maximum contaminant level for applicable contaminants as defined in Chapter 3745-81 of the Administrative Code.
- (G) Prior plan approval is required if the conditions for any of the exemptions in paragraphs (D) to (F) of this rule are not met. Failure to obtain plan approval or meet the conditions of any of the exemptions is a violation of this rule.
- (H) Public water systems shall remove equipment that is not required to meet safe drinking water regulations when it is no longer intended for use on a temporary, seasonal or permanent basis, no longer in working order or poses a potential threat to water quality. Plan approval prior to the removal of this equipment is required unless written agreement from the director to the public water system indicates plan approval is not required.

[Comment: "Recommended Standards for Water Works" 2012 edition. Copies are available from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215," (614) 644-2752 or online at <http://10statesstandards.com> or [www.epa.ohio.gov/ddagw](http://www.epa.ohio.gov/ddagw).]

Effective: 06/13/2016

Five Year Review (FYR) Dates: 03/28/2016 and 06/13/2021

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.04, 6109.07

Prior Effective Dates: 11/26/80, 12/01/93, 12/01/99, 01/01/02, 12/31/06,  
05/20/10, 04/19/12

3745-91-03      **Requirements for plan drawings.**

(A) Plan drawings shall conform to the following:

- (1) Be legible prints suitable for reproduction by photocopy or other means.
- (2) Show the names of the owner and of the person responsible for design of the project, including their signature indicating approval of the project.
- (3) Be issued in a manner consistent with section 4733.14 of the Revised Code by a registered professional engineer when required by paragraph (B) or (C) of this rule.
- (4) Contain a suitable title for the project.
- (5) Include a site map showing the location of the project with reference to highways, streets, corporate boundaries and local physical landmarks.
- (6) Be drawn to scale and if not drawn to scale, must be dimensioned.
- (7) Indicate north.
- (8) Include relevant elevations.
- (9) Show existing water supply facilities that are relevant to the proposed project, if any, and the relationship of the proposed project to these existing facilities.
- (10) Show the locations of sewer lines and other potential sources of contamination in the area of the proposed project in plan and profile views.
- (11) Provide dimensions of all structures, facilities and other relevant features.
- (12) When the project includes treatment facilities, provide a treatment process schematic and hydraulic flow schematics.

(B) The following types of plans required pursuant to rule 3745-91-02 of the Administrative Code shall be prepared by a registered professional engineer and issued in a manner consistent with section 4733.14 of the Revised Code:

- (1) Plans involving the expenditure of public funds in excess of five thousand dollars.
- (2) Plans for the removal, inactivation or chemical treatment of a health-based contaminant.
- (3) Plans for chemical feed systems that pose a safety risk, such as gaseous chlorine, fluoride or sodium hydroxide.
- (4) Plans for change or modification of coagulant feed systems at surface water treatment plants.
- (5) Plans for small systems that are not within the scope of the Ohio environmental protection agency's "Guidelines for Design of Small Public Water Systems" 2015.

- (6) Plans for community water system line extensions costing more than five thousand dollars.
  - (7) Plans for elevated back-wash storage tanks.
  - (8) Plans for booster pumping stations.
  - (9) Plans for on-ground or in-ground water storage tanks with a capacity greater than fifty thousand gallons located at water treatment plants.
  - (10) Plans for all distribution storage tanks.
  - (11) General plans for community water systems and noncommunity water systems that are not within the scope of the Ohio environmental protection agency's "Guidelines for Design of Small Public Water Systems" 2015.
- (C) In addition to the specific types of plans in paragraph (B) of this rule, the director may require other plans to be prepared and issued in a manner consistent with section 4733.14 of the Revised Code by a registered professional engineer to protect the public welfare or to safeguard life, health or property.
- (D) The director may require a demonstration of knowledge and experience by the designer for projects containing a high degree of complexity, non-standard technology, unusual features or deviations from standards and guidelines used by the agency.
- (E) The following types of plans required pursuant to rule 3745-91-02 of the Administrative Code may be prepared by a qualified individual knowledgeable in the field or scope of project other than a registered professional engineer unless the plans involve the expenditure of public funds in excess of five thousand dollars:
- (1) Plans for new wells.
  - (2) Plans for chemical feed systems at ground water treatment plants other than plans for gaseous chlorine, fluoride or sodium hydroxide feed systems.
  - (3) Plans for small noncommunity systems that are within the scope of the Ohio environmental protection agency's "Guidelines for Design of Small Public Water Systems" 2015.
  - (4) Plans within the scope of the Ohio environmental protection agency's "Guidelines for Design of Small Public Water Systems" (2015) for water treatment systems for community water systems with a capacity of fifty thousand gallons per day or less.
  - (5) Plans for emergency generators.
  - (6) Plans for deactivation of a water treatment plant.
  - (7) Plans for pre-engineered on-ground or in-ground water storage tanks with a capacity of fifty thousand gallons or less located at water treatment plants.
  - (8) Non-required treatment systems that will have no discernable effect.

(9) Lead and copper corrosion control studies and recommendations.

[This rule references the "Guidelines for Design of Small Public Water Systems" fourth edition, issued 2015. This document is available from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215," (614) 644-2752. A copy may also be obtained online at [www.epa.ohio.gov/ddagw](http://www.epa.ohio.gov/ddagw).]



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Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.04, 6109.07

Prior Effective Dates: 11/26/80, 10/17/03, 05/20/10, 02/23/15

3745-91-04      **Requirements for specifications.**

Specifications shall:

- (A) Fully describe in detail all facilities or equipment to be installed under the proposed plans, including but not limited to water intakes, wells, pumps, valves, pipe, treatment devices or processes, filtration media, monitoring or control facilities, laboratory equipment, meters, chemical storage or feed units, safety equipment, and plant construction;
- (B) Summarize the number and capacity of the equipment to be installed, including but not limited to the total lineal feet of each size and type of distribution pipe, and the number and capacity of each type of chemical feed unit, pump or treatment unit;
- (C) Indicate a manufacturer and model number for each piece of equipment to be installed, which may identify either the actual equipment to be used or a standard by which equivalent equipment may be selected;
- (D) Be prepared in a legible and organized manner to permit easy reference. Separate specifications are not required if facilities and equipment are adequately specified on the plan drawings.

Effective: November 26, 1980

Five Year Review (FYR) Dates: 10/26/2015 and 10/26/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: None

3745-91-05      **Requirements for data sheet.**

The data sheet shall be on a form as provided by the director and shall include information such as the title of the project, project location, identification of the ultimate owner, identification of the designer, estimated construction cost, basis of design, and such other information as may be required. Additional information may be required depending upon the type and complexity of the project under review.

Effective date: 01/01/2002

Five Year Review (FYR) Dates: 10/26/2015 and 10/26/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04, 6109.07

Prior Effective Dates: 11/26/80

**3745-91-06 Requirements for supporting information.**

The supporting information required by this rule may vary depending on the type and complexity of the project and shall, at a minimum, include:

- (A) An explanation of the project and its basis of design, and such other information relevant to approval of plans that may not be fully evident from the plan drawings and specifications;
- (B) A copy of the results of any required chemical, bacteriological, radiological, or other analyses performed on the raw or finished water;
- (C) Information as to the capacity and long-term adequacy of the source of supply; and
- (D) If the plans include a new well as a source of water, the following additional materials shall be submitted:
  - (1) A well site acceptance letter signed by a representative of the district office;
  - (2) A copy of a deed, easement, or other legal instrument showing that the owner has control of lands sufficient to provide isolation as approved in the well site acceptance letter; and
  - (3) A copy of the log of the well, and a copy of the results of the pumping tests performed on the well. Test pumping and sampling for chemical and radiological analyses are required unless waived by the director.
- (E) A capability assurance plan, if required by Chapter 3745-87 of the Administrative Code.

Effective: 04/19/2012

Five Year Review (FYR) Dates: 10/26/2015 and 10/26/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04, 6109.07

Prior Effective Dates: 11/26/80, 01/01/02

3745-91-07      **Requirements for submittal letter.**

The submittal letter shall:

- (A) Be signed by the responsible public official or, for a privately-owned project, the owner or his authorized representative;
- (B) Be addressed to the division of drinking and ground waters at the applicable district office;
- (C) Specifically request that the Ohio environmental protection agency review the plans for approval;
- (D) Accompany the plan drawings and other documents required by this chapter of the Administrative Code when they are submitted for review;
- (E) Include the name, mailing address, and telephone number of the owner or other person with whom contact can be made if further information is required.

Effective date: 01/01/2002

Five Year Review (FYR) Dates: 10/26/2015 and 10/26/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04, 6109.07

Prior Effective Dates: 11/26/80

3745-91-08      **Procedure for approval; changes.**

- (A) The following shall be used as a guide in the technical review of plans submitted under this chapter of the Administrative Code:
- (1) The Ohio environmental protection agency's "Planning and Design Criteria for Establishing Approved Capacity for (1) Surface Water and Ground Water Supply Sources, (2) Drinking Water Treatment Plants (WTPs), and (3) Source/WTP Systems" (2010). The terms and conditions of this document shall be followed in the event of inconsistencies between this document and the document in paragraph (A)(2) of this rule.
  - (2) "The Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers' Recommended Standards for Water Works" (2012).
  - (3) The Ohio environmental protection agency's "Guidelines for Design of Small Public Water Systems" (2015). The requirements of Chapter 3745-9 of the Administrative Code shall be followed in the event of inconsistencies between this document and Chapter 3745-9 of the Administrative Code.
  - (4) The Ohio environmental protection agency's "Guidelines for Arsenic Removal Treatment for Small Public Drinking Water Systems" (2010).
  - (5) Such other publications as may be prepared by the Ohio environmental protection agency for guidance of designers of public water systems.
- (B) If an application is incomplete, the applicant shall be so notified. No action will be taken on an application until it is complete. An incomplete application may be returned to the applicant.
- (C) If an application is complete, but plans are not approvable, the applicant shall be so notified. Such notice may be accompanied by a statement of alterations or revisions necessary for approval, or the director may, in the alternative, disapprove the plans. A revised application shall be made in the same manner as required by this chapter of the Administrative Code for original application, or as directed in the notice.
- (D) Approval of plans submitted under this chapter of the Administrative Code may be conditioned upon requirements that may be necessary or desirable to ensure that the system being constructed, or of which the proposed project is a part, will be able to meet generally accepted standards for the design, equipping and operation of water systems.
- (E) Plans that require an escrow under section 6109.08 of the Revised Code shall not be approved until compliance with said section and Chapter 3745-92 of the Administrative Code is achieved. Compliance with said section and chapter are not required until the applicant is notified that the plans will be approved upon compliance with said section and chapter. If compliance does not occur within thirty days following receipt of such notice, the director may return the application as incomplete.

- (F) When plans are approved, a copy of the plan drawings shall be so marked and returned to the owner, accompanied by notice of approval. The director may send copies of such materials to such other persons as the director may deem advisable.
- (G) No person shall construct or install a public water system, or make any substantial change in a public water system, as defined in rule 3745-91-01 of the Administrative Code, which is not in accordance with plans approved by the director.

Requests for substantial changes from approved plans shall be made in advance of any construction work that will be affected by such changes, and shall allow sufficient time for review and approval by the director. A request for substantial change shall be made in the same manner as required by this chapter of the Administrative Code.

[Comment: "Planning and Design Criteria for Establishing Approved Capacity for (1) Surface Water and Ground Water Supply Sources, (2) Drinking Water Treatment Plants (WTPs), and (3) Source/WTP Systems," issued 2010. This document is available from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215," (614) 644-2752. A copy may also be obtained online at [www.epa.ohio.gov/ddagw](http://www.epa.ohio.gov/ddagw).]

[Comment: "Recommended Standards for Water Works" 2012 edition. Copies are available from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215," (614) 644-2752 or online at <http://10statesstandards.com> or [www.epa.ohio.gov/ddagw](http://www.epa.ohio.gov/ddagw).]

[Comment: "Guidelines for Design of Small Public Water Systems," issued 2015. This document is available from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215," (614) 644-2752. A copy may also be obtained online at [www.epa.ohio.gov/ddagw](http://www.epa.ohio.gov/ddagw).]

[Comment: "Guidelines for Arsenic Removal Treatment for Small Public Drinking Water Systems," first edition, issued 2010. This document is available from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215," (614) 644-2752. A copy may also be obtained online at [www.epa.ohio.gov/ddagw](http://www.epa.ohio.gov/ddagw).]

Effective:	06/13/2016
Five Year Review (FYR) Dates:	03/28/2016 and 06/13/2021
Promulgated Under:	119.03
Statutory Authority:	6109.04
Rule Amplifies:	6109.04, 6109.07
Prior Effective Dates:	11/26/80, 01/01/02, 07/01/04, 05/20/10



**3745-91-09 Iron and manganese treatment.**

(A) New community water systems shall provide treatment for removal of the following:

- (1) Iron to meet the secondary maximum contaminant level (SMCL) set forth in rule 3745-82-02 of the Administrative Code when the level of iron in water entering the water plant exceeds the SMCL.
- (2) Manganese to meet the SMCL set forth in rule 3745-82-02 of the Administrative Code when the level of manganese in water entering the water plant exceeds the SMCL.

(B) Existing community water systems, which develop a new source, or change a source shall provide treatment for removal of the following:

- (1) Iron to meet the SMCL set forth in rule 3745-82-02 of the Administrative Code, if the level of iron at the entry point to the distribution system increases and exceeds the SMCL.
- (2) Manganese to meet the SMCL in rule 3745-82-02 of the Administrative Code, if the level of manganese at the entry point to the distribution system increases and exceeds the SMCL.

Effective: 10/14/2016

Five Year Review (FYR) Dates: 07/26/2016 and 10/14/2021

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.03, 6109.04  
Prior Effective Dates: 11/26/80, 01/01/02

**Drinking water source protection plan.**

- (A) A community public water system that provides water to a political subdivision of Ohio and serves a minimum of two hundred fifty people shall develop a drinking water source protection plan or update a previously endorsed drinking water source protection plan (i.e., wellhead protection plan) when, after the effective date of this rule, the system receives plan approval for use of a well.
- (B) The plan shall be submitted to the Ohio environmental protection agency within two years of the date of the director's final action approving the public water system well.
- (C) The plan shall address education and outreach, drinking water shortage and emergency response, potential contaminant source control strategies and the need for an early warning ground water monitoring program. The plan shall contain an implementation schedule for the identified actions and be updated at least every ten years.
- (D) A public water system is exempt from the requirements of this rule if it has an updated drinking water source protection plan that was submitted to and endorsed by the agency during the previous five years; and any increased pumping or the location of the well will not change the boundaries of the previously endorsed inner management zone or drinking water source protection area.

Effective: 09/01/2009

R.C. 119.032 review dates: 09/01/2014 and 04/24/2019

Promulgated Under: 119.03

Statutory Authority: 6111.42, 6109.04

Rule Amplifies: 6109.01, 6109.04

**3745-91-12 Certification by political subdivisions and investor-owned public utilities.**

- (A) The director may enter into an agreement with any political subdivision or investor-owned public utility that owns or operates a public water system which proposes to extend the distribution facilities of the system, increase the number of service connections to the system, add distribution pump station, or add storage tank in the distribution system.
- (B) Such an agreement under this rule shall authorize a qualified officer or representative of the political subdivision or investor-owned public utility to review plans for the extension of the distribution facilities, the increase in the number of service connections, the addition of distribution system pump station, or the addition of storage tank in the distribution system. At a minimum, said qualified person shall be a professional engineer licensed by the state of Ohio.
- (C) Agreements under this rule shall include, but not be limited to, the following public water system requirements:
  - (1) Submission of a general plan within one year of the effective date of the agreement.
  - (2) Submission of an annual report summarizing all plans which were self-certified in the previous year. The annual report shall be signed by the professional engineer identified in the agreement, submitted on a form acceptable to the director and shall include at least the following:
    - (a) Date of the certification.
    - (b) Project title.
    - (c) Summary sheet type (i.e., waterline extension, storage tank).
    - (d) List of each set of plans approved.
    - (e) Amendments to the plan.
    - (f) Actual construction costs.
    - (g) Construction start and end dates.
    - (h) Date placed in service.
    - (i) Numbers of actual and potential service connections.
    - (j) Increase in average and peak daily demand.
    - (k) Operating pressure range, each year during the term of the agreement.
  - (3) Compliance with periodic audits by the director.
- (D) All plan submissions under this rule shall include the following:

- (1) Certification by said qualified person to the director that said plans conform to all requirements of section 6109.07 of the Revised Code and the administrative rules adopted thereunder.
  - (2) Three copies of the plans.
  - (3) Appropriate project summary sheets in a format acceptable to the director.
  - (4) An administrative service fee calculated in accordance with division (N)(2) of section 3745.11 of the Revised Code and paragraph (F) of this rule.
  - (5) One copy of a data sheet as specified in rule 3745-91-05 of the Administrative Code.
- (E) Pursuant to an effective agreement under this rule and compliance with all requirements of this rule, plans submitted shall be approved without further review by the director. An order of approval shall be issued by the director as a final action.
- (F) The director annually shall calculate the administrative fee that shall be paid for each plan submitted under this rule and notify the political subdivision or investor-owned public utility of the amount of the fee. The administrative service fee shall not exceed the minimum amount necessary to pay administrative costs directly attributable to processing plan approvals.

Replaces: 3745-91-12

Effective: 10/26/2015

Five Year Review (FYR) Dates: 10/26/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.04, 6109.07

Prior Effective Dates: 12/01/93, 01/01/99

3745-92-01    **Definitions.**

As used in this chapter of the Administrative Code:

- (A) "Community water system" and "director" have the same meanings as ascribed to such terms in rule 3745-81-01 of the Administrative Code.
- (B) "Public entity" means the federal government, the state, any political subdivision, and any agency, institution, or instrumentality thereof.

Effective: November 26, 1980

Five Year Review (FYR) Dates: 02/19/2016 and 02/19/2021

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.04, 6109.08  
Prior Effective Dates: None

3745-92-02

**Escrow deposit Financial assurance required.**

If the system for which an application is made under rule 3745-91-02 of the Administrative Code is a community water system which serves or will serve fewer than five hundred service connections, and the system ~~it is not a system~~ owned and operated by a public entity, ~~a system which supplies water only to premises owned by the water supplier,~~ or a system regulated by the public utilities commission, evidence shall be submitted prior to approval under said rule showing the following:

- (A) That the owner or operator has ~~deposited in escrow~~ provided financial assurance, in a form acceptable to the director, in the amount required by section 6109.08 of the Revised Code;.
- (B) The name and location of the escrowee, which shall be a bank or other institution approved in writing by the director;.
- (C) A copy of the ~~escrow agreement~~ financial assurance, the terms of which shall ensure compliance with the requirements of this chapter ~~of the Administrative Code~~ and section 6109.08 of the Revised Code.



Effective: 11/8/2018

Five Year Review (FYR) Dates: 2/19/2021

CERTIFIED ELECTRONICALLY

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Certification

10/29/2018

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Date

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.08  
Prior Effective Dates: 11/26/1980

3745-92-03

**Amount of deposit financial assurance.**

The amount ~~deposited in escrow~~ provided in financial assurance shall be ~~fifty-one hundred thousand dollars unless the cost of the completed community water system as estimated by the engineer responsible for the design of the project is less than three-six hundred thirty-three-sixty-six thousand three-six hundred thirty-three-sixty-six dollars, in which case the amount deposited of financial assurance shall be fifteen per cent of the estimated cost. If the project is for the construction of less than an entire system, the amount to be used for this purpose is the aggregate amount of contracts for construction, installation, or modification of that part of the system that will be affected in the project. Whenever the executed contracts for construction, installation, or modification of the system or part thereof, including increases due to change orders, show a cost different from that of the above estimate, the total amount deposited in escrow of financial assurance shall be increased or decreased so that it the financial assurance is not less than fifteen per cent of the contract amount including increases due to change orders, or fifty-one hundred thousand dollars if such contract amount is three-six hundred thirty-three-sixty-six thousand three six hundred thirty-three-sixty-six dollars or more. No work shall be performed under such contract when the amount in escrow of financial assurance is less than the amount required to be deposited by this rule, without prior written consent of the director.~~ fifty-one hundred thousand dollars unless the cost of the completed community water system as estimated by the engineer responsible for the design of the project is less than three-six hundred thirty-three-sixty-six thousand three-six hundred thirty-three-sixty-six dollars, in which case the amount deposited of financial assurance shall be fifteen per cent of the estimated cost. If the project is for the construction of less than an entire system, the amount to be used for this purpose is the aggregate amount of contracts for construction, installation, or modification of that part of the system that will be affected in the project. Whenever the executed contracts for construction, installation, or modification of the system or part thereof, including increases due to change orders, show a cost different from that of the above estimate, the total amount deposited in escrow of financial assurance shall be increased or decreased so that it the financial assurance is not less than fifteen per cent of the contract amount including increases due to change orders, or fifty-one hundred thousand dollars if such contract amount is three-six hundred thirty-three-sixty-six thousand three six hundred thirty-three-sixty-six dollars or more. No work shall be performed under such contract when the amount in escrow of financial assurance is less than the amount required to be deposited by this rule, without prior written consent of the director.

Effective: 11/8/2018

Five Year Review (FYR) Dates: 2/19/2021

CERTIFIED ELECTRONICALLY

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Certification

10/29/2018

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Date

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.08  
Prior Effective Dates: 11/26/1980

3745-92-04     **Release of escrow.**

- (A) The escrow agreement shall be irrevocable unless released by the director upon a showing that the system or part thereof for which the escrow deposit is made:
  - (1) Has gone out of service and is no longer needed by the persons it formerly served;
  - (2) Has been acquired and is being operated by a public entity or has come under regulation of the public utilities commission; or
  - (3) Any other circumstances if the director determines that retention of the escrow deposit is no longer required under section 6109.08 of the Revised Code.
- (B) If there is a change of ownership of the system and a release of the escrow agreement pursuant to paragraph (A) of this rule, the escrow deposit shall be released to the new owner.

Effective: November 26, 1980

Five Year Review (FYR) Dates: 02/19/2016 and 02/19/2021

Promulgated Under:	119.03
Statutory Authority:	6109.04
Rule Amplifies:	6109.04, 6109.08
Prior Effective Dates:	None

3745-92-05

**Orders of the director, notice to owner.**

- (A) If the director finds that a system or part thereof for which ~~an escrow deposit~~ financial assurance is required under division (A) of section 6109.08 of the Revised Code is being operated but is not properly constructed, maintained, repaired or operated, ~~he the director~~ may order the owner and the operator of ~~such the~~ system or part thereof to correct the deficiencies in construction, maintenance, repair or operation. If the order required construction, installation, or modification, the owner or operator, within ninety days of receipt of such order or within such additional period as the director may approve, shall submit plans for correcting the deficiency pursuant to rule 3745-91-02 of the Administrative Code.
- (B) The director shall authorize use of ~~funds in the escrow~~ funds from the financial assurance as necessary to enable compliance with ~~his the~~ order. Upon prior written approval of the director the ~~escrowee water system~~ shall make or cause payment to be made to persons who have performed work under contract with the owner or ~~his the owner's~~ agent, or a designated representative, for the purpose of correcting such deficiencies in construction, maintenance, repair or operation, as ordered by the director. When ~~funds are withdrawn from an escrow account~~ funds from the financial assurance are used, ~~they shall be replaced by the owner or the operator of such the~~ system or part thereof shall replace such funds within six months of ~~withdrawal~~ use.
- (C) If the system is owned by multiple owners of lots served by the system, the "owner" shall be considered notified for purposes of this rule when notice of the director's order is sent by first-class mail to the mailing address of the association representing the lot owners or to all the known officers of such association, or, if neither of these methods is possible, to the last known address of each lot owner.
- (D) The provisions of this rule do not apply to the extent that they may be inconsistent with an emergency order made by the director under section 6109.05 of the Revised Code.

Effective: 11/8/2018

Five Year Review (FYR) Dates: 2/19/2021

CERTIFIED ELECTRONICALLY

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Certification

10/29/2018

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Date

Promulgated Under: 119.03  
Statutory Authority: 6109.04  
Rule Amplifies: 6109.08  
Prior Effective Dates: 11/26/1980

3745-92-06    **Fee for escrow deposit.**

Nothing in this chapter of the Administrative Code prohibits the bank or savings institution holding the escrow deposit from charging the person requesting an escrow a fee for its services.



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Five Year Review (FYR) Dates: 02/19/2016 and 02/19/2021

Promulgated Under:	119.03
Statutory Authority:	6109.04
Rule Amplifies:	6109.04, 6109.08
Prior Effective Dates:	None

3745-95-01      **Backflow prevention and cross-connection control definitions.**

As used in this chapter of the Administrative Code:

(A)

- (1) "Air gap separation" means the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device and the flood level rim of the receptacle.
- (2) "Approved" means that a backflow prevention assembly, device, or method has been accepted by the supplier of water and the director as suitable for the proposed use.
- (3) "Auxiliary water system" means any water system on or available to the premises other than the public water system. These auxiliary water systems shall include used water or water from a source other than the public water system, such as wells, cisterns or open reservoirs that are equipped with pumps or other prime movers, including gravity.

(B)

- (1) "Backflow" means the flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable water supply from any source other than the intended source of the potable water supply.
- (2) "Backflow preventer" means any assembly, device, method or type of construction intended to prevent backflow into a potable water system. This definition applies wherever "backflow prevention device" is used in this chapter.
- (3) "Booster pump" means any device which is intended to increase the in-line water pressure.

(C)

- (1) "Consumer" means the owner or person in control of any premises supplied by or in any manner connected to a public water system.
- (2) "Consumer's water system" means any water system, located on the consumer's premises, supplied by or in any manner connected to a public water system. A household plumbing system is considered to be a consumer's water system.
- (3) "Containment principle backflow preventer" is a backflow preventer, installed in a consumer's water system, that is intended to contain the water within the premises in order to prevent any polluted or contaminated water from backflowing into the public water system. Typically, the containment principle backflow preventer is placed at the service connection unless placement is

otherwise specified by rule herein.

- (4) "Cross-connection" means any arrangement whereby backflow can occur.

(D)

- (1) "Degree of hazard" is a term derived from an evaluation of the potential risk to health and welfare.
- (2) "Director" means the director of environmental protection or the director's duly authorized representative.
- (3) "Double check valve assembly" means an assembly composed of two single, independently acting, check valves including tightly closing shutoff valves located at each end of the assembly and suitable connections for testing the watertightness of each check valve.
- (4) "Double check-detector check valve assembly" means a specially designed assembly composed of a line-size approved double check valve assembly with a specific bypass water meter and a meter-sized approved double check valve assembly. The meter shall register accurately for only very low rates of flow and shall show a registration for all rates of flow.

(E) [Reserved.]

(F) [Reserved.]

(G) [Reserved.]

(H)

- (1) "Health hazard" means any condition, device, or practice in a water system or its operation that creates, or may create, a danger to the health of users.
- (2) "Human consumption" means the ingestion or absorption of water or water vapor as the result of drinking, cooking, dishwashing, hand washing, bathing, showering or oral hygiene.

(I) "Interchangeable connection" means an arrangement or device that will allow alternate but not simultaneous use of two sources of water and includes an approved reduced pressure principle backflow prevention assembly or an approved reduced pressure principle-detector assembly on the public water system side of the connection.

(J) [Reserved.]

(K) [Reserved.]

(L) [Reserved.]

(M) [Reserved.]

(N) [Reserved.]

(O) [Reserved.]

(P)

- (1) "Person" means the state, any political subdivision, public or private corporation, individual, partnership, or other legal entity.
- (2) "Pollutional hazard" means a condition through which an aesthetically objectionable or degrading material, which is not dangerous to the public water system or health of users, may enter the public water system or portion of a consumer's water system.
- (3) "Potable water" means water intended for human consumption.
- (4) "Premises" means any building, structure, dwelling or area containing plumbing or piping supplied from a public water system.
- (5) "Pressure vacuum breaker" means an assembly composed of an independently acting spring loaded check valve located downstream of an independently acting spring loaded air inlet valve including, tightly closing shutoff valves located at each end of the assembly and suitable connections for testing the integrity of the air inlet and check valves.
- (6) "Process fluids" means any fluid or solution which may be chemically, biologically or otherwise contaminated or polluted in a form or concentration such as would constitute a pollutional, system, health or severe health hazard if introduced into the public water system or portion of a consumer's water system. This includes, but is not limited to the following:
  - (a) Polluted or contaminated waters.
  - (b) Process waters.
  - (c) Used waters originating from a public water system which may have deteriorated in sanitary quality.
  - (d) Cooling waters.
  - (e) Contaminated natural waters taken from wells, lakes, streams or irrigation systems.
  - (f) Chemicals in solution or suspension.
  - (g) Oils, gases, acids, alkalis, and other liquid and gaseous fluids used in industrial or other processes, or for fire fighting purposes.
- (7) "Public water system" has the same meaning as in rule 3745-81-01 of the Administrative Code.

(Q) [Reserved.]

(R)

- (1) "Reduced pressure principle backflow prevention assembly" means an assembly containing a minimum of two independently acting check valves together with an automatically operated pressure differential relief valve located between the two check valves. During normal flow and at the cessation of normal flow, the pressure between these two checks shall be less than the supply pressure. In case of leakage of either check valve, the differential relief valve, by discharging to the atmosphere, shall operate to maintain the pressure between the check valves at less than the supply pressure. The unit must include tightly closing shutoff valves located at each end of the assembly, and each assembly shall be fitted with properly located test cocks.
- (2) "Reduced pressure principle-detector assembly" means a specially designed assembly composed of a line-size approved reduced pressure principle backflow prevention assembly with a specific bypass water meter and a meter sized approved reduced pressure principle backflow prevention assembly. The meter shall register accurately for only very low rates of flow and shall show a registration for all rates of flows.

(S)

- (1) "Service connection," for the purposes of this chapter, means the terminal end of a service line from the public water system. If a meter is installed at the end of the service, then the service connection means the downstream end of the meter.
- (2) "Severe health hazard" means a health hazard to users that could reasonably be expected to result in significant morbidity or death.
- (3) "Supplier of water" means the owner or operator of a public water system.
- (4) "System hazard" means a condition posing an actual or potential threat of damage to the physical properties of the public water system or a consumer's water system.

(T) [Reserved.]

(U) "Used water" means any water supplied by a supplier of water from a public water system to a consumer's water system after the water has passed through the service connection and is no longer under the control of the supplier.

(V) [Reserved.]

(W)

- (1) "Water system" means a system for the provision of piped water or process fluids, and includes any collection, treatment, storage or distribution facilities used primarily in connection with such system.
- (2) "Weep holes" means a series of small diameter holes located in the wall of the supply pipe for a yard hydrant that allow for drainage of accumulated water from the delivery piping. These holes are usually part of a plunger and valve system that seals off the holes during water usage and opens the holes during shutdown. These openings are located below ground level and below the frost line in areas where the threat of freezing exists.

(X) [Reserved.]

(Y) "Yard hydrant" means a device that is located outside of a building, equipped with a valved mechanism that controls the delivery of potable water, and is not designed to supply a fire department pumper.

(Z) [Reserved.]

Effective: 10/26/2015

Five Year Review (FYR) Dates: 07/06/2015 and 10/26/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.04, 6109.13

Prior Effective Dates: 07/01/72, 11/26/80, 05/01/03, 10/01/06, 04/19/12

3745-95-02      **Backflow prevention and cross-connection control.**

- (A) No person shall install or maintain a water service connection to any premises where actual or potential cross-connections to a public water system or a consumer's water system may exist unless such actual or potential cross-connections are abated or controlled to the satisfaction of the supplier of water.
- (B) No person shall install or maintain a connection between a public water system or consumer's water system and an auxiliary water system unless the auxiliary water system, the method of connection and the use of such system have been approved by the supplier of water and by the director as required by section 6109.13 of the Revised Code.
- (C) A public water system shall develop and implement a backflow prevention and cross-connection control program consistent with this chapter.

Effective: 10/26/2015

Five Year Review (FYR) Dates: 07/06/2015 and 10/26/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.04, 6109.13

Prior Effective Dates: 07/01/72, 11/26/80, 05/01/03

3745-95-03      **Surveys and investigations.**

- (A) The supplier of water shall conduct or cause to be conducted an initial assessment and periodic surveys or investigations of water use practices within a consumer's premises to determine whether there are actual or potential cross-connections to the consumer's water system through which contaminants or pollutants could backflow into the public water system or determine where in the judgment of the supplier of water, a pollutorial system, health or severe health hazard to the public water system exists.

To meet this requirement, the supplier of water shall conduct or cause to be conducted an on-site investigation of all premises at least every five years to identify changes in water use practices at the consumer's property so that new or increased hazards to the water supply are identified and mitigated.

- (1) In lieu of conducting an on-site investigation of all premises every five years, the supplier of water can document, in writing, an alternate, on-going, methodology to identify changes in water use practices that may represent a new or increased hazard to the public water supply. An on-site investigation is required when a potential new or increased hazard is suspected to confirm the degree of risk and how it will be addressed. Information obtained through a water use survey questionnaire or in coordination with the local building, zoning, health, fire protection and other licensing agencies may be used as an indicator of when an on-site investigation should be conducted. Other triggers, such as a request to the supplier of water for a new or additional service line, or an additional or larger meter should warrant an on-site investigation.
  - (2) In lieu of conducting an on-site investigation of each residential premise, the supplier of water may institute an on-going educational campaign to inform consumers of common backflow hazards created during residential water use and provide a reporting mechanism for suspected cross-connections. An education campaign may use local media and advertising resources, but must also include information delivered, either electronically or hard copy, to each residential service connection at least annually.
- (B) The supplier of water, or the supplier's authorized representative, shall have the right to enter premises served by the public water system at all reasonable times for the purpose of making surveys and investigations of water use practices within the premises.
- (C) On request by the supplier of water, or the supplier's authorized representative, the consumer shall furnish the supplier, or the supplier's authorized representative, information on water use practices within the consumer's premises.
- (D) Paragraph (A) of this rule does not relieve the consumer of the responsibility for conducting, or causing to be conducted, periodic surveys of water use practices on his premises to determine whether there are actual or potential cross-connections



in the consumer's water system through which contaminants or pollutants could backflow into a public water system or a potable consumer's water system.

Effective: 10/26/2015

Five Year Review (FYR) Dates: 07/06/2015 and 10/26/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.04, 6109.13

Prior Effective Dates: 07/01/72, 11/26/80

**3745-95-04 Where protection is required.**

- (A) An approved backflow preventer shall be installed on each service line to a consumer's water system serving premises, where in the judgment of the supplier of water or the director, a pollutional, system, health or severe health hazard to the public water system exists.
- (B) An approved backflow preventer shall be installed on each service line to a consumer's water system serving premises where any of the following conditions exist:
  - (1) Premises having an auxiliary water system on the premises, unless such auxiliary system is accepted as an additional source by the supplier of water and the source is approved by the director.
  - (2) Premises on which any substance is handled in such a fashion as to create an actual or potential hazard to a public water system. This shall include premises having sources or systems containing process fluids.
  - (3) Premises having internal cross-connections that, in the judgment of the supplier of water, are not correctable, or intricate plumbing arrangements which make it impracticable to determine whether or not cross-connections exist.
  - (4) Premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make a complete cross-connection survey.
  - (5) Premises having a repeated history of cross-connections being established or re-established.
  - (6) Others specified by the director.
- (C) The following requirements apply to premises that have an auxiliary water system on the real property that is owned or under control of the consumer and adjacent to the premises:
  - (1) A physical separation shall be maintained between the public water system or a consumer's water system and the auxiliary water system as required by paragraph (B) of rule 3745-95-02 of the Administrative Code.
  - (2) An approved backflow preventer shall be installed on each service connection serving the consumer's water system, unless the supplier of water does all of the following:
    - (a) Determines, on a case-by-case basis, that the installation of an approved backflow preventer on a service connection is not required in consideration of factors including, but not limited to, the past history of cross connections being established or re-established on the premises, the ease or difficulty of connecting the auxiliary water system with the public water system on the premises, the presence or absence of contaminants on the property or other risk factors.
    - (b) Requires the consumer to sign an agreement which specifies the penalties, including those set forth in rule 3745-95-08 of the Administrative Code, for creating a connection between the public water system and the auxiliary water system.
    - (c) Conducts or causes to be conducted an inspection at least every twelve months to certify that no connection or means of connection has been created between the public water system and the auxiliary water system.
    - (d) Maintains an inventory of each consumer's premises where an auxiliary water system is on or available to the premises, or on the real property adjacent to the premises.
    - (e) Develops and implements an education program to inform all consumers served by the public water

system about the dangers of cross-connections and how to eliminate cross-connections.

- (D) An approved backflow preventer shall be installed on each service line to a consumer's water system serving, but not necessarily limited to, the following types of facilities unless the director determines that no severe health, health, system or pollutional hazard to the public water system exists:
- (1) Hospitals, mortuaries, clinics, nursing homes.
  - (2) Laboratories.
  - (3) Piers, docks, waterfront facilities.
  - (4) Sewage treatment plants, sewage pumping stations, or storm water pumping stations.
  - (5) Food or beverage processing plants.
  - (6) Chemical plants.
  - (7) Metal plating industries.
  - (8) Petroleum processing or storage plants.
  - (9) Radioactive material processing plants or nuclear reactors.
  - (10) Car washes.
  - (11) Others specified by the director.
- (E) An approved backflow preventer shall be installed at any point of connection that is approved in accordance with paragraph (B) of rule 3745-95-02 of the Administrative Code between a public water system or a consumer's water system and an auxiliary water system, unless such auxiliary system is accepted as an additional source by the supplier of water and the source is approved by the director.

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Statutory Authority:	6109.04
Rule Amplifies:	6109.04, 6109.13, 6109.03, 6109.01
Prior Effective Dates:	07/01/1972, 11/26/1980, 05/01/2003

**3745-95-05      Type of protection required.**

- (A) The type of protection required under paragraphs (A), (B), (C) and (D) of rule 3745-95-04 of the Administrative Code shall depend on the degree of hazard which exists as follows:
  - (1) An approved air gap separation shall be installed where a public water system may be contaminated with substances that could cause a severe health hazard.
  - (2) An approved air gap separation, an approved reduced pressure principle backflow prevention assembly or an approved reduced pressure detector check assembly shall be installed where a public water system may be contaminated with any substance that could cause a system or health hazard.
  - (3) An approved air gap separation, an approved reduced pressure principle backflow prevention assembly, an approved reduced pressure principle-detector check assembly, an approved double check valve assembly or an approved double check-detector check valve assembly shall be installed where a public water system may be contaminated with any substance that could cause a pollutional hazard.
- (B) The type of protection required under paragraph (E) of rule 3745-95-04 of the Administrative Code shall be an approved air gap separation or an approved interchangeable connection. A removable spool piece connection is not an acceptable method.
- (C) Where an auxiliary water system is used as a secondary source of water for a fire protection system, the provisions of paragraph (B) of this rule for an approved air gap separation or an approved interchangeable connection may be waived by the director, provided the following conditions exist:
  - (1) At premises where the auxiliary water system may be contaminated with substances that could cause a system, health or severe health hazard, a public water system or a consumer's water system shall be protected against backflow by installation of an approved reduced pressure principle backflow prevention assembly or an approved reduced pressure principle-detector check assembly.
  - (2) At all other premises, a public water system or a consumer's water system shall be protected against backflow by installation of an approved reduced pressure principle backflow prevention assembly, an approved reduced pressure principle-detector check assembly, an approved double check valve assembly or an approved double check-detector check valve assembly.
  - (3) A public water system or a consumer's water system shall be the primary source of water for the fire protection system.
  - (4) The fire protection system shall be normally filled with water from a public

water system or a consumer's water system.

- (5) The water in the fire protection system shall be used for fire protection only, with no other use of water from the fire protection system downstream from the approved backflow prevention device.
- (D) An exception to the requirement in paragraph (A)(2) of this rule may be applied when mitigating the health hazard associated with a water-only, residential-type irrigation system that is not subjected to backpressure and is not equipped with pumps or other prime movers which can create backpressure to the public or the consumer's water system. In this instance, an approved pressure vacuum breaker can be used to isolate the service line to the irrigation system in lieu of installing a containment assembly at the service connection. The same maintenance and testing requirements as outlined in rule for containment assemblies apply. This exception does not apply if an additive is used within the irrigation system. The supplier of water may determine other hazards exist that warrant additional containment protection at the service connection.

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Rule Amplifies: 6109.04, 6109.13

Prior Effective Dates: 07/01/72, 11/26/80, 05/01/03

**3745-95-06      Backflow prevention devices.**

- (A) Any containment principle backflow preventer required by rules 3745-95-04 and 3745-95-05 of the Administrative Code shall be of a model or construction approved by the supplier of water and conform to at least one of the following standards:
- (1) For air gap separations: the specific edition of the American national standards institute (ANSI) and the American society of mechanical engineers (ASME) standard as referenced in rule 4101:3-13-01 of the Administrative Code.
  - (2) For reduced pressure principle backflow prevention assemblies: the specific edition of the ANSI and the American water works association (AWWA) standard, or the American society of sanitary engineering (ASSE) standard, or the Canadian standards association (CSA) standard as referenced in rule 4101:3-13-01 of the Administrative Code; or the foundation for cross-connection control and hydraulic research, university of Southern California specifications of backflow assemblies for reduced pressure principle assemblies - tenth edition (2009).
  - (3) For double check valve assemblies: the specific edition of the ANSI and the AWWA standard, or the ASSE standard, or the CSA standard as referenced in rule 4101:3-13-01 of the Administrative Code; or the foundation for cross-connection control and hydraulic research, university of Southern California specifications of backflow assemblies for double check valve assemblies - tenth edition (2009).
  - (4) For reduced pressure principle-detector assemblies: the specific edition of the ANSI and the ASSE standard, or the CSA standard as referenced in rule 4101:3-13-01 of the Administrative Code; or the foundation for cross-connection control and hydraulic research, university of Southern California specifications of backflow assemblies for reduced pressure principle-detector assemblies - tenth edition (2009).
  - (5) For double check-detector check valve assemblies: the ANSI and the ASSE standard, or the CSA standard as referenced in rule 4101:3-13-01 of the Administrative Code, or the foundation for cross-connection control and hydraulic research, university of Southern California specifications of backflow assemblies for double check-detector assemblies - tenth edition (2009).
  - (6) For pressure vacuum breakers: the ANSI and the ASSE standard, or the CSA standard as referenced in rule 4101:3-13-01 of the Administrative Code.
- (B) Any containment principle backflow preventer required by rules 3745-95-04 and 3745-95-05 of the Administrative Code shall be installed at a location and in a manner approved by the supplier of water and shall be installed at the expense of the water consumer. In addition, any backflow prevention device required by paragraphs (B) and (C) of rule 3745-95-05 of the Administrative Code shall be

installed at a location and in a manner approved by the director as required by section 6109.13 of the Revised Code.

- (C) It shall be the duty of the water consumer to maintain any containment principle backflow preventer required by rules 3745-95-04 and 3745-95-05 of the Administrative Code in proper working order and in continuous operation.
  - (1) The supplier of water shall retain authority over any containment principle backflow preventer required by rules 3745-95-04 and 3745-95-05 of the Administrative Code.
  - (2) It shall be the duty of the supplier of water to see that the tests and inspections required under this paragraph are made.
  - (3) The consumer shall, on any premises on which any containment principle backflow preventer required by rules 3745-95-04 and 3745-95-05 of the Administrative Code are installed, have thorough inspections and operational tests made of the backflow preventers at the time of installation or repair, and as may be reasonably required by the supplier of water or the director, but in all cases at least once every twelve months. These inspections and tests shall be at the expense of the water consumer and shall be performed by the supplier of water or a person approved by the supplier as qualified to inspect and test backflow preventers.
  - (4) These devices shall be repaired, overhauled or replaced at the expense of the consumer whenever they are found to be defective.
  - (5) Records of such inspections, tests, repairs and overhaul shall be kept by the consumer and made available to the supplier of water.
  - (6) The supplier of water shall maintain a paper or electronic record of inventory of survey, investigation and containment principle backflow preventer installation reports. Records of inspections, tests, repairs and overhauls related to the containment principle backflow preventer required by rules 3745-95-04 and 3745-95-05 of the Administrative Code shall be maintained by the supplier of water for a minimum of five years.
- (D) The supplier of water shall inspect or cause to be inspected all installations where an approved connection exists between an auxiliary water system and the public water system or a consumer's water system at least once every twelve months and shall maintain an inventory of all such installations and inspection records. Such inventories and inspection records shall be made available during sanitary surveys and at other reasonable times. Paper or electronic inspection records shall be maintained by the supplier of water for a minimum of five years.
- (E) Containment principle backflow preventers approved by the supplier of water and conforming to prior or subsequent editions of the standards cited in paragraph (A)



of this rule, and which are properly maintained in accordance with paragraph (C) of this rule shall be excluded from the requirements of paragraphs (A) and (B) of this rule if the supplier of water and the director are assured that the backflow preventer will satisfactorily protect the public water system.

[Comment: This rule incorporates portions of the following manual by reference: The manual of cross-connection control, tenth edition, published by the foundation for cross-connection control and hydraulic research, university of Southern California. At the effective date of this rule, a copy of this document may be obtained from the foundation for cross-connection control and hydraulic research, university of Southern California, research annex 219, 3716 Hope street, Los Angeles, CA 90089-7700, phone: 866-545-6340, world-wide web address: <http://www.usc.edu/dept/fccchr/>. This document is available for review at Ohio EPA, Lazarus government center, 50 West Town street, suite 700, Columbus, OH 43215.]

Replaces: 3745-95-06

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Rule Amplifies: 6109.04, 6109.13

Prior Effective Dates: 07/01/72, 11/26/80, 05/01/03

**3745-95-07      Booster pumps.**

- (A) No person shall install or maintain a water service connection where a booster pump has been installed, unless an approved method is in place and is operational to maintain a minimum suction pressure as prescribed in the following:
- (1) For booster pumps not intended to be used for fire suppression, no person shall install or maintain a water service connection to any premises where a booster pump has been installed on the service line to or within such premises, unless such booster pump is equipped with a low pressure cut-off designed to shut-off the booster pump when the pressure in the service line on the suction side of the pump drops to ten pounds per square inch gauge or less.
  - (2) For booster pumps used for fire suppression, also referred to as fire pumps, no person shall install or maintain a water service connection to any premises where a fire pump has been installed on the service line to or within such premises, unless the pump is equipped with one of the following:
    - (a) A low suction throttling valve which is a pilot-operated valve installed in the discharge piping that maintains positive pressure in the suction piping, while monitoring pressure in the suction piping through a sensing line. The valve must throttle the discharge of the pump when necessary so that suction pressure will not be reduced below ten pounds per square inch gauge while the pump is operating.
    - (b) A variable speed suction limiting control which is a speed control system used to maintain a minimum positive suction pressure at the pump inlet by reducing the pump driver speed while monitoring pressure in the suction piping through a sensing line. It will be set so that the suction pressure will not be reduced below ten pounds per square inch gauge while the pump is operating.
  - (3) Booster pumps used for fire suppression, also referred to as fire pumps, installed prior to August 8, 2008, which are equipped with a low pressure cut-off as defined in paragraph (A)(1) of this rule, are not required to be modified solely for the purpose of meeting the new methods accepted after this date, under paragraph (A)(2) of this rule.
- (B) The water consumer shall maintain the low pressure cut-off device, the low suction throttling valve, or the variable speed suction limiting control in proper working order and certify to the supplier of water, at least once every twelve months that the minimum suction pressure sustaining method is operable and maintained in continuous operation.
- (C) The supplier of water shall maintain electronic or paper records of inventory of booster pump installations. Electronic or paper records certifying operation must be retained for a period of five years.
- (D) The provisions of this rule shall be followed notwithstanding inconsistent provisions in the "Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers' Recommended Standards for Water Works" (2012).

[Comment: "Recommended Standards for Water Works" 2012 edition. Copies are available from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215, (614) 644-2752" or online at <http://10statesstandards.com> or [www.epa.ohio.gov/ddagw](http://www.epa.ohio.gov/ddagw).]

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Statutory Authority: 6109.04

Rule Amplifies: 6109.04, 6109.13

Prior Effective Dates: 07/01/1972, 11/26/1980, 05/01/2003, 08/08/2008,  
10/26/2015

**3745-95-08      Violations.**

- (A) After reasonable notice to the occupant thereof, the supplier of water shall deny or discontinue the water service to any premises wherein any of the following occurs:
- (1) A backflow preventer required by this chapter is not installed, tested and maintained in a manner acceptable to the supplier of water.
  - (2) The backflow preventer has been removed or by-passed.
  - (3) An unprotected cross-connection exists on the premises.
  - (4) A low pressure cut-off, low suction throttling valve or variable speed suction limiting control, as required by rule 3745-95-07 of the Administrative Code, is not installed or maintained in working order.
  - (5) The supplier of water or the director, or the authorized representative of either, is denied entry to determine compliance with this chapter.
- (B) Water service to such premises shall not be restored until the consumer has corrected or eliminated such conditions or defects in conformance with this chapter , and to the satisfaction of the supplier of water.

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Prior Effective Dates: 07/01/1972, 11/26/1980

**Requirements for yard hydrants.****(A) Yard hydrants with weep holes.**

- (1) Yard hydrants with weep holes used for human consumption installed on a public water system are prohibited unless the weep holes are sealed.
- (2) Yard hydrants with weep holes not used for human consumption installed on a public water system, and those installed on a consumer's water system, shall have an appropriate backflow prevention assembly on the service line to protect the public water system. Yard hydrants with weep holes installed on public water systems shall be clearly labeled as "non-potable" or "not for human consumption."

**(B) Sanitary yard hydrants that do not have weep holes, such as those that meet the requirements of the "American Society of Sanitary Engineers (ASSE) standard 1057, Performance Requirements for Freeze Resistant Yard Hydrants with Backflow Protection" (2001), are not prohibited provided:**

- (1) The device is acceptable to the public water system to which it will be connected; and
- (2) Any other applicable backflow prevention and cross-connection control requirements of this chapter are met.

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Prior Effective Dates: 02/15/1951, 11/26/1980, 10/01/2006

**3745-96-01      Consumer confidence report applicability and definitions.**

- (A) This chapter establishes the minimum requirements for the content of the annual report that a community water system shall deliver to its customers. The report shall contain information on the quality of the water delivered by the system and characterize the risks from exposure to contaminants detected in the drinking water in an accurate and understandable manner.
- (B) Notwithstanding the provisions of paragraph (G) of this rule and rule 3745-81-02 of the Administrative Code, this chapter applies to community water systems as defined in rule 3745-81-01 of the Administrative Code.
- (C) For the purpose of this chapter, "customers" are defined as service connections to which water is delivered by a community water system.
- (D) For the purpose of this chapter, detected is defined as at or above the levels in the following rules:
  - (1) Paragraph (H) of rule 3745-81-23 of the Administrative Code for inorganic contaminants listed in paragraph (B) of rule 3745-81-11 of the Administrative Code.
  - (2) Table 1 of appendix B to rule 3745-89-03 of the Administrative Code for inorganic chemicals nitrate, nitrite, chlorite, and bromate.
  - (3) Paragraph (A)(13) of rule 3745-81-24 of the Administrative Code for the volatile organic chemicals listed in paragraph (D) of rule 3745-81-12 of the Administrative Code.
  - (4) Paragraphs (B)(14) and (B)(10)(c) of rule 3745-81-24 of the Administrative Code for the synthetic organic chemicals listed in paragraph (E) of rule 3745-81-12 of the Administrative Code.
  - (5) Table 4 of appendix B to rule 3745-89-03 of the Administrative Code for radioactive contaminants.
  - (6) Tables 1, 2, and 3 of appendix B to rule 3745-89-03 of the Administrative Code for disinfectant residuals, total trihalomethanes (TTHM), and haloacetic acids five (HAA5).
- (E) Each community water system shall deliver a report to its customers and meet the requirements of paragraph (B) of rule 3745-96-04 of the Administrative Code by July first annually. Each report shall contain data collected during, or prior to, the previous calendar year as prescribed in paragraph (D)(3) of rule 3745-96-02 of the Administrative Code.
- (F) A new community water system shall deliver its first report by July first of the year after its first full calendar year in operation and annually thereafter.
- (G) Any public water system as defined in rule 3745-81-01 of the Administrative Code

that sells water to a community water system shall deliver the applicable information required in rules 3745-96-02 and 3745-96-03 of the Administrative Code to the buyer, or consecutive water system, by April first annually. Delivered information shall include all source water information, information on detected contaminants, information on cryptosporidium and radon, and compliance with state primary drinking water rules as described in rule 3745-96-02 of the Administrative Code.

- (H) Consecutive water systems shall include in their report all information received from the wholesaler, including all source water information, detected contaminants from the plant tap, cryptosporidium and radon information, and wholesaler violation information.

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Prior Effective Dates: 05/01/01, 09/01/03, 07/01/04, 07/24/09



**3745-96-02 Consumer confidence report - required content.**

- (A) Each community water system shall provide to customers an annual report that contains the information specified in this rule and rule 3745-96-03 of the Administrative Code.
- (B) All of the following information on the source of the water delivered:
- (1) Each report shall identify the sources of the water delivered by the community water system by providing information on each of the following as applicable:
    - (a) The type of the water (e.g., surface water, ground water).
    - (b) The commonly used name (if any) and location of the body or bodies of water.
  - (2) When a source water assessment has been completed, the report shall notify consumers of the availability of this information and the means to obtain it. Where a community water system has received a source water assessment summary from the director, the report shall include a brief summary of the community water system's susceptibility to potential sources of contamination, using language provided by the director or equivalent language acceptable to the director.
- (C) Report definitions.
- (1) Each report shall include the following definitions:
    - (a) "Maximum contaminant level goal" or "MCLG" means the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
    - (b) "Maximum contaminant level" or "MCL" means the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
  - (2) A report that contains data on contaminants the state regulates shall include the following definitions as applicable:
    - (a) "Treatment technique," as defined in rule 3745-81-01 of the Administrative Code..
    - (b) "Action level" means the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system shall follow.
    - (c) "Maximum residual disinfectant level goal" or "MRDLG" means the level of drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
    - (d) "Maximum residual disinfectant level" or "MRDL" means the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
    - (e) "Lead threshold level," as defined in rule 3745-81-01 of the Administrative Code.
  - (3) A report that contains information regarding a level one or level two assessment required under rules 3745-81-50 to 3745-81-55 of the Administrative Code shall include the following definitions as applicable:

- (a) "Level one assessment": A level one assessment is a study of the water system to identify potential problems and determine, if possible, why total coliform bacteria have been found in the water system.
- (b) "Level two assessment": A level two assessment is a very detailed study of the water system to identify potential problems and determine, if possible, why an *Escherichia coli* (*E. coli*) maximum contaminant level violation has occurred or why total coliform bacteria have been found in the water system on multiple occasions.

(D) Information on detected contaminants.

- (1) This paragraph specifies the requirements for information to be included in each report for contaminants subject to mandatory monitoring (except *Cryptosporidium*) and applies to all of the following:
  - (a) Contaminants subject to an MCL, action level, maximum residual disinfectant level or treatment technique (regulated contaminants) in accordance with Chapter 3745-81 of the Administrative Code.
  - (b) Contaminants for which monitoring is required by 40 C.F.R. 141.40 (May 2, 2012), (unregulated contaminants).
- (2) The data relating to these contaminants shall be displayed in one table or in several adjacent tables. Any additional monitoring results which a community water system chooses to include in its report shall be displayed separately.
- (3) The data shall be derived from data collected to comply with U.S. EPA and state monitoring and analytical requirements during the previous calendar year with the following exception:
  - (a) Where a system is allowed to monitor for regulated contaminants less often than once a year, the table shall include the date and results of the most recent sampling and the report shall include a brief statement indicating that the data presented in the report are from the most recent testing done in accordance with the regulations. No data older than five years shall be included.
- (4) For detected regulated contaminants (listed in the appendix to this rule), the tables shall contain all of the following information:
  - (a) The MCL for that contaminant expressed as a number equal to or greater than 1.0 (as provided in the appendix to this rule).
  - (b) The MCLG for that contaminant expressed in the same units as the MCL.
  - (c) If there is no MCL for a detected contaminant, the table shall indicate that there is a MRDL, MRDLG, treatment technique or specify the action level applicable to that contaminant, and the lead threshold level. The report shall include the definitions for MRDL, MRDLG, treatment technique or action level, as applicable, or lead threshold level specified in paragraph (C)(2) of this rule.
  - (d) For contaminants subject to an MCL or MRDL, except turbidity, total coliform, fecal coliform and *E. coli*, the highest contaminant level used to determine compliance with state primary drinking water rules and the range of detected levels, as follows:
    - (i) When compliance with the MCL is determined by calculating a running annual average of all samples taken at a sampling point: the highest average of any of the sampling points and the range of all sampling points expressed in the same units as the MCL. Beginning one year after

the applicable compliance date identified in rule 3745-81-24 of the Administrative Code, for the MCLs for TTHM and HAA5 in paragraphs (B) and (C) of rule 3745-81-12 of the Administrative Code, systems shall include the highest locational running annual average for TTHM and HAA5 and the range of individual sample results for all monitoring locations expressed in the same units as the MCL. If more than one location exceeds the TTHM or HAA5 MCL, the system shall include the locational running annual averages for all locations that exceed the MCL.

(ii) When compliance with the MCL is determined on a system-wide basis by calculating a running annual average of all samples at all sampling points: the average and range of detection expressed in the same units as the MCL.

(iii) When compliance with the MCL is determined by any other method: the highest value used to determine compliance with state primary drinking water rules and the range of detected levels.

(e) For turbidity, report the highest single measurement and the lowest monthly percentage of samples meeting the turbidity limits specified in rule 3745-81-73 of the Administrative Code for the filtration technology being used. The report shall include an explanation of the reasons for measuring turbidity.

(f) For lead and copper, the ninetieth percentile value of the most recent round of sampling and the number of sampling sites exceeding the action level, and the individual results above the lead threshold level.

(g) The likely sources of detected contaminants to the best of the operator's knowledge. If the operator lacks specific information on the likely source, the report shall include one or more of the typical sources for that contaminant listed in the appendix to this rule which are most applicable to the system.

(h) For E. coli analytical results under rules 3745-81-50 to 3745-81-55 of the Administrative Code, the total number of positive samples.

(5) If a community water system distributes water to its customers from multiple hydraulically independent distribution systems that are fed by different raw water sources, the table should contain a separate column for each service area and the report should identify each separate distribution system. Alternatively, a community water system may produce separate reports tailored to include data for each service area.

(6) The table shall clearly identify any data indicating violations of MCLs, MRDLs or treatment techniques and the report shall contain a clear and readily understandable explanation of the violation including: the length of the violation, the potential adverse health effects and actions taken by the system to address the violation. To describe the potential health effects, the community water system shall use the relevant language for the particular contaminant as specified in the appendix to this rule.

(7) For detected unregulated contaminants (without an MCL) for which monitoring is required (except *Cryptosporidium*), the table shall contain the average and range at which the contaminant was detected. The report may include a brief explanation of the reasons for monitoring for unregulated contaminants.

(E) Information on *Cryptosporidium*, radon and other contaminants:

(1) If the system has performed monitoring for *Cryptosporidium*, which indicates that *Cryptosporidium* may

be present in the source water or the finished water, the report shall include:

- (a) A summary of the results of the monitoring.
  - (b) An explanation of the significance of the results.
- (2) If the community water system has performed any monitoring for radon which indicates that radon may be present in the finished water, the report shall include both of the following:
- (a) The results of the monitoring.
  - (b) An explanation of the significance of the results.
- (3) For a community water system that has performed additional monitoring which indicates the presence of other contaminants in the finished water, the director recommends the water system include in its report any results which may indicate a health concern. To determine if results may indicate a health concern, the director recommends the community water system find out if U.S. EPA has proposed a national primary drinking water regulation or issued a health advisory for that contaminant by calling the safe drinking water hotline (800-426-4791). The director considers detects above a proposed MCL or health advisory level to indicate possible health concerns. For such contaminants, the report may include the following information:
- (a) The results of the monitoring, including the average and range of values.
  - (b) An explanation of the significance of the results noting the existence of a health advisory or a proposed regulation.
- (F) Compliance with state primary drinking water rules. In addition to the requirements set forth in paragraph (D)(6) of this rule, the report shall note any violation that occurred during the year covered by the report of any of the following, and include a clear and readily understandable explanation of the violation, any potential adverse health effects and the steps the community water system has taken to correct the violation:
- (1) Monitoring and reporting of compliance data.
  - (2) Filtration and disinfection prescribed by rules 3745-81-71 to 3745-81-75 of the Administrative Code. For systems which have failed to install adequate filtration or disinfection equipment or processes, or have had a failure of such equipment or processes which constitutes a violation, the report shall include the following language as part of the explanation of potential adverse health effects: "Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches".
  - (3) Lead and copper control requirements prescribed by rules 3745-81-80 to 3745-81-89 of the Administrative Code. For systems which fail to take one or more actions prescribed by paragraph (D) of rule 3745-81-80 and rule 3745-81-81, 3745-81-82, 3745-81-83 or 3745-81-84 of the Administrative Code, the report shall include the applicable language of the appendix to this rule for lead, copper or both.
  - (4) Treatment techniques for acrylamide and epichlorohydrin prescribed by rule 3745-81-17 of the Administrative Code. For systems which violate the requirements of rule 3745-81-17 of the Administrative Code, the report shall include the relevant language from the appendix to this rule.
  - (5) Recordkeeping of compliance data as required by rule 3745-81-33 of the Administrative Code.

- (6) Special monitoring requirements for organic and inorganic contaminants as prescribed by 40 C.F.R. 141.40 (May 2, 2012) and for sodium as prescribed by 40 C.F.R. 141.41 (December 5, 1994).
  - (7) Violation of the terms of an administrative or judicial order.
  - (8) Any ground water system that receives notice from the director of a significant deficiency or notice from a laboratory of a fecal indicator-positive ground water source sample that is not invalidated under rule 3745-81-42 of the Administrative Code shall inform its customers of any significant deficiency that is uncorrected at the time of the next report or of any fecal indicator-positive ground water source sample in the next report. The system shall continue to inform the public annually until the director determines that particular significant deficiency is corrected or the fecal contamination in the ground water source is addressed in accordance with rule 3745-81-43 of the Administrative Code. If required, a system with significant deficiencies that have been corrected before the next report is issued shall inform its customers of the significant deficiency, how the deficiency was corrected and the date of correction in accordance with this paragraph. Each report shall include all of the following elements:
    - (a) The nature of the particular significant deficiency or the source of the fecal contamination (if the source is known) and the date the significant deficiency was identified by the director or the dates of the fecal indicator-positive ground water source samples.
    - (b) If the fecal contamination in the ground water source has been addressed under rule 3745-81-43 of the Administrative Code and the date of such action.
    - (c) For each significant deficiency or fecal contamination in the ground water source that has not been addressed under rule 3745-81-43 of the Administrative Code, the director-approved plan and schedule for correction, including interim measures, progress to date and any interim measures completed.
    - (d) If the system receives notice of a fecal indicator-positive ground water source sample that is not invalidated by the director, the potential health effects using the health effects language in the appendix to this rule.
- (G) Additional information.
- (1) The report shall contain a brief explanation regarding contaminants which may reasonably be expected to be found in drinking water, including bottled water. This explanation shall include the following language:
    - (a) "The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.
    - (b) Contaminants that may be present in source water include the following:
      - (i) Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
      - (ii) Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

- (iii) Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff and residential uses.
  - (iv) Organic chemical contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff and septic systems.
  - (v) Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.
- (c) In order to ensure that tap water is safe to drink, U.S. EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Food and drug administration regulations establish limits for contaminants in bottled water which shall provide the same protection for public health.
- (d) Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling U.S. EPA's safe drinking water hotline (800-426-4791)."
- (2) The report shall include the telephone number of the owner, operator or designee of the community water system as a source of additional information concerning the report.
- (3) In community water systems that serve a large proportion of non-english speaking residents, defined as ten per cent or more of the residents speak the same non-english language, the report shall include one of the following:
- (a) Information in the applicable language or languages regarding the importance of the report.
  - (b) A telephone number or address where such residents may contact the community water system to obtain a translated copy of the report or assistance in the applicable language.
- (4) The report shall include information about opportunities for public participation in decisions that may affect the quality of the water when such opportunities are routinely scheduled by the community water system (e.g., time and place of regularly scheduled board meetings).
- (5) The report shall include information on the status of the system's license to operate issued pursuant to Chapter 3745-84 of the Administrative Code.
- (6) The community water system may include additional information as it deems necessary for public education consistent with, and not detracting from, the purpose of the report.
- (7) Compliance information for the U.S. EPA revised total coliform rule, beginning April 1, 2016.
- (a) Any public water system required to comply with the level one assessment requirement or level two assessment requirement in accordance with rule 3745-81-53 of the Administrative Code that is not due to an E. coli MCL violation shall include in the report the following text, as applicable, filling in the blanks accordingly:
    - (i) "Coliforms are bacteria which are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a

potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessments to identify problems and to correct any problems that were found during these assessments.

- (ii) During the past year we were required to conduct [insert number of level one assessments] level one assessments. [insert number of level one assessments] level one assessments were completed. In addition, we were required to take [insert number of corrective actions] corrective actions and we completed [insert number of corrective actions] of these actions.
- (iii) During the past year [insert number of level two assessments] level two assessments were required to be completed for our water system. [insert number of level two assessments] level two assessments were completed. In addition, we were required to take [insert number of corrective actions] corrective actions and we completed [insert number of corrective actions] of these actions."
- (iv) Any system that has failed to complete all the required assessments or correct all identified significant deficiencies, is in violation of the treatment technique requirement and shall also include one or both of the following statements, as applicable:
  - (a) "During the past year we failed to conduct all of the required assessments."
  - (b) "During the past year we failed to correct all identified deficiencies that were found during the assessments."
- (b) Any system required to conduct a level two assessment due to an E. coli MCL violation shall include in the report the following text, filling in the blanks accordingly, and shall include the text in paragraph (G)(7)(b)(iii) of this rule if applicable:
  - (i) "E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches or other symptoms. They may pose a greater health risk for infants, young children, the elderly and people with severely compromised immune systems. We found E. coli bacteria, indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessments to identify problems and to correct any problems that were found during these assessments."
  - (ii) "We were required to complete a level two assessment because we found E. coli in our water system. In addition, we were required to take [insert number of corrective actions] corrective actions and we completed [insert number of corrective actions] of these actions."
  - (iii) Any system that has failed to complete the required assessment or correct all identified significant deficiencies, is in violation of the treatment technique requirement and must also include one or both of the following statements, as applicable:
    - (a) "We failed to conduct the required assessment."
    - (b) "We failed to correct all significant deficiencies that were identified during the assessment that we conducted."
- (c) If a public water system detects E. coli and has violated the E. coli MCL, in addition to completing the table as required in paragraph (D) of this rule, the system shall include one or more of the following

statements to describe any noncompliance, as applicable:

- (i) "We had an E. coli-positive repeat sample following a total coliform-positive routine sample."
  - (ii) "We had a total coliform-positive repeat sample following an E. coli-positive routine sample."
  - (iii) "We failed to collect all required repeat samples following an E. coli-positive routine sample."
  - (iv) "We failed to test for E. coli when a repeat sample tested positive for total coliform."
- (d) If a public water system detects E. coli and has not violated the E. coli MCL, in addition to completing the table as required in paragraph (D) of this rule, the system may include a statement that explains that although they have detected E. coli, they are not in violation of the E. coli MCL.

[Comment: The 40 C.F.R. 141.40 and 141.41 refers to the "Code of Federal Regulations" published on May 2, 2012 and December 5, 1994. Copies of these codes may be obtained from the "U.S. Government Bookstore" toll-free at (866) 512-1800 or <https://www.gpo.gov/fdsys>, or from "Ohio EPA Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215," (614) 644-2752. The code is available for review at, "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215."]



Effective: 5/1/2018

Five Year Review (FYR) Dates: 1/31/2018 and 05/01/2023

Promulgated Under: 119.03

Statutory Authority: 6109.04, 6109.12

Rule Amplifies: 6109.04, 6109.12

Prior Effective Dates: 5/1/02, 9/1/03, 8/1/05, 7/24/09, 1/1/10, 10/31/10,  
4/1/16

## APPENDIX TO RULE 3745-96-02 -- REGULATED CONTAMINANTS TABLE

### Key

**AL**=Action Level

**MCL**=Maximum Contaminant Level

**MCLG**=Maximum Contaminant Level Goal

**MFL**=million fibers per liter

**mrem/year**=millirems per year (a measure of radiation absorbed by the body)

**MRDL**= Maximum Residual Disinfectant Level

**MRDLG**=Maximum Residual Disinfectant Level Goal

**NTU**=Nephelometric Turbidity Units

**pCi/L**=picocuries per liter (a measure of radioactivity)

**mg/L**=milligrams per liter; or ppm, parts per million

**µg/L** micrograms per liter; or ppb, parts per billion

**ng/L**= nanograms per liter; or ppt, parts per trillion

**ppq**=parts per quadrillion; or picograms per liter

**TT**=Treatment Technique

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
Microbiological Contaminants						
Total Coliform Bacteria †	MCL: systems that collect 40 or more samples per month, 5% of monthly samples are positive; systems that collect fewer than 40 samples per month, 1 positive monthly sample.			0	Naturally present in the environment	Coliforms are bacteria which are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
Total Coliform Bacteria ‡	TT	-	TT	N/A	Naturally present in the environment	Coliforms are bacteria which are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct problems that were found during these assessments.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
Fecal coliform and <i>E. coli</i> †	0	-	0	0	Human and animal fecal waste	Fecal coliforms and <i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly and people with severely compromised immune systems.
<i>E. coli</i> ‡	Routine and repeat samples are total coliform-positive and either is <i>E. coli</i> -positive or system fails to take repeat samples following <i>E. coli</i> -positive routine sample or system fails to analyze total coliform-positive repeat sample for <i>E. coli</i> .	-	Routine and repeat samples are total coliform-positive and either is <i>E. coli</i> -positive or system fails to take repeat samples following <i>E. coli</i> -positive routine sample or system fails to analyze total coliform-positive repeat sample for <i>E. coli</i> .	0	Human and animal fecal waste	<i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, the elderly and people with severely compromised immune systems.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
Fecal Indicators (enterococci or coliphage)	TT		TT	N/A	Human and animal fecal waste	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
Total Organic Carbon	TT		TT	N/A	Naturally present in the environment.	Total organic carbon(TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection by-products. These by-products include trihalomethanes (THM) and haloacetic acids (HAAs). Drinking water containing these by-products in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.
Turbidity	TT (NTU)	-	TT (NTU)	N/A	Soil runoff	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea and associated headaches.

† Until March 31, 2016

‡ Beginning April 1, 2016

Radioactive Contaminants						
Beta/photon emitters	4 mrem/yr	-	4mrem/yr (AL=50 pCi/L)	0	Decay of natural and man-made deposits	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Alpha emitters	15 pCi/L	-	15 pCi/L	0	Erosion of natural deposits	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
Combined radium	5 pCi/L	-	5 pCi/L	0	Erosion of natural deposits	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium	30 µg/L	-	30 µg/L	0	Erosion of natural deposits	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
<b>Inorganic Contaminants</b>						
Antimony	.006 mg/L	1000	6 µg/L	6 µg/L	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
Arsenic	0.010 mg/L <sup>1</sup>	1000	10 µg/L	0 <sup>1</sup>	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
Asbestos	7 MFL	-	7 MFL	7 MFL	Decay of asbestos cement water mains; Erosion of natural deposits	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
Barium	2 mg/L	-	2 mg/L	2 mg/L	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
Beryllium	.004 mg/L	1000	4 µg/L	4 µg/L	Discharge from metal refineries and coal-burning factories; Discharge from electrical, aerospace, and defense industries	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
Bromate	0.01 mg/L	1000	10 µg/L	0	By-product of drinking water chlorination.	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
Cadmium	.005 mg/L	1000	5 µg/L	5 µg/L	Corrosion of galvanized pipes; Erosion of natural deposits; Discharge from metal refineries; Runoff from waste batteries and paints	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
Chlorite	1 mg/L		1 mg/L	0.8 mg/L	By-product of drinking water chlorination.	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
Chromium	.1 mg/L	1000	100 µg/L	100 µg/L	Discharge from steel and pulp mills; Erosion of natural deposits	Some people who drink water containing chromium in well in excess of the MCL over many years could experience allergic dermatitis.
Copper	AL=1.3 mg/L	-	AL=1.3 mg/L	AL=1.3 mg/L	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
Cyanide	.2 mg/L	1000	200 µg/L	200 µg/L	Discharge from steel/metal factories; Discharge from plastic and fertilizer factories	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.
Fluoride	4 mg/L	-	4 mg/L	4 mg/L	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
Lead	AL=0.015 mg/L or Threshold Level = 0.015 mg/L	1000  1000	AL=15 µg/L or Threshold Level = 15 µg/L	0  0	Corrosion of household plumbing systems; Erosion of natural deposits	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
Mercury [inorganic]	.002 mg/L	1000	2 µg/L	2 µg/L	Erosion of natural deposits; Discharge from refineries and factories; Runoff from landfills; Runoff from cropland	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
Nickel	.1 mg/L	1000	100 µg/L	100 µg/L	Erosion of natural deposits; Discharge from electroplating, stainless steel, and alloy products; Mining and refining operations.	Some people who drink water containing nickel in excess of the MCL over many years could experience problems with their heart or liver.
Nitrate	10 mg/L	-	10 mg/L	10 mg/L	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
Nitrite	1 mg/L	-	1 mg/L	1 mg/L	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
Selenium	.05 mg/L	1000	50 µg/L	50 µg/L	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.

Thallium	.002 mg/L	1000	2 µg/L	0.5 µg/L	Leaching from ore-processing sites; Discharge from electronics, glass, and drug factories	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.
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Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
<b>Synthetic Organic Contaminants including Pesticides and Herbicides</b>						
2,4-D	.07 mg/L	1000	70 µg/L	70 µg/L	Runoff from herbicide used on row crops	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
2,4,5-TP [Silvex]	.05 mg/L	1000	50 µg/L	50 µg/L	Residue of banned herbicide	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
Acrylamide	TT	-	TT	0	Added to water during sewage/ wastewater treatment	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
Alachlor	.002 mg/L	1000	2 µg/L	0	Runoff from herbicide used on row crops	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, experience anemia, and may have an increased risk of getting cancer.
Atrazine	.003 mg/L	1000	3 µg/L	3 µg/L	Runoff from herbicide used on row crops	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
Benzo(a)pyrene [PAH]	.0002 mg/L	1,000,000	200 nanograms/L	0	Leaching from linings of water storage tanks and distribution lines	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties or may have an increased risk of getting cancer.
Carbofuran	.04 mg/L	1000	40 µg/L	40 µg/L	Leaching of soil fumigant used on rice and alfalfa	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
Chlordane	.002 mg/L	1000	2 µg/L	0	Residue of banned termiticide	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver, blood, or nervous system, and may have an increased risk of getting cancer.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
Dalapon	.2 mg/L	1000	200 µg/L	200 µg/L	Runoff from herbicide used on rights of way	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
Di(2-ethylhexyl) adipate	.4 mg/L	1000	400 µg/L	400 µg/L	Discharge from chemical factories	Some people who drink water containing di (2-ethylhexyl) adipate well in excess of the MCL over many years could experience general toxic effects or reproductive difficulties.
Di(2-ethylhexyl) phthalate	.006 mg/L	1000	6 µg/L	0	Discharge from rubber and chemical factories	Some people who drink water containing di (2-ethylhexyl) phthalate in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
Dibromochloropropane	.0002 mg/L	1,000,000	200 nanograms/L	0	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive problems and may have an increased risk of getting cancer.
Dinoseb	.007 mg/L	1000	7 µg/L	7 µg/L	Runoff from herbicide used on soybeans and vegetables	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
Diquat	.02 mg/L	1000	20 µg/L	20 µg/L	Runoff from herbicide use	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
Dioxin [2,3,7,8-TCDD]	.00000003 mg/L	1,000,000,000	30 ppq	0	Emissions from waste incineration and other combustion; Discharge from chemical factories	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
Endothall	.1 mg/L	1000	100 µg/L	100 µg/L	Runoff from herbicide use	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
Endrin	.002 mg/L	1000	2 µg/L	2 µg/L	Residue of banned insecticide	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
Epichlorohydrin	TT	-	TT	0	Discharge from industrial chemical factories; An impurity of some water treatment chemicals	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
Ethylene dibromide	.00005 mg/L	1,000,000	50 nanograms/L	0	Discharge from petroleum refineries	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
Glyphosate	.7 mg/L	1000	700 µg/L	700 µg/L	Runoff from herbicide use	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or adverse reproductive difficulties.
Heptachlor	.0004 mg/L	1,000,000	400 nanograms/L	0	Residue of banned pesticide	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
Heptachlor epoxide	.0002 mg/L	1,000,000	200 nanograms/L	0	Breakdown of heptachlor	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.
Hexachlorobenzene	.001mg/L	1000	1 µg/L	0	Discharge from metal refineries and agricultural chemical factories	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
Hexachlorocyclopentadiene	.05 mg/L	1000	50 µg/L	50 µg/L	Discharge from chemical factories	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their stomach or kidneys.
Lindane	.0002 mg/L	1,000,000	200 nanograms/L	200 nanograms/L	Runoff/leaching from insecticide used on cattle, lumber, gardens	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
Methoxychlor	.04 mg/L	1000	40 µg/L	40 µg/L	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
Oxamyl [Vydate]	.2 mg/L	1000	200 µg/L	200 µg/L	Runoff/leaching from insecticide used on apples, potatoes and tomatoes	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
PCBs [Polychlorinated biphenyls]	.0005 mg/L	1,000,000	500 nanograms/L	0	Runoff from landfills; Discharge of waste chemicals	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
Pentachlorophenol	.001 mg/L	1000	1 µg/L	0	Discharge from wood preserving factories	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
Picloram	.5 mg/L	1000	500 µg/L	500 µg/L	Herbicide runoff	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
Simazine	.004 mg/L	1000	4 µg/L	4 µg/L	Herbicide runoff	Some people who drink water containing simazine in excess of the MCL over many years could experience tremors or have problems with their blood.
Toxaphene	.003 mg/L	1000	3 µg/L	0	Runoff/leaching from insecticide used on cotton and cattle	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their thyroid, kidneys, or liver and may have an increased risk of getting cancer.
<b>Volatile Organic Contaminants</b>						
Benzene	.005 mg/L	1000	5 µg/L	0	Discharge from factories; Leaching from gas storage tanks and landfills	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
Carbon tetrachloride	.005 mg/L	1000	5 µg/L	0	Discharge from chemical plants and other industrial activities	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
Chlorobenzene	.1 mg/L	1000	100 µg/L	100 µg/L	Discharge from chemical and agricultural chemical factories	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their kidneys or liver.
o-Dichlorobenzene	.6 mg/L	1000	600 µg/L	600 µg/L	Discharge from industrial chemical factories	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
p-Dichlorobenzene	.075 mg/L	1000	75 µg/L	75 µg/L	Discharge from industrial chemical factories	Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
1,2-Dichloroethane	.005 mg/L	1000	5 µg/L	0	Discharge from industrial chemical factories	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
1,1-Dichloroethylene	.007 mg/L	1000	7 µg/L	7 µg/L	Discharge from industrial chemical factories	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
cis-1,2-Dichloroethylene	.07 mg/L	1000	70 µg/L	70 µg/L	Discharge from industrial chemical factories	Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
trans-1,2-Dichloroethylene	.1 mg/L	1000	100 µg/L	100 µg/L	Discharge from industrial chemical factories	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
Dichloromethane	.005 mg/L	1000	5 µg/L	0	Discharge from pharmaceutical and chemical factories	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
1,2-Dichloropropane	.005 mg/L	1000	5 µg/L	0	Discharge from industrial chemical factories	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
Ethylbenzene	.7 mg/L	1000	700 µg/L	700 µg/L	Discharge from petroleum refineries	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
Haloacetic Acids (HAA)	.06 mg/L	1000	60 µg/L	n/a	By-product of drinking water disinfection.	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
Styrene	.1 mg/L	1000	100 µg/L	100 µg/L	Discharge from rubber and plastic factories; Leaching from landfills	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
Tetrachloroethylene	.005 mg/L	1000	5 µg/L	0	Discharge from factories and dry cleaners	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
1,2,4-Trichlorobenzene	.07 mg/L	1000	70 µg/L	70 µg/L	Discharge from textile-finishing factories	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
1,1,1-Trichloroethane	.2 mg/L	1000	200 µg/L	200 µg/L	Discharge from metal degreasing sites and other factories	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
1,1,2-Trichloroethane	.005 mg/L	1000	5 µg/L	3 µg/L	Discharge from industrial chemical factories	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
Trichloroethylene	.005 mg/L	1000	5 µg/L	0	Discharge from metal degreasing sites and other factories	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
TTHMs [Total trihalomethanes]	.08 mg/L	1000	80 µg/L	n/a	By-product of drinking water chlorination	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer.
Toluene	1 mg/L	-	1 mg/L	1 mg/L	Discharge from petroleum factories	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
Vinyl Chloride	.002 mg/L	1000	2 µg/L	0	Leaching from PVC piping; Discharge from plastics factories	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
Xylenes	10 mg/L	-	10 mg/L	10 mg/L	Discharge from petroleum factories; Discharge from chemical factories	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.

Contaminant/Chemical	MCL in compliance Units	to convert for CCR, multiply by	MCL in CCR units	MCLG in CCR Units	Major Sources in Drinking Water	Health Effects Language
<b>Residual Disinfectants</b>						
Chloramine	MRDL = 4 mg/L		MRDL = 4 mg/L	MRDLG = 4 mg/L	Water additive used to control microbes.	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in the excess of the MRDL could experience stomach discomfort or anemia.
Chlorine	MRDL = 4 mg/L		MRDL = 4 mg/L	MRDLG = 4 mg/L	Water additive used to control microbes.	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in the excess of the MRDL could experience stomach discomfort.
Chlorine dioxide	MRDL = .8 mg/L	1000	MRDL= 800 µg/L	MRDLG = 800 µg/L	Water additive used to control microbes.	Some infants and young children who drink water containing chlorine dioxide in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MCL. Some people may experience anemia.

† Until March 31, 2016  
‡ Beginning April 1, 2016

**Required additional health information.**

- (A) All reports shall prominently display the following language: "Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the safe drinking water hotline (800-426-4791)."
- (B) A community water system that detects arsenic above 0.005 mg/L and up to and including 0.010 mg/L shall include the following informational statement: "While your drinking water meets EPA's standards for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems."
- (C) A community water system which detects nitrate at levels above five mg/L, and up to and including ten mg/L shall include an informational statement about the impacts of nitrate on children using the following language: "Nitrate in drinking water at levels above ten mg/L is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant you should ask advice from your health care provider."
- (D) All community water systems shall include the following lead-specific information about lead in drinking water and its effects on children: "If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. [NAME OF UTILITY] is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for thirty seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. A list of laboratories certified in the State of Ohio to test for lead may be found at <http://www.epa.ohio.gov/ddagw> or by calling 614-644-



2752. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at 800-426-4791 or at <http://www.epa.gov/safewater/lead>."

- (E) Community water systems that detect total trihalomethanes (TTHMS) monitored and calculated as an annual average under the provisions in rule 3745-81-24 of the Administrative Code, shall include health effects language prescribed by the appendix to rule 3745-96-02 of the Administrative Code if that level is above the MCL of 0.080 mg/L, even if the water system is not yet required to comply with the MCL.

Effective: 10/31/2010

Five Year Review (FYR) Dates: 10/26/2015 and 10/26/2020

Promulgated Under: 119.03

Statutory Authority: 6109.04

Rule Amplifies: 6109.03, 6109.04

Prior Effective Dates: 05/01/01, 09/01/03, 08/01/05, 07/24/09

3745-96-04      **Consumer confidence report delivery and recordkeeping.**

- (A) Each community water system shall mail or otherwise directly deliver one copy of the report to each customer.
- (B) The community water system shall make a good faith effort to reach consumers who do not receive water bills. A good faith effort will be tailored to the consumers who are served by the community water system but are not bill-paying customers, such as renters and workers. A good faith effort to reach consumers shall include a mix of methods appropriate to the particular system such as: posting the reports on the internet; mailing to postal patrons in metropolitan areas; advertising the availability of the report in the news media; publication in a local newspaper; posting in public places such as cafeterias or lunch rooms of public buildings; delivery of multiple copies for distribution by single-biller customers such as apartment buildings, condominium complexes and large private employers; and delivery to community organizations.
- (C) By July first annually, each community water system shall provide to the director all of the following information:
  - (1) A copy of the report.
  - (2) A distribution certification, on a form acceptable to the director, certifying that the report has been distributed to customers, a good faith effort to reach non-bill paying customers has been completed, and that the information is correct and consistent with the compliance monitoring data previously submitted to the director.
- (D) Each community water system shall make its reports available to the public upon request.
- (E) Each community water system serving one hundred thousand or more consumers shall post its current year's report to a publicly-accessible site on the Internet for at least a one year period.
- (F) Any community water system subject to this chapter shall retain copies of its consumer confidence report for no less than three years.

Effective: 10/26/2015

Five Year Review (FYR) Dates: 07/06/2015 and 10/26/2020

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