Building the New Reclaimed Water WAC
Proposed Draft Rule Language - work in progress (WIP) for Rule Advisory Committee Use Only Wednesday, April 29, 2009

Part IV ADEQUATE AND RELIABLE TREATMENT - version 1.0

(4-23-2009)

Note: *Embedded in the following language are questions related to significant rule changes. Unless otherwise noted, all changes are proposed by the Technical Advisory Panel (TAP) and Ecology.*

WAC 173-219- 300 Requirements for adequate and reliable treatment.

1. Minimum requirements. Prior to distribution or use, reclaimed water permitted under this chapter must meet the applicable requirements for adequate and reliable treatment including:
   a. WAC 173-219-310 Source control
   b. WAC 173-219-320 Class A-based treatment and monitoring
   c. WAC 173-219-325 Class B-based treatment and monitoring
   d. WAC 173-219-330 Use specific treatment and monitoring
   e. WAC 173-219-340 Disinfection
   f. WAC 173-219- 350 Reliability
   g. WAC 173-219-360 Operation and maintenance
   h. WAC 173-219-370 Sampling and analysis
2. Alternative Methods.
   a. Other methods of treatment may be accepted if the applicant demonstrates to the satisfaction of the departments that the methods of source control, pretreatment, treatment, sampling and monitoring ensure an equal degree of treatment, public health protection and reliability.
   b. For uses requiring Class A or higher treatment, Ecology and DOH may require pilot plant or other studies to demonstrate that the alternative method is capable of reliably producing reclaimed water that is essentially free of viable pathogens.

Questions for next section - 310: Source control and pretreatment requirements.

1. *What else should Ecology do to regulate source water quality?*

2. *Is Ecology legally limited in its ability to expand the requirements for reclaimed water source control and pretreatment beyond the existing requirements under state and federal law?*

WAC 173-219- 310 Source control and pretreatment requirements.

To assure adequate and reliable treatment of reclaimed water, the permittee shall control the entry of industrial and toxic discharges that may affect reclaimed water quality. At a minimum:

1. The reclaimed water generator shall insure that all collection systems providing the source of wastewater used to generate the reclaimed water comply with:
    a. The requirements for pretreatment of industrial wastewater under 40 CFR 403 and Sections 307(b) and 308 in the Federal Water Pollution Control Act, and Ch 90.48 RCW, the Washington Water Pollution Control Act.
    b. The discharge restrictions and prohibitions of dangerous waste regulations, chapter 173-303 WAC and WAC 173-216-060.
2. Unless exempted under WAC 173-216-050, all industries discharging into the reclaimed water generator's wastewater collection system shall (a) have current waste discharge permits issued by Ecology or (b) be included under an Ecology delegated industrial wastewater pre-treatment program.
3. The lead agency may require the reclaimed water generator to submit an industrial user survey to determine the extent of compliance of all industrial users of the reclaimed water generator's wastewater collection system with state and federal pretreatment regulations.

Questions for next sections 320 and 325: Class-based treatment and monitoring

1. *Should Ecology reduce the number of classes from four to two by eliminating existing Class B and Class D?*
    a. *If so, should Ecology split section 320 into two sections for the two classes?*
    b. *Should Ecology use the terms "Class A" and "Class B" or the terms" "unrestricted non-potable human contact water" and "restricted non-potable human contact water" to identify the classes?*

2. *Should Ecology add the proposed separate, technology-based criteria for membrane filtration to produce Class A reclaimed water?*

3. *Should Ecology establish the proposed log-based requirements for virus reduction for Class A and higher reclaimed water?*

4. *How should Ecology best address other unregulated or not yet identified contaminants?*

WAC 173-219- 320 Class A reclaimed water treatment and monitoring

Reclaimed water must meet the following technology based requirements to be considered Class A, suitable for approved non-potable uses with unrestricted human contact.

1. Meet either of the following treatment technology trains:
   a. For traditional Class A, the minimum treatment techniques of source control, oxidation, coagulation, filtration and disinfection with treatment occurring in the order listed, or
   b. For membrane filtration Class A, the minimum treatment techniques of source control, oxidation, microfiltration or ultrafiltration with membranes, and disinfection.
2. Bypassing of any treatment units is prohibited.
3. Meet the reliability requirements under this chapter at all times.
4. For traditional Class A treatment systems, meet the following:
   a. At the sampling point immediately following the oxidation treatment process and prior to filtration
      i. Five-day Biochemical Oxygen Demand (BOD5): Monthly average shall not exceed 30 mg/L as measured by a 24-hour composite sample collected at least weekly.
      ii. Dissolved oxygen must be present as measured by a grab sample collected at least daily when wastewater characteristics are most demanding on the treatment facilities.
      iii. Total Suspended Solids (TSS): Monthly average shall not exceed 30 mg/L as measured by a 24-hour composite sample collected daily unless Ecology and DOH allow a reduced frequency.
   b. At the sampling point following filtration and prior to final disinfection, the average monthly operating turbidity shall not exceed 2 NTU and turbidity shall not exceed 5 NTU at any time.

5. For membrane filtration Class A systems, at the sampling point following filtration and prior to final disinfection, meet an average monthly operating turbidity that shall not exceed 0.2 NTU and a turbidity that shall not exceed 0.5 NTU at any time.

6. For all Class A systems, at the sampling point following final disinfection of the reclaimed water, the 7-day median shall not exceed 2.2 total coliform/100mL and sample maximum shall not exceed 23 total coliform/100mL as measured by a grab sample collected daily at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures.[1]

7. For all Class A systems,

   a. At the sampling point following final disinfection of the reclaimed water, meet at least one of the following:

      i. 5-log virus removal or inactivation following nondisinfected secondary wastewater treatment, with a minimum of two treatment barriers, one of which must be filtration or the equivalent.

      ii. 4-log virus removal or inactivation following coagulation, flocculation, sedimentation, and filtration,

      iii. 4-log virus removal or inactivation following micro or ultra membrane filtration

   b. Proof of meeting one of the virus reduction options in subsection (a) above, must be based on either of the following:

      i. A challenge study protocol conducted for the proposed treatment system according to State of Washington ***Design Criteria for Reclaimed Water Systems*** and approved by the lead agency.

      ii. Acceptance of an equivalent third party challenge study meeting the criteria found in **The State of California Department of Health Services Treatment Technology Report for Recycled Water,** http://www.dhs.ca.gov/ps/ddwem/publications/waterrecycling/treatmenttechnology.pdf. [2].

WAC 173-219- 325 Class B reclaimed water treatment and monitoring

[1] TAP recommends adding virus reduction standards to the rule for Class A (unrestricted human contact). Proof of virus reduction would be based upon a challenge study conducted for the water to be treated or acceptance of a third party study meeting peer review.

[2] An example of an equivalent challenge study would be one accepted by the State of California regulation Title 22, Chapter 3, Article 1, 60301.230 for tertiary recycled water. The specified log removal or inactivation may be demonstrated by measuring the number of plaque forming units of F-specific bacteriophage MS2, or polio virus in the water. A virus that is at least as resistant to disinfection as polio virus may be used for purposes of the demonstration.

Reclaimed water must meet the following technology based requirements to be considered Class B and suitable for approved non-potable uses with restricted human contact.

1. Meet the minimum treatment techniques of source control, oxidation and disinfection with treatment occurring in the order listed.
2. Bypassing of any treatment units is prohibited.
3. Meet reliability requirements under this chapter at all times.
4. Meet the following water quality requirements at the sampling point for the final disinfected reclaimed water.
    a. Five-day Biochemical Oxygen Demand (BOD5): Monthly average not exceeding 30 mg/L as measured by a 24-hour composite sample collected at least weekly.
    b. Dissolved oxygen must be present as measured by a grab sample collected at least daily when wastewater characteristics are most demanding on the treatment facilities.
    c. Total Suspended Solids (TSS): Monthly average not exceeding 30 mg/L as measured by a 24-hour composite sample collected daily unless Ecology and DOH allow a reduced frequency.
    d. Class B bacterial standards: 7-day median of 23 total coliform/100mL and sample maximum of 240 total coliform/100mL as measured by a grab sample collected daily at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures.

WAC 173-219- 330 Use-based treatment requirements

In addition to the Class-based requirements, the reclaimed water must also meet the applicable requirements established in these rules for the specific type of use or uses including:

WAC 173-219-500 Reclaimed Water for Commercial and Industrial Uses

WAC 173-219-530 Land Application (Irrigation) Uses

WAC 173-219-560 Impoundments

WAC 173-219-600 Wetlands

WAC 173-219-650 Stream Flow Augmentation

WAC 173-219-700 Groundwater Recharge

WAC 173-219-900 Other Types of Use

Questions for the next section – 340 Disinfection

1. *Do you support the following recommendations?*

a. *State that chlorine residual shall be measured as a free, not total chlorine residual. For Class A or higher? For less than Class A?*

b. *State that contact time shall be measured as $T_{10,}$ the same method used in the federal Surface Water Treatment Rule. For Class A or higher? For less than Class A?*
c. *Allow flexibility in meeting the CT by adjusting either chlorine residual or contact time and permitting alternative methods use modal T and combined C*
d. *Use the NWRI criteria as the standard method for UV disinfection design.*

2. *Should Ecology require a minimum concentration (1 mg/L is the current requirement) for the chlorine dose?*

3. *Should Ecology require a minimum of 20-minute contact time for chlorine disinfection at peak hourly flows? This is the minimum design criterion for domestic wastewater treatment facilities in the Criteria for Sewage Works Design.*

4. *Should temperature and pH effects be considered when calculating CT in the same fashion that the federal Surface Water Treatment Rule uses?*

WAC 173-219- 340 Treatment Process Disinfection

1. **Chlorine.**
   a. Except as provided under subsection 1d and 1e of this section, where chlorine is used as the disinfectant in the treatment process for Class A or higher reclaimed water:
      i. The required CT measured as mg-min per liter at all times (the product of C x T) must be 30 or greater.
      ii. The residual concentration, "C", shall be measured as a free chlorine residual.
      iii. The minimum contact time, "T_{10}" shall be based on peak hourly flow. T_{10} means the amount of time elapsed between the time that a tracer, such as salt or dye, is injected at the entrance to a chamber and the time that 10 percent of the volume of a slug of tracer is observed exiting the chamber.

   b. Except as provided under subsection 1d and 1e of this section, where chlorine is used as the disinfectant in the treatment process for Class B or lesser quality reclaimed water:

i. The required CT measured as mg-min per liter (the product of C x T) must be 20 or greater.

ii. The residual concentration, "C", shall be measured as a free (or total?) chlorine residual.

iii. The minimum contact time, "T_{10}"? shall be (20 minutes) based on peak hourly flow. T_{10} means the amount of time elapsed between the time that a tracer, such as salt or dye, is injected at the entrance to a chamber and the time that 10 percent of the volume of a slug of tracer is observed exiting the chamber.

c. If pipelines or other facilities are used to meet the required chlorine contact time, such facilities are considered to be part of the treatment process and shall be subject to applicable requirements of these regulations and any other reclamation requirements specified by the departments.

d. As described in the Design Criteria for Reclaimed Water Systems, the lead agency may accept an alternative CT measurement such as total chlorine residual or a modal T value provided to the agency is satisfied that the proposed alternative provides an equivalent degree of human health protection.

e. Where it is the opinion of the department of health that a higher CT value is required to assure adequate pathogen reduction for the proposed use, the lead agency may require a higher CT value.

2. **Ultraviolet Light Disinfection**

a. Where ultraviolet light is used as the disinfectant in the treatment process: it shall be designed and installed in accordance with Ultraviolet Disinfection, Guidelines for Drinking Water and Water Reuse, Second Edition published by the National Water Research Institute (NWRI) in collaboration with the American Water Works Association Research Foundation, May 2003, as amended.

b. The departments may accept equivalent ultraviolet disinfection methods as described in Design Criteria for Reclaimed Water Systems.

3. **Other Disinfection Systems**. Where disinfection systems other than chlorine or ultraviolet light are used in the treatment process, the departments shall review and approve the design and installation on a case-by-case basis. Design and operational requirements shall conform to recognized standards and engineering practices as defined in ***Design Criteria for Reclaimed Water Systems.***

Questions for the next section – 350 Reliability

1. *The TAP recommended that detailed design criteria for reliability features such as retention of inadequately treated water or diversion to alternative discharge locations be provided in design guidance. This would provide flexibility for the engineer to appropriately design the wide variety of facilities and features that could be proposed. Do you support this recommendation? If not, what alternatives would you propose?*

2. *The TAP recommended putting more general minimum requirements within the rule. This includes some specifications and management practices for retention or diversions used as reliability features and requiring alarms at all facilities (even those with automated diversions). Do you support these recommendations? If not, what alternatives would you propose?*

WAC 173-219- 350 Treatment Facility Reliability

1. Facilities shall construct and operate treatment reliability features as approved by the departments. Design and operational requirements for all treatment reliability features shall be consistent with the most recent edition of the state's ***Design Criteria for Reclaimed Water Systems.***

2. Unless the applicant demonstrates to the satisfaction of the departments that a proposed alternative will assure an equal degree of treatment reliability, facilities must meet all of the reliability requirements under this section.
   a. There shall be no bypassing of untreated or partially treated wastewater from the approved reclamation facility to the distribution system or to the point of use.
   b. Facilities generating reclaimed water must either retain inadequately treated wastewater for additional treatment or have authorization to discharge the wastewater to another permitted site. Facilities may provide both options.
   c. Retention. Retention facilities that are approved as treatment reliability features must:
      i. Reserve the approved facilities for the intended purposes.
      ii. Include all the necessary diversion works, conduits, and pumping and pump back equipment.
      iii. Provide a power supply independent of the primary power supply or a standby source for all diversion equipment.
      iv. For a short-term retention facility, provide capacity for at least a 24-hour period.
      v. For a long-term retention facility, provide capacity for at least 20 days.
   d. Alternative Discharge Location. Facilities approved to discharge to another location as a treatment reliability feature must:

i. Obtain all required authorization and permits for the discharge location.

ii. Include all the necessary diversion works, conduits, and pumping and pump back equipment.

iii. Provide a power supply independent of the primary power supply or a standby power source for all diversion equipment.

e. Automated Diversions. Facilities approved to use automated diversions as a treatment reliability feature**,** must provide all necessary sensors, instruments, valves, and other devices to enable fully automatic diversion to the approved location. The reset process must be manually operated to prevent automatic restart.

f. Alarm System Requirements.

i. All facilities generating reclaimed water must provide alarm systems warning of a) loss of power from the primary power supply, b), failure of required treatment units, c), interruption of required chemical feeds, and d) other features as required in the approved engineering report.

ii. Alarm systems approved as treatment reliability features must be independent of the primary power supply of the reclamation facility.

iii. Alarm systems approved as treatment reliability features must sound at an attended location to warn the operator in responsible charge or other designated responsible person capable of taking prompt corrective action. Individual alarms may be connected to a master alarm sounding at an attended location. If the facility is not attended at all times, the master alarm must sound at an attended location (such as a police or fire station) that will immediately alert the person in responsible charge be independent of the primary power supply of the reclamation facility.

Questions for the next section – 360 Operational Reliability

Should monthly operation summary reports only be submitted to the Lead Agency?

WAC 173-219- 360 Operational Reliability

1. Each reclamation plant shall be provided with a sufficient number of qualified personnel to operate the facility effectively so as to achieve the required level of treatment at all times.
2. A preventive maintenance program shall be provided at each reclamation plant to ensure that all equipment is kept in a reliable operating condition.
3. Operating records shall be maintained at the reclamation plant or a central depository within the operating agency. These shall include: all analyses specified in

these regulations; records of operational problems, unit process and equipment breakdowns, and diversions to emergency storage or disposal; and all corrective or preventive action taken.

4. Process or equipment failures triggering an alarm shall be recorded and maintained as a separate record file. The recorded information shall include the time and cause of failure and corrective action taken.
5. A monthly summary of operations shall be submitted each month on a form provided, or otherwise approved, by the Lead Agency, and shall be postmarked or received by the date specified in the facility operating permit. The contents of this summary shall be in accordance with all conditions specified in the operating permit for each facility.

6. Any discharge of untreated or partially treated wastewater to the use area, and the cessation of same, shall be reported immediately by telephone to the Lead Agency. The lead agency may establish additional reporting requirements within the permit.

Questions for the next section – 370 Sampling and Analysis Reliability

To what extent should minimum sampling frequencies be included under the class-based or the use-based requirements?

1. Should there be reduced or increased monitoring requirements for facilities that have records of compliance or permit violations?
2. Should there be reduced or increased frequencies for certain uses rather than a specified frequency by class of reclaimed water?
3. Should there be a reduction in frequency for small facilities? How should we define a small facility for this reduction?

WAC 173-219- 370 Sampling and Analysis Reliability

1. Specific minimum sampling types and frequencies are included under class-based and use-based treatment requirements. Additional sampling parameters may be specified by the departments within the permit.
2. For some uses, the departments may require a groundwater monitoring program. Where required, the groundwater monitoring program shall be established by the permittee and approved by the departments. The monitoring program shall be based on type of use, reclaimed water quality and quantity, site-specific soil and hydrogeologic characteristics, and other considerations.
3. Samples shall be analyzed by approved laboratory methods, and analyses shall be conducted in laboratories approved by the departments.