

**DRINKING WATER PROGRAM GUIDANCE**

**DEQ Reference No.** DW-96-01

**SUBJECT:** **Surface Water Treatment Rule Compliance Guidance**

***Effective Date:*** January 29, 1996

**Citation:** This policy outlines the criteria and procedures to be used for determining if a public water system using a surface water source is in compliance with the treatment requirements of the Surface Water Treatment Rule (CFR 141.70 *et seq.*).

**Background and Purpose:**

The Surface Water Treatment Rule requires the State to develop guidance for the evaluation of public water systems that use surface water. The purpose of this evaluation is to insure that filtration and disinfection treatments meet specific efficiency criteria. These criteria were developed over a period of years by a national working group of which Leigh Woodruff, former Idaho Drinking Water Program Manager, was a contributing member. The attached policy outlines these compliance requirements and describes the process of evaluating them. Although it is based on the national guidelines, this policy has been adapted to the conditions that prevail in Idaho.

**Policy (Attached)**

This policy has been developed in cooperation with other states in our region. It has been reviewed by DEQ drinking water program personnel throughout the state. It has also had the benefit of review and comment by the Idaho Drinking Water Advisory Committee.

**Approved by:**

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Date

SWTR Compliance Guidance

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## INTRODUCTION

### Background

Systems with surface sources or ground water sources under the direct influence of surface water (GWUDI), and which are required to filter, must rely on filtration and disinfection to adequately remove or inactivate giardia and viruses. Under federal and state regulations, these systems must meet the following criteria:

- \* Remove/inactivate through filtration plus disinfection:
  - 3 logs (99.9%) of giardia
  - 4 logs (99.99%) of viruses;
- \* Achieve effluent turbidity limits;
- \* Maintain 0.2 mg/l disinfectant residual entering the distribution system;
- \* Maintain a disinfectant residual in the distribution system;
- \* Comply with state design standards;
- \* Meet state established operating conditions;
- \* Have a qualified operator(s).

### Purpose

Since federal and state regulations do not always specify how the SWTR requirements are to be met, this document outlines DEQ's policies in the following areas:

- \* Initial assessment of filtration and disinfection systems for compliance with SWTR requirements;
- \* Operations plan contents;
- \* Operator qualification requirements;

Guidance in this document is intended to be used in evaluating both existing and new facilities. If existing systems do not initially conform to SWTR requirements based on evaluation of the system design, operation and effluent quality, DEQ's intent is to enter into a voluntary consent order with the system. The consent order would contain a negotiated timetable for bringing the system into compliance, including intermediate milestones and stipulated penalties for violation of the agreement. A standardized consent order and procedures have been developed for this purpose. DEQ does not intend to disapprove or take further enforcement action against systems provided they enter into a voluntary consent order and move towards compliance in a timely manner.

It should be demonstrated that new treatment plants meet the treatment criteria listed above prior to providing water for public consumption, or before terminating public notice requirements for violations requiring modifications to existing non-complying facilities.

## INITIAL COMPLIANCE EVALUATION

By July 1, 1993 or other specifically established compliance date, each system with a surface source must comply with the filtration and disinfection requirements in Idaho regulations. In order to determine whether systems are in compliance with the requirements by the deadline, the system must provide DEQ with an evaluation of their system. If DEQ staff and resources are available, DEQ may elect to carry out the evaluation of some small systems (e.g., < 500 pop). These evaluations should contain:

- A. Evaluation of the system design, and recommended improvements;
- B. Evaluation of the giardia removal effectiveness by filtration;
- C. Evaluation of the filter's ability to achieve turbidity performance criteria;
- D. Evaluation of operating procedures;
- E. Evaluation of the system's CTs showing the giardia/virus inactivation provided by disinfection; and
- F. Evaluation of operator(s) qualifications.

Further guidance on these items is provided below.

### A. Design.

Review of system design should include both filtration and disinfection facilities. Applicable design standards are the Recommended Standards for Water Works<sup>1</sup> (Ten State Standards; 1992) with additions recommended in the Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources<sup>2</sup>, and appropriate sections of IDAPA 16.01.08550, and 16.01.08551. The following references should be used for review of slow sand filter design in lieu of Ten States Standards; AWWA Manual of Design for Slow Sand Filtration<sup>3</sup>, Slow Sand Filtration (ASCE, 1991)<sup>4</sup>, and Slow Sand Filtration (WHO)<sup>5</sup>. The filter media type, size and age should be considered in evaluations of both slow sand and coagulation facilities.

For facilities using coagulation, a checklist has been prepared by Bellamy<sup>6</sup> to optimize cryptosporidium removal, see Appendix A. Cryptosporidium has caused several major waterborne disease outbreaks, and is expected to be present in virtually all surface waters. While the focus of Bellamy's article and checklist is control of cryptosporidium, any improvements made to control cryptosporidium will also help control giardia, virus, and bacteria.

Disinfection design and equipment specifications should conform to the Ten States Standards. Additional disinfection performance criteria are listed below under Section E.

**B. Giardia Removal Effectiveness.**

Under 40 CFR 141.72(b)(1), states must determine that filtration plus disinfection achieves at least 3 log giardia removal/inactivation and 4 log virus removal/inactivation. Methods to evaluate inactivation by disinfection using CTs are well established (see subsection E.). However, states must establish a method to assess removal of giardia and viruses by filtration. Idaho policies for determining these removals are outlined below.

Giardia removal credit will be granted for filtration processes provided they meet the following conditions:

- \* The filtration process is operated in accordance with an approved operations plan [IDAPA 16.01.08300.03.c.ii.(a)].
- \* The system complies with turbidity performance criteria established for that filtration technology [IDAPA 16.01.08300.03.c.ii.(b)].
- \* Coagulant chemicals are added at all times when conventional and direct filtration facilities are in operation [IDAPA 16.01.08300.03.c.ii.(c)].
- \* Slow sand filters are operated at a rate not to exceed 0.1 gallons per minute per square foot [IDAPA 16.01.08300.03.c.ii.(d)].
- \* Diatomaceous earth filters are operated at a rate not to exceed 1.5 gallons per minute per square foot [IDAPA 16.01.08300.c.ii.(e)].
- \* Filtration processes are operated to achieve at least 2 log (99%) removal of giardia cysts [IDAPA 16.01.08550.05.a.ii].

The last requirement was established as a minimum level below which filtration is not considered an effective barrier. Research has shown that properly operated filtration facilities are in most cases capable of achieving 3 log (99.9%) removal of giardia. Filters not removing 2 logs (99%) of giardia cysts may place consumers at increased risk of microbiological illness, and increase their exposure to disinfection by-products normally removed by filtration.

Unless demonstrated otherwise to the satisfaction of DEQ, the maximum giardia and virus removal credit for filtration is listed below in Table 1.

Table 1

Filtration type	Giardia removal	Virus removal
Complete conventional	2.5 log	2.0 log
Direct	2.0 log	1.0 log
Slow sand	2.0 log	2.0 log
Diatomaceous earth	2.0 log	1.0 log
Cartridge/bag filters	2.0 log	0 log
Other technology	credit assigned case-by-case	

Other technology not listed such as microfiltration, ultrafiltration, etc. will be assigned giardia and virus removal credit on a case-by-case basis. On-site removal demonstration studies, or equivalent, using a protocol approved by DEQ are required.

All filtration facilities will be granted the maximum virus removal credit listed in Table 1 provided they demonstrate 2 log (99%) giardia removal (2.5 log [99.7%] giardia removal for complete conventional filtration). No virus removal credit will be granted to cartridge, bag, or other filtration technology unless virus demonstration removal studies are performed. DEQ will review these study results and assign virus removal credit for these facilities on a case-by-case basis.

Each system must initially establish the giardia removal effectiveness of their filtration process using one or more of five methods. If the following conditions are met, Regional offices may, at their discretion, simplify (but not eliminate) the procedures for evaluating the effectiveness of a treatment technology if the technology has already been successfully utilized for that source water:

- previous field evaluation at that location has shown that the treatment technology is capable of at least 2 log (99%) removal of giardia cysts,
- the design and construction of the new treatment facilities are virtually the same as those previously installed,
- water quality and its variability are expected to be the same for all facilities.

Giardia removal effectiveness evaluations for coagulation facilities must include evaluation of coagulant/polymer efficacy, since the coagulant/polymer type and dosage, filtration rates, etc. can greatly impact the effectiveness of each facility.

Table 2 indicates which evaluation methods are applicable to various filtration technologies. A system may use several evaluation techniques, but need only demonstrate 2 log removal by a single method. The five evaluation techniques and their criteria are described further on the following pages.

Supplemental information. Data described below must be submitted for each evaluation method. In addition to this data, it is highly recommended that basic operating records including any data on pH, temperature, flows, etc. be submitted, as this information will greatly assist the evaluation.

Table 2

Filtration type	1. Particle counting	2. MPA	3. Turbidity reduction	4. Design & operation	5. Giardia or crypto challenge
Complete conventional	X	X	X	X	X
Direct	X	X	X	X	X
Slow sand		X		X	X
Diatomaceous earth	X	X		X	X
Cartridge/bag	X	X			X
Other technology	X	X			X

**1. Particle counting.**

Giardia removal credit may be granted based on the removal of particles in the 5 - 15  $\mu$ m size range between the raw and finished water, as measured using a particle counter. Other size ranges may be appropriate depending on the instrument used. DEQ staff should be consulted if other size ranges are to be evaluated. Although not required, consideration should be given to evaluating removal of particles in the cryptosporidium size range (3 - 5  $\mu$ m), as treatment requirements for this pathogen are expected to be established in the future.

**Criteria:** To receive giardia removal credit, particle count data must show 2 log (99%) or greater removal in the 5 - 15  $\mu$ m size range in both;

\* 80% of measurements during the first 30 minutes of a filter run; and,

\* 95% of measurements during the remainder of the filter run.

**Procedures:** A protocol for the particle count evaluation should be submitted for review and approval by DEQ before initiating the evaluation. Procedures in Appendix B should be followed unless otherwise justified. It is recommended that each filter be evaluated. However, combined effluent from all filters may be evaluated provided:

\* turbidities from individual filters remain below 0.5 NTU for the duration of the study,

\* turbidities from individual filters are approximately the same as the combined effluent,

\* all filter beds are in use for the duration of the study, and

\* filters are operated as close as feasible to their maximum filtration rates.

**Calibration:** Particle counters must be calibrated using the methods and frequencies recommended by the manufacturers. The date and method of instrument calibration should be recorded.

**Minimum data:** A minimum of 20 and preferably 40 sets (raw/finished) of particle count data must be included. The study must include both filter start-up and filter-run termination. At the beginning of a filter run, measurements should be made every 5 minutes for the first 30 minutes of the filter run, then every 30 minutes for the first 3 hours. Measurements may continue hourly until backwash, or may be discontinued until the last 30 minutes of the run. Measurements must be taken every 5 minutes during the last 30 minutes of the run.

In addition to particle counts, the following data must be submitted:

date/time	coagulant/polymer type(s)
finished turbidity	coagulant/polymer dosage
filtration rate	filter age (hours)
name of sampler	

In addition, it is recommended that raw water turbidity, pH, and temperature also be submitted.

## 2. Microscopic Particle Size Analysis for Water Treatment Plant Evaluation.

Giardia removal credit may be granted based on the removal of particles in the 5 - 15  $\mu$ m size range between the raw and finished water, as measured using MPA. Although not required, consideration should be given to evaluating removal of particles in the cryptosporidium size range (3 - 5  $\mu$ m), as treatment requirements for this pathogen are expected to be established in the future.

**Criteria:**  $\geq 2$  log (99%) removal of 5 - 15  $\mu$ m particles in all analysis.

**Minimum data:** 2 pairs of analysis (raw/finished), each collected over one (1) or more complete filter runs.

**Methods:** Analysis and sampling procedures must follow the USEPA Consensus Method<sup>7</sup>, unless otherwise approved by DEQ. Raw water samples must be collected before any treatment (eg., chlorination, coagulation, etc.). Finished water samples must be collected prior to disinfection. Finished and raw water samples should be collected concurrently.

Laboratories used for this analysis must have successfully completed training by the USEPA Region 10 laboratory or be recognized by the Region 10 laboratory as qualified to perform this analysis. As of 2/94, all labs on Region 10's 8/31/95 list (Appendix C) are acceptable except the Bio Vir and Morrell Associates, Inc. labs.

*Note: Labs must be specifically instructed to perform particle counting in the proper size ranges. In our experience, without these instructions the lab may perform an MPA analysis for GWUDI evaluation which cannot be used for assessment of filtration performance.*



In addition to MPA analysis results, the following data must be submitted with each pair of analysis:

begin/end time of each sample	coagulant/polymer type(s)
raw and finished turbidity	filtration rate
coagulant/polymer dosage(s)	begin filter age (hours)
sampler/analyst	

### 3. Turbidity reduction.

Percent turbidity reduction has been shown to be a useful indicator of giardia removal in some coagulation facilities<sup>8,9,10</sup>, but is not as useful an indicator of performance for other filtration technology. Due to the low cost and readily available nature of turbidity data, it is acceptable for coagulation facilities to use turbidity removal to initially demonstrate compliance with filtration removal criteria. Turbidity removal is only to be used for the initial evaluation, and DEQ must follow these at a later time with field verification of removals using DEQ particle counting equipment. Should DEQ particle count data show that a filtration facility does not remove 2 log (99%) of particles in the giardia size range, the system will be required to modify the treatment process to achieve at least 2 log (99%) removal. Turbidity reduction cannot be used to assign removal credit > 2 log (99%), but higher log removals may be assigned based on evaluation of particle removal using particle counting or MPA analysis.

**Criteria:** Turbidity must be reduced by 90% in  $\geq 95\%$  of measurements between raw and finished water.

**Raw water:** Must be  $\geq 5.0$  NTU in at least 50% of measurements over the study period (all data must be used).

**Calibration:** Turbidimeters must be calibrated using methods and frequencies recommended by the manufacturer. The date and method of calibration should be recorded.

**Minimum data:** Finished water turbidity measurements must be reported every 4 hours the system is in operation for a minimum of three (3) months. Systems serving populations  $\leq 500$  may monitor once/day.

### 4. Design & operation.

Certain types of filtration may be granted filtration removal credit on the basis of their design and operating characteristics as described below. In general, design must conform to Recommended Standards for Water Works<sup>1</sup> or other acceptable reference. Please note that this includes the requirement for dual filtration units each capable of meeting the plant design capacity (maximum daily demand) at the approved filtration rate.

#### a) Slow sand filtration.

Slow sand filters will be granted 2 log (99%) removal credit provided;

- (1) they are designed and constructed in accordance with IDAPA 16.01.08550, and 16.01.08551 and the AWWA Manual of Design for Slow Sand Filters<sup>3</sup> or other references acceptable to DEQ,

- (2) they are operated at filtration rates  $\leq 0.1$  gpm/ft<sup>2</sup> or other rate acceptable to DEQ,
- (3) active filters produce at least 0.02 gpm/ft<sup>2</sup>,
- (4) they comply with the turbidity performance criteria, and
- (5) the system has at least two (2) filter beds so that treated water is available during periods when filters are off line, unless an alternate source of water is available.

Removal credit up to 2.5 log (99.7%) may be allowed on a case-by-case basis at the discretion of DEQ. Additional monitoring of source water and filter effluent (coliforms, temperature, etc.) will be required.

**b) Diatomaceous earth filters.**

Diatomaceous earth filters will be granted 2 log (99%) removal credit provided they are:

- (1) designed and constructed in accordance with the IDAPA 16.01.08550 and 16.01.08551 or other references acceptable to DEQ,
- (2) are operated at filtration rates  $\leq 1.5$  gpm/ft<sup>2</sup> or other rate acceptable to DEQ, and
- (3) comply with the turbidity performance criteria.

**c) Coagulation facilities (complete conventional, direct).**

For high quality source waters where turbidity, MPA and particle counting cannot be used to evaluate filter performance, log removal credit may be assigned based on design and operation of the filters. To receive 2 log (99%) removal credit, each of the following conditions must be satisfied, unless specifically waived by DEQ:

- (1) The system must comply with the turbidity performance criteria ( $\leq 0.5$  NTU in 95% of monthly samples and not to exceed 5.0 NTU).
- (2) The system must comply with design requirements in IDAPA 16.01.08550 and 16.01.08551
- (3) The system must demonstrate that pretreatment (coagulation, flocculation, sedimentation) is optimized via jar testing, streaming current, or zeta potential.
- (4) The system must have an approved operations plan which includes procedures for ensuring that pretreatment is continuously optimized.
- (5) Equipment must be in place to automatically adjust the rate of coagulant and or polymer feed, and adjust pH if necessary.
- (6) Sufficient monitoring equipment (on-line turbidimeter, particle counter, or streaming current meter) must be available to evaluate

whether changes in raw water quality are adversely impacting finished water quality.

- (7) The system must demonstrate that there are no turbidity spikes in finished water following backwash and start-up or that they are minimized.

Removals greater than 2 log (99%) can only be granted if actual removal data using particle counts or MPA is provided due to uncertainties in other methods. Seeding studies may be performed to aid in such analysis. Plans for such studies must be submitted for review and approval by the DEQ regional office.

5. Giardia or cryptosporidium challenge study.

Live giardia or cryptosporidium pilot challenge studies are the most accurate method to evaluate filtration plant removals. However, they are also logistically difficult, expensive, and standard procedures for these evaluations have not been developed. DEQ will consider these studies on a case-by-case basis. The system or consultant should first submit a study plan to DEQ. Regions are encouraged to involve the central office in their review at least until standard procedures are developed.

It is mandatory that sampling and analysis for giardia be conducted by a third party with recognized expertise in giardia or cryptosporidium handling and analysis.

6. Other techniques.

If sufficient documentation is provided, DEQ may approve additional techniques for assigning log removal credit on a case-by-case basis.

C. Turbidity Performance Criteria.

Each type of filtration must comply with turbidity performance criteria (formerly the turbidity MCL), identified as follows in 40 CFR 141.73:

FILTRATION TYPE	TURBIDITY CRITERIA
Conventional, direct	≤ 0.5 NTU in 95% of measurements *
Slow sand	≤ 1 NTU in 95% of measurements *
Diatomaceous earth	≤ 1 NTU in 95% of measurements *
Alternate technology (bag, cartridge, etc.)	≤ 1 NTU in 95% of measurements *

\* - At no time may turbidity exceed 5 NTU.

Turbidity data must be included in the initial compliance evaluation to indicate whether this criteria will be met. At least one month of daily turbidity measurements should be reviewed in order to make this determination.

Data should be summarized and percent of measurements below the applicable criteria calculated.

**D. Operating Procedures.**

All systems (existing and new) using coagulation treatment must have the following capabilities. The compliance evaluation should describe how these will be achieved.

**1. Coagulation control.**

In coagulation facilities, chemical pretreatment is the most critical aspect of providing effective filtration<sup>8</sup>. For that reason, it is strongly recommended that a qualified operator be present at all times when the treatment plant is in operation.

The evaluation should describe:

- a). How treatment processes will be optimized.
- b). What procedures have been established for ensuring that coagulation is continuously optimized.
- c). What method of coagulant dosage control will be used.

The evaluation should describe how chemical pretreatment will be controlled by the operator during his/her presence and absence. For example, coagulant dosage could be optimized based on jar tests then automated using flow paced metering equipment. It is preferable, but not required, that coagulant dosage also be adjusted using streaming current, zeta potential, or particle analyzers.

If an operator will not be present at all times, the system must be equipped with an automatic alarm and plant shut down if turbidity is excessive.

**2. Filter to waste after start-up or backwash.**

- a). Existing plants. Filter to waste capability is recommended but not required. If filter to waste is not provided, a method must be established to minimize/eliminate turbidity spikes at start-up. For example, filter rates should be increased gradually, backwash water could be preconditioned with polymer, etc.

If filter to waste will not be installed, continuously monitored effluent turbidity data from several runs should be provided to demonstrate that filter to waste is not necessary.

- b). New plants. As required in IDAPA 01.08550,04.a.iv, plants constructed after 12/31/92 must have filter to waste capability. Filter to waste must be initiated after each backwash and prior to each start-up. The length of the filter to waste cycle must be based on turbidity or particle count measurements of the effluent. Filter to waste duration may be pre-set rather than relying on effluent measurements during each cycle, however, the operator should periodically verify the effectiveness of filter to waste by reviewing continuous turbidity data.

**E. CT Evaluation.**

Credit for giardia and virus removal by filtration will be granted based on information developed under

**B. Giardia Removal Effectiveness.** Disinfection must provide the remaining inactivation required. For example, if filtration provides 2.0 log giardia removal, disinfection must provide 1.0 log giardia inactivation in order to achieve the overall 3.0 log giardia removal/inactivation and 4.0 log virus inactivation.

The inactivation of giardia and viruses will be determined by CTs [disinfectant concentration (C) times contact time (T)]. The system will be in compliance if the systems CT values meet or exceed the CT necessary to achieve the log removal required.

Methods of determining CTs and inactivation ratios are found in Appendix C of the USEPA Guidance Manual<sup>2</sup>. Alternatively, procedures outlined in Bishop, et al.<sup>11</sup> may be used to assess reservoir and clear well contact time efficiency. CTs for various temperatures, pHs and disinfectant levels are found in 40 CFR 141.74 and Appendix E of the USEPA Guidance Manual.

All systems with final effluent  $\text{pH} \leq 9$  and which achieve at least 0.5 log giardia inactivation using chlorine disinfection are considered to comply with the 4.0 log virus inactivation requirement. Systems with  $\text{pH} > 9$  or which use other types of disinfectants may need to provide additional data to demonstrate adequate virus inactivation. Specific monitoring and reporting requirements for these systems will be established on a case by case basis.

The following information should be included in the evaluation:

1. Contact times.

Contact time during peak hourly flow (not including fire flow) must be determined. Procedures for determining peak hourly flow and contact time are:

a). **Peak Hourly Flow.**

- (1) Measure daily using an instantaneous flow meter with recorder, or
- (2) Estimate using the peak plant capacity if pumping or flowing directly into the distribution system, or
- (3) If pumping out of a reservoir, use the rated capacity of the pump, or
- (4) If gravity feed out of a reservoir, use 3X the average for the peak day, or
- (5) If gravity feed out of a reservoir, and irrigation is significant (summer flow is 2X or more winter flow), use 5X the average for the peak day.

b). **T (contact time).**

Pipelines

Assume plug flow; divide the internal volume of the pipe by the flow to determine contact time.

### Reservoirs/clear wells

- (1) Use the lowest volume of the reservoir under peak day conditions, unless other documentation supports using a higher volume.
- (2) Use a curve developed from tracer studies (see Appendix C, EPA Guidance Manual) for various flows, or
- (3) Use the  $T_{10}/T$  ratios for various reservoir configurations in Table C-5 Appendix C, USEPA Guidance Manual, or tables found in Bishop, et al.<sup>11</sup> may be used.

2. **Chlorine residual.** For purposes of calculating CT, disinfectant residual should be measured at peak hourly flow and at a location before the first customer. Either continuous measurements or grab samples may be used.

Periods of peak flow may be determined using a continuously recording flow meter, or manual observation of flowmeter readings. Systems need not use meter readings each day to determine the peak hour, but must use data from their system to establish the expected period of peak use in order to monitor chlorine residual (e.g., 8:00 to 9:00 am).

Since systems must also measure the disinfectant residual entering the distribution system each day, most systems are expected to use this data to calculate CT.

Current chlorine residual measurements at peak hourly flow should be included in the evaluation in order to calculate CTs.

3. **Temperature.** Provide current temperature data (measured once/day) and the expected temperature range at points where disinfectant residual measurements will be made.
4. **pH.** For systems using chlorine disinfection, provide current pH data (measure once/day) and the expected pH range at points where disinfectant residual measurements will be made.
5. **Inactivation ratio.** Estimate the worst case inactivation ratios under peak flow conditions based on the above information. If the current design or disinfection practices do not achieve an inactivation ratio of 1.0 under peak flow conditions, recommendations for CT improvement should be made.

DEQ regional offices may reduce the frequency of measurement for peak hourly flow, temperature and pH provided, 1) sufficient monitoring (one year) has been conducted to evaluate variations, and 2) assumptions used in daily calculations are conservative and acceptable to DEQ.

### F. Operations Plans.

Per IDAPA 16.01.08552.04, by July 31, 1993 or within 6 months of installation of a filtration facility, each system with filtration treatment must have a draft operations plan. The draft operations plan must be finalized within 12 months. DEQ recommends that this plan be reviewed yearly and updated if necessary.

The intent of the operations plan is to describe basic tasks an operator needs to perform on a daily basis in order to remain in compliance with the SWTR. This should include water quality monitoring, flow measurement and adjustment, chemical dosage procedures and adjustments, CT measurements,

**monitoring equipment calibration and maintenance, etc. Suggested contents of the plan are as follows:**

- 1. Name, certification level, and phone numbers (home and work) of all plant operations personnel.**
- 2. Name, and phone number of primary DEQ regional office contact.**
- 3. Commonly used phone numbers of equipment and chemical suppliers.**
- 4. Monitoring. Identify monitoring frequencies and locations:**
  - a. Raw water,**
  - b. Chemical dosages,**
  - c. Individual filter and final effluent turbidities,**
  - d. CTs,**
    - i. Determining peak hourly flow**
    - ii. Disinfectant residual**
    - iii. pH**
    - iv. Temperature**
    - v. Contact time**
- 5. Determining CTs. The plan should describe how and when to monitor the individual parameters listed in 2.d. above, and how to calculate and report log inactivation for giardia.**
- 6. Emergency procedures in the event of a filtration or disinfection system failure (see 13. also).**
- 7. Chemical dosage procedures (coagulants, polymers, chlorine, etc.).**
  - a. Listing of chemicals used and chemical suppliers.**
  - b. Methods for determining appropriate chemical dosages including, jar test procedures as a minimum for coagulation facilities.**
  - c. Procedures for adjustment of chemical dosages as water quality changes.**
  - d. Methods of accurately monitoring chemical feed rates.**
  - e. Additional chemical feed capability (e.g., for polymers, etc.).**
  - f. Points of application and concentrations of all chemicals fed on a regular basis.**
- 8. Standardization (calibration) procedures and frequencies for all monitoring equipment.**
- 9. Filter backwash procedures, frequency of backwash, and filter run length criteria.**
- 10. Filter to waste procedures, including NPDES permit requirements, if applicable.**
- 11. Filter scraping procedures and frequency for slow sand filters.**
- 12. Frequency and procedures for filter media inspection and replacement.**
- 13. Flow variations expected and hours the plant is operated. This should include the proposed maximum flow through the plant and address the maximum and minimum filtration rates.**
- 14. Notification procedures in case of violations or emergencies;**
  - a. Customer notification procedures (newspaper, mail, etc.), frequencies, and contents.**
  - b. Procedures to notify DEQ in case of violations.**
  - c. Procedures to notify customers in case of emergencies more critical than routine**

violations, for example phone or door-to-door contact, posting, or use of news media.

15. Key components (e.g., chlorinators, pumps, injectors, etc.) should be listed including make/model number, and a list and phone number of major suppliers.
16. Reporting and recordkeeping requirements.
  - a. Reporting. Include examples of forms and other information which must be reported to DEQ.
    - i. Systems are required to report routine monitoring data (coliform samples, turbidity, disinfection) to DEQ within 10 days of the end of the month, or other reporting period.
    - ii. Systems are required to notify DEQ within 48 hours of the occurrence of any violation.
    - iii. Copies of any required public notification are to be submitted to DEQ within 10 days of issuing the notification.
  - b. Identify which records must be retained, and where they are to be kept.
    - i. Records of coliform analysis must be kept for at least 5 years.
    - ii. Records of turbidity, disinfection, and other chemical analysis must be kept for 10 years.
    - iii. Records of sanitary surveys must be kept for 10 years.

Systems are also encouraged to keep copies of daily operating records. For example, amount of chemicals used, individual filter turbidities, backwash frequencies, raw water turbidity, filtration rates, gallons of water produced, and any problems encountered.

For additional details regarding operating procedures for other aspects of system operation, systems should contact their DEQ regional office.

**G. Operator requirements.**

All systems utilizing surface water must have at least one qualified operator. A qualified operator need not be at the treatment plant at all times it is operating, but if the plant is not manned, it must have automatic shut-down or dial-in capability when turbidity limits are exceeded, and it is recommended that the plant also have these capabilities for loss of disinfectant residual.

Listed below are criteria to determine if operators are qualified to operate surface water treatment facilities in Idaho. If operators do not currently meet these criteria, they should be given sufficient time to achieve the appropriate level of certification. It is appropriate to include these time frames in a voluntary consent order, as the system is not in compliance with the operator requirements of the SWTR.

1. Systems serving populations > 500, and all systems with filtration plants utilizing coagulation treatment (i.e., conventional and direct filtration).

Each system shall have at least one operator with a current water treatment plant certification from the Idaho Voluntary Certification Board. DEQ encourages small systems to pool resources. Use of a certified operator who runs more than one system (satellite management) satisfies this requirement.

The level of certification shall be the same as the classification of the treatment plant based on



guidelines found in the most recent edition of the Idaho Water and Wastewater Operators Certification Guidelines.

Where shift work is necessary and the principle operator is not present during each shift, there shall be at least one operator present during each shift which has a current water treatment plant operator certificate issued by the Idaho Voluntary Certification Board. The level of certification for the shift operator may be one level below the classification of the treatment plant.

2. Systems serving populations  $\leq 500$ .

Per IDAPA 16.01.08.300.c., systems serving  $\leq 500$  population, and which do not use coagulation as part of the filtration process, are allowed additional options to meet the operator requirements as follows:

- a. If the system has a certified operator(s) which meet the requirements of 1. above, or
- b. DEQ determines the system has not been modified since December 31, 1992; and
- c. DEQ determines that the compliance history of the system is acceptable; and
- d. The individual(s) passes any field evaluation of operating and record keeping procedures required by the Department; and
- e. The individual(s) attends any training as may be required by DEQ.

Operators may only be "qualified" for the treatment plants they operated on January 1, 1993.

If the plant is modified, upgraded, or the operator switches plants, the operator must be certified by the Idaho Voluntary Certification Board in accordance with 1. above.

Field evaluation of operating and recordkeeping procedures (see d. above) will be based on sanitary surveys conducted by DEQ periodically.

DEQ will hold training sessions every two (2) years at each of the DEQ regional offices for operators of these plants, i.e., cartridge, bag, slow sand, and membrane. Operators will be required to attend these sessions, but there will be no exam or other testing required. DEQ may issue a contract for this training at a later date. In addition, training presented by other organizations may be substituted for DEQ sponsored training, provided it covers in detail the operation, maintenance and compliance pertaining to the filtration technology used by the system in question.

## References

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