

**Building the New Reclaimed Water WAC  
Proposed Draft Rule Language - work in progress (WIP)  
for Rule Advisory Committee Use Only – July 22, 2009**

***PART VI Use-Based Requirements  
(version 1.1 – RAC discussion draft 7-22-2009)***

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**Intent of Part VI**

1. Identify the applicability of class-based requirements to different categories of reclaimed water use. Categories include:
    - Commercial and industrial uses
    - Irrigation (land application) uses
    - Impoundments
    - Wetlands
    - Surface water augmentation
    - Ground water recharge
  
  2. Specify the special requirements (additional standards and best management practices) that apply to each category (and applicable subcategories) of use.
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**Proposed Sections: (section numbers may change)**

173-219- 500 Commercial and industrial uses.  
173-219- 530 Land application (irrigation) uses.  
173-219-560 Impoundments.  
173-219- 600 Wetlands. (future meeting)  
173-219- 700 Streamflow augmentation.(future meeting)  
173-219- 800 Ground water recharge

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***PART VI Use-Based Requirements***

**Commercial and Industrial Uses (version 1.1 – RAC discussion draft 7-22-2009)**

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

1. **Applicability.** This section applies only to reclaimed water used as a source of supply for commercial and industrial non-irrigation purposes that do not otherwise require potable water.
2. **Minimum Class Requirements.**
  - a. Class A Uses. Nonpotable water uses that have unrestricted human contact or a similar high potential for public exposure require a minimum of Class A quality water as defined in Part IV of these rules. Allowed uses include:
    - i. Urban water features such as decorative fountains.
    - ii. Spray washing to clean streets.
    - iii. Fire protection in hydrants and in sprinkler systems commercial or industrial facilities or buildings, hotels, motels or in residential buildings where consistent with federal and state plumbing codes.
    - iv. Flush toilets and urinals in commercial or industrial facilities or buildings, hotels, and motels or in residential buildings where consistent with federal and state plumbing codes.
    - v. Industrial cooling purposes where aerosols or other mist are created.
    - vi. Industrial processes with exposure of workers.
    - vii. Washing yards, lots, and sidewalks on corporate grounds.
    - viii. Similar uses when approved by the lead agency.
  - b. Class B Uses. Nonpotable water uses that have restricted human contact or similar reduced potential for public exposure require a minimum of Class B quality water as defined in Part IV of these rules. Allowable uses include:
    - i. Street sweeping by dampening brushes and street surfaces.
    - ii. Dust control by dampening unpaved roads and other surfaces.
    - iii. Dampening soil for compaction (construction sites, landfills)

- iv. Fire fighting by dumping from aircraft.
- v. Ship ballast water.
- vi. Washing aggregate and making concrete.
- vii. Industrial processes without exposure to workers.
- viii. Similar uses when approved by the lead agency.

c. Exceptions to class-based requirements

- i. When under the direct control of responsible maintenance personnel, reclaimed water not meeting the Class B disinfection may be used:
  - (1) Within the bounds of the wastewater treatment facility for treatment plant purposes, wash down water, yard hydrants, and restricted site irrigation.
  - (2) At restricted locations within the sanitary sewer collection system for flushing of the sanitary sewers and pump station maintenance.
- ii. All other exceptions require case-by-case consideration and written approval from the lead agency.
- iii. Before allowing an exception, the lead agency must determine that the proposed requirements are adequate to protect public health and the environment and approve any such exceptions in writing. At a minimum, the lead agency must consider the following:
  - (1). Potential for human contact with the reclaimed water.
  - (2). Reliability features.
  - (3). Hours of use including peak time of use and flexibility in hours of use.
  - (4). Size of the distribution system, storage and pumping facilities.
  - (5). Potential for cross connections including whether or not there are retrofits of existing potable systems.
  - (6). Potential for improper use of the reclaimed water.
  - (7). Ability of customers to provide additional treatment or other controls on-site.
  - (8). Whether essential services such as fire flows are provided by the reclaimed water.
  - (9). Compliance history of the facility.
  - (10). Other case specific factors.

**3. Additional water quality requirements.**

- a. Reclaimed water provided for commercial and industrial uses must be suitable for the specific uses proposed. The reclaimed water quality should be within the typical range established by standard engineering practices.
- b. The lead agency may establish additional water quality or monitoring requirements as appropriate for a specific commercial or industrial use.
- c. (Note - The TAP recommended Table 19-4 from Asano, 2008 (pages 1111 and 1112) appended as proposed guidance in the Criteria for Reclaimed Water Works Design.
- d. The lead agency may require additional treatment and disinfection of reclaimed water before allowing certain uses (such as in swimming pools, hospitals, around potable water pipelines, food production facilities) when the lead agency determines there is a significant potential for prolonged contact or exposure to sensitive subgroups of the population.

**4. Other requirements for commercial and industrial use.**

- a. Reclaimed water used for commercial and industrial uses shall meet the minimum requirements established under Part IV and V of this regulation.
- b. The lead agency may establish additional best management practices for all commercial and industrial uses, a specific type of use or on a case-by-case basis including, but not limited to:
  - i. Blending with other water sources.
  - ii. Dual distribution systems.
  - iii. Metering.
  - iv. Confining water within the distribution system and to the site of use.
- c. Engineering reports submitted under Part II of these rules that propose commercial or industrial uses of reclaimed water must also address:
  - i. Typical water quality concerns applicable to the uses such as control of corrosion, scaling and deposition, temperature, biological fouling, odors, color, foaming, and the potential for interference with industrial processes.
  - ii. Critical water quality parameters for the use identified in the Criteria for Reclaimed Water Works Design, standard engineering references, industry or manufacturer references, or specifically identified by the user.
  - iii. The specific responsibilities of the reclaimed water generator, distributor and user regarding any restrictions on the water quality and requirements for additional treatment. These responsibilities must be included within all agreements with the user.
  - iv. The best management practices identified under this section.

- d. The lead agency permit may specify additional requirements deemed necessary to meet state and federal regulatory requirements for water quality and public health protection.

**End rule content for commercial and industrial uses**

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**Note:** Guidance Tables follow:

**Table 19-4**  
 Typical reclaimed water quality requirements for various industrial processes<sup>a</sup>

| Parameters                      | Unit                      | Cooling water                       |       |         |                |              |          |                          |          |
|---------------------------------|---------------------------|-------------------------------------|-------|---------|----------------|--------------|----------|--------------------------|----------|
|                                 |                           | Boiler feedwater (bar) <sup>b</sup> |       |         |                | Once-through |          | Makeup for recirculation |          |
|                                 |                           | 0–10                                | 10–12 | 48–103  | 103–344        | Fresh        | Brackish | Fresh                    | Brackish |
| Silica (SiO <sub>2</sub> )      | mg/L                      | 30                                  | 10    | 0.1     | 0.01           | 50           | 25       | 50                       | 25       |
| Aluminum (Al)                   | mg/L                      | 5                                   | 0.1   | 0.01    | 0.01           |              |          | 0.1                      |          |
| Iron (Fe)                       | mg/L                      | 1                                   | 0.3   | 0.05    | 0.01           |              |          | 0.5                      |          |
| Manganese (Mn)                  | mg/L                      | 0.3                                 | 0.1   | 0.01    |                |              |          | 0.5                      |          |
| Copper (Cu)                     | mg/L                      | 0.5                                 | 0.05  | 0.05    | 0.01           |              |          |                          |          |
| Calcium (Ca)                    | mg/L                      |                                     | 0     | 0       | — <sup>c</sup> | 200          | 520      | 50                       | 420      |
| Magnesium (Mg)                  | mg/L                      |                                     | 0     | 0       | — <sup>c</sup> |              |          |                          |          |
| Sodium (Na)                     | mg/L                      |                                     |       |         |                |              |          |                          |          |
| Ammonia (NH <sub>3</sub> )      | mg/L                      | 0.1                                 | 0.1   | 0.1     | 0.7            |              |          |                          |          |
| Bicarbonate (HCO <sub>3</sub> ) | mg/L                      | 170                                 | 120   | 50      | — <sup>c</sup> | 600          |          | 25                       |          |
| Sulfate (SO <sub>4</sub> )      | mg/L                      |                                     |       |         |                | 680          | 2700     | 200                      | 2700     |
| Chloride (Cl)                   | mg/L                      |                                     |       |         |                | 600          |          | 500                      |          |
| Fluoride (F)                    | mg/L                      |                                     |       |         |                | 600          | 19,000   | 500                      | 19,000   |
| Nitrate (NO <sub>3</sub> )      | mg/L                      |                                     |       |         |                |              |          |                          |          |
| Phosphate (PO <sub>4</sub> )    | mg/L                      |                                     |       |         |                |              |          |                          |          |
| Dissolved solids                | mg/L                      | 700                                 | 500   | 200     | 0.5            | 1000         | 35,000   | 500                      | 35,000   |
| Suspended solids                | mg/L                      | 10                                  | 5     | 0       | 0              | 5000         | 2500     | 100                      | 100      |
| Hardness                        | mg/L as CaCO <sub>3</sub> | 20                                  | 1.0   | 0.1     | 0.07           | 850          | 6250     | 130                      | 6250     |
| Alkalinity                      | mg/L as CaCO <sub>3</sub> | 140                                 | 100   | 40      | 0              | 500          | 115      | 20                       | 115      |
| Acidity                         | mg/L as CaCO <sub>3</sub> |                                     |       |         |                |              |          |                          |          |
| pH                              | unitless                  | 8–10                                | 8–10  | 8.2–9.2 | 8.2–9.2        | 5.0–8.3      |          |                          |          |
| Color                           | color units               |                                     |       |         |                |              |          |                          |          |
| COD                             | mg/L                      | 5                                   | 5     | 0.5     | 0              | 75           | 75       | 75                       | 75       |
| Dissolved oxygen                | mg/L                      | <0.03                               | <0.03 | <0.03   | <0.005         |              |          |                          |          |
| Temperature                     | °C                        | 49                                  | 49    | 49      | 49             | 38           | 49       | 38                       | 49       |
| Turbidity                       | NTU                       | 10                                  | 5     | 0.5     | 0.05           | 5000         | 100      |                          |          |

(Continued)

**Table 19-4**  
 Typical reclaimed water quality requirements for various industrial processes<sup>a</sup> (Continued)

| Parameters                      | Unit                      | Process water by industry |                |          |                             |               |         |
|---------------------------------|---------------------------|---------------------------|----------------|----------|-----------------------------|---------------|---------|
|                                 |                           | Textile                   | Pulp and paper | Chemical | Petroleum and coal products | Primary metal | Tanning |
| Silica (SiO <sub>2</sub> )      | mg/L                      | 25 <sup>d</sup>           | 50             | 50       | 60                          |               |         |
| Aluminum (Al)                   | mg/L                      | 8 <sup>e</sup>            |                |          |                             |               |         |
| Iron (Fe)                       | mg/L                      | 0.1–0.3                   | 0.3            | 0.1      | 1.0                         |               | 50      |
| Manganese (Mn)                  | mg/L                      | 0.01–0.05                 | 0.1            | 0.1      |                             |               | 0.2     |
| Copper (Cu)                     | mg/L                      | 0.01–5                    |                |          |                             |               |         |
| Calcium (Ca)                    | mg/L                      |                           | 20             | 70       | 75                          |               | 60      |
| Magnesium (Mg)                  | mg/L                      |                           | 12             | 20       | 30                          |               |         |
| Sodium (Na)                     | mg/L                      |                           |                |          | 230                         |               |         |
| Ammonia (NH <sub>3</sub> )      | mg/L                      |                           |                |          | 40                          |               |         |
| Bicarbonate (HCO <sub>3</sub> ) | mg/L                      |                           |                | 130      | 480                         |               |         |
| Sulfate (SO <sub>4</sub> )      | mg/L                      | 100                       |                | 100      | 600                         |               | 250     |
| Chloride (Cl)                   | mg/L                      |                           | 200            | 500      | 300                         | 500           | 250     |
| Fluoride (F)                    | mg/L                      |                           |                | 5        | 1.2                         |               |         |
| Nitrate (NO <sub>3</sub> )      | mg/L                      |                           |                |          | 10                          |               |         |
| Phosphate (PO <sub>4</sub> )    | mg/L                      |                           |                |          |                             |               |         |
| Dissolved solids                | mg/L                      | 100–200                   | 100            | 1000     | 1000                        | 1500          |         |
| Suspended solids                | mg/L                      | 0–5                       | 10             | 5        | 10                          | 3000          |         |
| Hardness                        | mg/L as CaCO <sub>3</sub> | 0–50                      | 475            | 250      | 350                         | 1000          | 150     |
| Alkalinity                      | mg/L as CaCO <sub>3</sub> |                           |                | 125      | 500                         | 200           |         |
| Acidity                         | mg/L as CaCO <sub>3</sub> |                           |                |          |                             | 75            |         |
| pH                              | unitless                  | 6–8                       | 4.6–9.4        | 5.5–9.0  | 6–9                         | 5–9           | 6–8     |
| Color                           | color units               | 0–5                       | 10             | 20       | 25                          |               | 5       |
| COD                             | mg/L                      |                           |                |          |                             |               |         |
| Dissolved oxygen                | mg/L                      |                           |                |          |                             |               |         |
| Temperature                     | °C                        |                           | 38             |          |                             | 38            |         |
| Turbidity                       | NTU                       | 0.3–5                     |                |          |                             |               | 0       |

<sup>a</sup>Adapted from State of California (1963), U.S. EPA (1973).

<sup>b</sup>1 bar = 10<sup>5</sup> Pa ≈ 14.5 lb/in.<sup>2</sup>

<sup>c</sup>Determined by treatment of other constituents.

<sup>d</sup>As SiO<sub>3</sub>.

<sup>e</sup>As aluminum oxide, Al<sub>2</sub>O<sub>3</sub>.

Note: specific quality requirements may vary greatly with each industrial process.

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***PART VI Use-Based Requirements***

***Irrigation Uses (version 1.1 – RAC discussion draft 7-22-2009)***

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

**1. Applicability.**

- a. This section applies to the non-potable use of reclaimed water for agricultural food and non-food crop irrigation and the watering of landscape features such as lawns, golf courses, and highway medians.
- b. The discharge of wastewater effluent to a site that uses the pollutant uptake capacity of non-food crops for treatment purposes is not subject to the requirements of these rules. The discharge site must be on land owned or under the long-term control of the Permittee. The discharge is regulated under the state waste discharge permits requirements of Ch 173-216 WAC.

**2. Minimum Class Requirements.**

- a. Class A Uses. Nonpotable water uses that have unrestricted human contact or similar high potential for public exposure require a minimum of Class A quality water as defined in Part IV of these rules. Allowed uses include:
  - i. Food crop irrigation uses except as otherwise authorized within this section.
  - ii. Irrigation of public landscape areas including parks, golf courses, and playgrounds.
  - iii. Irrigation of residential landscapes.
  - iv. Similar uses when approved by the lead agency.
- e. Class B Uses. Nonpotable water uses that have restricted human contact or similar reduced potential for public exposure require a minimum of Class B quality water as defined in Part IV of these rules. . Allowed uses include:
  - i. Freeway landscapes, cemeteries.
  - ii. Agricultural irrigation of non-food crops.
  - iii. Pasture with access to milking animals.
  - iv. Frost protection of orchard crops when crops are not harvested for XXX days. (Note: DOH and DOA to check on this category)
  - v. Similar uses when approved by the lead agency.

f. Exceptions to class-based requirements.

- i. The lead agency may authorize use of reclaimed water for agricultural use at disinfection requirements less stringent than Class B limits but not less than 240/100ml total coliform provided the site has restricted access and one of the following applies:
  - (1). Surface irrigation of orchards and vineyards provided the fruit is not harvested if it contacts either the irrigation water or the ground.
  - (2). Spray or surface irrigation of non-food crop trees, fodder, fiber and seed crops provided pasture is not used for milking animals.
  - (3). Spray or surface irrigation of restricted access food crops provided the food crops undergo physical or chemical processing sufficient to destroy all pathogenic agents prior to distribution or sale and the use.
  
- ii. The lead agency may consider other exceptions to these class requirements on a case-by-case basis. The lead agency must approve any such exceptions in writing.
  
- iii. Before allowing an exception, the lead agency must determine that the proposed requirements are adequate to protect public health and the environment and must approve any such exceptions in writing. At a minimum, the lead agency must consider the following:
  - (11). Potential for human contact with the reclaimed water.
  - (12). Reliability features.
  - (13). Type of irrigation system (spray, surface, drip).
  - (14). Type of crop irrigated.
  - (15). Type of soils and distance to ground water.
  - (16). Hours of use including peak time of use and flexibility in hours of use.
  - (17). Size of the distribution system, storage and pumping facilities.
  - (18). Potential for cross connections including whether or not there are retrofits of existing potable systems.
  - (19). Potential for improper use of the reclaimed water.
  - (20). Ability of customers to provide additional treatment or other controls on-site.
  - (21). Compliance history of the facility.
  - (22). Other case specific factors.

### 3. Additional water quality requirements.

- a. Reclaimed water provided for irrigation/land application uses must be suitable for the specific uses proposed. Reclaimed water quality should be within the typical range established by standard agricultural practices and should not exceed the limits established for plant tolerance and protection of soils and ground water beneath the application site.
- b. The lead agency must consider the following limits in permits for irrigation uses: **(TAP recommendations)**
  - i. Total dissolved solids < 1500 mg/L ( or SAR or other good measure TBD – research in progress – what other states are doing)
  - ii. pH between 6-9 standard units.
  - iii. Free chlorine residual less than 1 mg/L at the point of use.
- c. The lead agency should establish other water quality requirements necessary to provide reclaimed water suitable for the planned irrigation uses.

**Note: The TAP suggested** (salts, organics, solids, metals, emerging contaminants, alkalinity, temperature, macro and micronutrients and nutrients at the right time).

*Asano, 2007, recommends monthly monitoring for TSS, BOD, ph, TDS, Electrical conductivity, N and P, Major solutes (Ca, Mg, K, carbonates, sulfates) and exchangeable cations (Na, Ca, Mg, K, Al) – annual monitoring for trace elements, metals.. Monthly volume measurement (metering) Weekly monitoring for coliform for Class B uses.*

### 4. Other requirements for irrigation use.

- a. Reclaimed water shall meet the minimum requirements established under Parts IV and V of this regulation.
- b. Application of reclaimed water to the use area shall be at reasonable agronomic rates and shall consider soil, climate, and nutrient demand.
- c. Application timing and rates shall ensure that a nuisance is not created. Runoff, ponding and overspray shall be avoided. There shall be no application of reclaimed water for irrigation purposes when the ground is saturated or frozen.
- d. The seasonal nutritive loading of the use area including the nutritive value of organic and chemical fertilizers and of the reclaimed water, shall not exceed the nutritive demand of the landscape.

- e. Degradation of groundwater, considering soil, climate, and nutrient demand, shall be minimized.
- f. Use areas that are spray irrigated or that allow public access shall be irrigated during periods of minimal use (e.g., between 9 p.m. and 6 a.m.). Consideration shall be given to allow maximum drying time prior to subsequent public use.
- g. Irrigation systems should not be installed near food establishments, picnic tables or drinking fountains.
- h. Where hose connections are required, hose bibs shall be replaced with quick couplers and other fittings that prevent interconnection between potable and nonpotable systems.
- i. The lead agency may establish additional best management practices for all irrigation uses, a specific type of use or on a case-by-case basis including, but not limited to:
  - v. Worker safety
  - vi. Blending with other water sources.
  - vii. Dual distribution systems.
  - viii. Metering.
  - ix. Confining water within the distribution system and to the site of use.
- j. Engineering reports submitted under Part II of these rules that propose irrigation uses of reclaimed water shall also address:
  - i. How agronomic rates will be determined, managed and monitored for each site to estimate demand. Include rainfall, temperature, crop type, stage of plant growth, method of irrigation, nutrient requirements, evapotranspiration and leaching of salts in determining hydraulic loadings and the limiting parameter. The calculated loading rate(s) and the parameters and methods used to determine the loading rate(s) shall be submitted to the lead agency approval.
  - ii. The responsibilities of the water generator, distributor and the user for control of water quality issues including irrigation schedules and worker safety, application methods, rates and practices, plant tolerance, salt build-up in the soil, agronomic uptake of metals, micro and macro nutrients, and groundwater protection.
  - iii. The specific responsibilities of the reclaimed water generator, distributor and user regarding any restrictions on the water quality and requirements for additional treatment. These responsibilities must be included within all agreements with the user.
  - iv. The best management practices identified under this section.

k. The lead agency permit may specify additional requirements deemed necessary to meet state and federal regulatory requirements for environmental and public health protection.

**End of rule language for irrigation uses.**

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**TAP SUGGESTIONS**

*Note: The TAP identified the following references to support rule and guidance:*

- a. Table 2.7 –USEPA Guidelines for Water Reuse, page 25, table 2-7 recommended limits for constituents in reclaimed water for irrigation.
- b. FAO Paper 29 Table 1 Guidelines for food crops
- c. Table 17.5 Metcalf and Eddy, Water Reuse (Asano, 2007)
- d. Table 17-27, page 1015, Typical minimum monitoring requirements.
- e. Ecology CSWD
- f. Irrigation Manuals (WSU, NRCS)
- g. Department of Agriculture
- h. Golf Course Association,
- i. CA general permit requirements for landscape irrigation

**Notes from RAC and TAP comments:**

- 1 Make sure guidance documents do not conflict with each other (Food and
- 2 Agriculture Organization (FAO) table 29 & Environmental Protection Agency
- 3 (EPA) table 27).
- 4 Salinity limit should copy standards from FAO or Takashi Asano.
- 5 Limit chlorine to less than or equal to 1 mg/L of total chlorine to protect plants.
- 6 Nitrogen concentrations should be greater than or equal to 10 mg/L unless
- 7 Ecology approves a variation.
- 8 Stock water standards should be based on the Department of Agriculture
- 9 requirements.
- 10 Algal growth was determined to be a management issue. The quality of the
- water
- 11 will depend on the customer or application you have for the use of the water.

- 12 Guidance is needed so users know if they need additional treatment to ensure against litigation protection.
- 13 Frost control.

*2007 M&E – Chapter 18 - Table 18-2 - **Guidance***

*Typical design considerations for urban landscape irrigation*

- *Plant selection (salt tolerance, boron tolerance, water needs)*
- *Irrigation method (required pressure, efficiency, exposure control)*
- *Leaching requirements*
- *Application rates*
- *O&M – irrigation timing, area restrictions, soil conditioning, sprinkler and emitter clogging control, monitoring.*
- *Distribution and storage – flow rate, pumping, peaking factors, storage, blending multipurpose use water, cross connection control – spacing ,pressure differences, backflow prevention, color coding, etc.*

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***PART VI Use-Based Requirements***

***Impoundments (version 1.1 – RAC discussion draft 7-22-2009)***

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**WAC 173-219-560 Impoundments**

- a. **Applicability.** This section applies to the non-potable use of reclaimed water for landscape impoundments such as ponds and golf course water hazards and public water features such as fish ponds, man-made recreational “lakes”, and constructed “wetlands”.
- b. **Special Use Advisory.** Reclaimed water shall not be used as a source of supply for swimming pools unless specifically authorized by Health and Ecology under a reclaimed water permit.
- c. **Minimum Class Requirements.**
  - i. Class A Uses. Reclaimed water used in recreational impoundments with unrestricted public contact or similar potential for public exposure shall, at a minimum, meet the Class A requirements. Such uses include, but are not limited to recreational lakes and public water features, fishponds and constructed treatment wetlands.<sup>1</sup>
  - ii. Class B Uses. Reclaimed water used in recreational or landscape impoundments with restricted public contact or similar potential for public exposure shall, at a minimum, meet the Class B requirements. Such uses include golf course water ponds/hazards, landscape ponds and vegetative landscape (lily) ponds, fishing and boating and other non-body contact uses including constructed treatment wetlands.
  - iii. Exceptions.
    - (1). *Reclaimed water that does not meet Class B reclaimed water standards may be discharged into constructed treatment wetlands provided a lesser standard is specifically authorized by Health and Ecology and the project includes a comprehensive monitoring plan to evaluate the effectiveness of the project and the degree of water quality improvement provided*

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<sup>1</sup> RCW 90.46.XXX until new rule adopted and 1997 WRR Standards Article 2, Section 4 state that constructed treatment wetlands shall meet Class A or Class B.

(2).The departments may consider other exceptions to these class requirements on a case-by-case basis. The departments must approve any such exceptions in writing.

**3. Additional requirements.**

- a. Phosphorus and Nitrogen. Reduction of phosphorus and/or nitrogen is recommended for reclaimed water used as a source of supply for recreational impoundments to minimize algal growths and maintain acceptable aesthetic conditions.
- b. Groundwater Protection. Reclaimed water impoundments and storage ponds shall not result in contamination of groundwater that is used as, or suitable to be used as, a source of water supply for domestic purposes. Reclaimed water impoundments and storage ponds that are not lined or sealed to prevent seepage are acceptable if it is demonstrated to the satisfaction of the Washington Departments of Health and Ecology that such contamination will not occur.
- c. Surface Water Protection. Impoundments with an outlet flowing to surface waters must meet requirements for a surface water discharge.

**Section 173-219-600 Wetlands will be addressed at a future meeting**

**Section 173-219-700 Streamflow Augmentation will be addressed at a future meeting.**

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**Questions for RAC members:**

1. Should we retain a requirement for reverse osmosis (RO) treatment for direct recharge of potable water aquifers but not for surface or vadose zone percolation projects? This assumes surface aquifer treatment (SAT) is equivalent to RO.
2. Should we retain technology-based and water quality-based requirements for both potable and non-potable aquifers per current 1997 standards?
3. Should we make the same distinction for surface or vadose zone percolation to potable and non-potable aquifers which are not in current standards?

### WAC 173-219-800 Ground Water Recharge

1. **Applicability.** These standards shall apply only to planned, ground water recharge projects using reclaimed water. Reclaimed water may recharge groundwater from facilities designed to percolate the water through the soils to reach the aquifer or recharge directly into the aquifer.
2. **Planning Requirement.** Reclaimed water use for groundwater recharge must be incorporated within a sewer or water comprehensive plan as applicable, adopted by the applicable local government and approved by the departments of Health and Ecology as applicable. The comprehensive water and/or sewer plan shall be prepared in accordance with WAC 173-240 (Ecology) and WAC 246-271 and WAC 246-290 (Health) and include a complete description of the proposed recharge project. (*more text in footnote*<sup>2</sup>)
  - a. For recharge by surface or vadose zone percolation, the project description must clearly specify the planned intent to recharge groundwater.<sup>3</sup>
  - b. For direct aquifer recharge projects, the creation or operation of direct recharge facilities to cause the injection of reclaimed water into a ground water basin is evidence of a planned ground water recharge project.<sup>4</sup>
3. **Minimum class and technology-based requirements**
  - a. **Surface and Vadose Zone Percolation.** *Reclaimed water used as a source of supply for ground water recharge by surface percolation shall, at a minimum meet the Class A requirements as specified in Part IV of this rule. The treatment process must include mechanisms to reduce total nitrogen to less than or equal to 10 mg/L.*<sup>5</sup>
  - b. **Direct Recharge to Nonpotable Ground Water.** *Reclaimed water used as a source of supply for ground water recharge by direct recharge to a nonpotable ground water aquifer shall, at a minimum:*
    - i. ***Meet the requirements for surface percolation.***
    - ii. Apply adequate and reliable treatment (ART) methods to prevent, control and treat wastewater effluent using available and reasonable technology prior to direct recharge.<sup>6</sup>
    - iii. Meet the following water quality requirements at the sampling point for the final disinfected reclaimed water prior to direct recharge.

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<sup>2</sup> The 1997 WRR Standards state that the comprehensive plan shall be prepared in addition to the engineering report required within these standards and that the project description shall discuss the estimated beneficial uses, the expected users, and the intended water rights status (artificially stored per WAC 173-136, or abandoned and available for appropriation to others) of all of the reclaimed water to be stored in the recharged groundwater. This may be more appropriate text for the submittal section under Part II of this rule.

<sup>3</sup> 1997 WRR Standards, Section 1, Article 3, section 3(3) for surface percolation.

<sup>4</sup> 1997 WRR Standards, Section 3, Article 1, section 2(d) for direct recharge.

<sup>5</sup> TAP recommended setting a value for nitrogen reduction rather than a vague reference.

<sup>6</sup> TAP recommended not using AKART as a term due to varied interpretation of its meaning.

*Five-day Biochemical Oxygen Demand (BOD5):* Monthly average not exceeding 5 mg/L as measured by a 24-hour composite sample collected at least daily.

*Total Suspended Solids (TSS):* Monthly average not exceeding 5 mg/L as measured by a 24-hour composite sample collected at least daily.

- c. Direct Recharge to Potable Ground Water. Reclaimed water used as a source of supply for direct aquifer recharge to a potable ground water aquifer shall, at a minimum:<sup>7</sup>
- i. Apply adequate and reliable treatment (ART) methods to prevent, control and treat wastewater effluent using available and reasonable technology prior to direct recharge.
  - ii. Meet the reliability requirements under this chapter at all times.
  - iii. Meet the minimum treatment techniques of oxidation, coagulation, filtration, reverse osmosis and disinfection with treatment occurring in the order listed. Bypassing of any treatment units is prohibited.<sup>8</sup>
  - iv. At the sampling point immediately following the oxidation treatment process and prior to filtration, meet the following:

*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.

*Dissolved oxygen* must be present as measure by a grab sample collected at least daily when wastewater characteristics are most demanding on the treatment facilities.

*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.

- v. 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.
- vi. At the sampling point for the final disinfected reclaimed water prior to direct recharge, meet the following water quality requirements.

*Total Organic Carbon (TOC):* Monthly average not exceeding 1.0 mg/L as measured by a 24-hour composite sample collected daily.

*Total Nitrogen as N:* Annual average not exceeding 10 mg/L as measured by a 24-hour composite sample or grab sample collected at least weekly.

*Turbidity:* The average monthly operating turbidity shall not exceed 0.1 NTU and turbidity shall not exceed 0.5 NTU at any time.

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<sup>7</sup> 1997 WRR Standards, Section 3, Article 2, section 1 and 2.

<sup>8</sup> 1997 Standards are unclear as to whether or not the Class A monitoring requirements for oxidized and for filtered wastewater apply to direct recharge projects. These are listed in the summary table for direct recharge projects so this draft assumes this is the intent of the standards.

*Bacterial standards:* The 7-day median shall not exceed 1.0 total coliform/100mL and sample maximum shall not exceed 5 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.

- d. Alternate Methods of Treatment. Methods of treatment other than those included in these standards and their reliability features may be accepted if:
  - i. *Equal Protection.* The applicant demonstrates to the satisfaction of the Lead Agency that the methods of treatment and reliability features will assure an equal degree of treatment, public health protection, and treatment reliability.
  - ii. *Pilot Studies.* For direct recharge into potable ground water, pilot plant or other special studies are required to demonstrate that methods of treatment other than those specified in this rule are capable of reliably producing reclaimed water that meets all applicable reclaimed water quality limits specified in this rule. For direct recharge into nonpotable ground water aquifers, pilot plant or other studies may be required. Requirements for pilot studies are addressed in **Part y, paragraph xx.**

#### 4. Additional water quality based requirements

- a. Reclaimed water used for groundwater recharge shall be at all times of a quality that fully protects public health and the water quality of waters of the state.
- b. Surface and Vadose Zone Percolation. Reclaimed water used for controlled application to the ground surface or to unsaturated soil (vadose zone) for the purpose of replenishing groundwater shall meet:

**[reserved for future language]<sup>9</sup>**

The primary point of compliance for surface and vadose zone percolation shall be a location within the groundwater aquifer at a point down gradient of the application site no further than the property boundary of the groundwater recharge site.

- c. Direct Recharge to Nonpotable Groundwater. The department shall determine the additional reclaimed water quality criteria required for direct recharge to nonpotable groundwater on a case-by-case basis. The determination shall consider the existing groundwater quality, hydrogeology, the subsequent use of any reclaimed water withdrawn from the underground, and other factors.
- d. Direct Recharge to Potable Ground Water. For direct recharge to any ground water that serves or could serve as a source of potable ground water, the reclaimed water shall meet the following requirements in the final reclaimed water prior to recharge:

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<sup>9</sup> The departments are currently seeking a legal opinion from AAGs for interpretation of the statute on this issue.

***[reserved for future language]***<sup>8</sup>

The primary point of compliance for direct recharge shall be the terminus of the discharge point in the aquifer or a prior sample point acceptable to the lead agency. In some instances, a secondary point of compliance may be accepted by the lead agency at a location within the groundwater aquifer at a point down gradient of the direct injection site no further than the property boundary of the groundwater recharge site.<sup>10</sup>

- e. In limited situations where background or natural contaminant levels are higher than water quality criteria specified above or it is otherwise found to be in the public interest, the lead agency may consider the net environmental benefit and establish groundwater quality enforcement levels higher than the water quality criteria.<sup>11</sup>

#### ***5. Groundwater monitoring***<sup>12</sup>

- a. A ground water monitoring program shall be established by the permittee and approved by the lead agency. The monitoring program shall be based on reclaimed water quality and quantity, site-specific soil and hydrogeologic characteristics, and other considerations. For direct recharge projects, monitoring wells shall be provided to detect the influence of the direct recharge operation.
- b. For surface percolation, the monitoring wells and constituents to be sampled shall be determined on a case-by-case basis by the lead agency.<sup>13</sup>
- c. For direct recharge to nonpotable aquifers, the monitoring wells and constituents to be sampled shall be determined on a case-by-case basis by the lead agency. At the discretion of the lead agency, withdrawal wells that extract ground water for nonpotable applications may be designated as monitoring wells.
- d. ***For direct recharge into potable source ground water aquifers, monitoring wells, as a minimum, shall be located at points 500 feet and 1,000 feet (plus or minus 10%) along the ground water flow path from the point of recharge to the nearest point of withdrawal of ground water used as a source of drinking water supply. The number and location of proposed monitoring wells shall be described in the engineering report submitted for approval.***

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<sup>10</sup> TAP recommended flexibility in determining points of compliance for groundwater quality standards.

<sup>11</sup> TAP and Ecology recommends OCPI for situations where exceptions to water quality standards should be considered.

<sup>12</sup> 1997 WRR Standards , Section 3, Article 5, Section 9 except for surface percolation.

<sup>13</sup> Meet the requirements under B73(2) depending whether the reclaimed water, ground water monitoring, or both are the most appropriate points of compliance.

- i. Ground water from monitoring wells shall be sampled at least quarterly for TOC and primary contaminants, secondary contaminants, radionuclides, and carcinogens listed in Table 1 in chapter 173-200 WAC.<sup>14</sup>
- ii. The lead agency may specify sampling for additional constituents and establish the frequency of sampling on a case-by-case basis.

#### 6. **Pilot Study Requirements for Direct Recharge**<sup>15</sup>

- a. A pilot plant study is required prior to implementation of direct recharge into a potable ground water aquifer. Pilot studies are not required for reclaimed water recharge into nonpotable aquifers unless specified by the lead agency.
- b. Direct recharge of reclaimed water into a ground water aquifer shall not occur during a pilot plant study unless authorized by the lead agency.
- c. A study protocol shall be submitted to the lead agency for review and approval prior to pilot plant testing. The protocol shall, as a minimum, include a description of all equipment and facilities to be used during the study, treatment capacity of the pilot plant, operation and maintenance procedures, constituents to be monitored, monitoring frequency, sampling techniques, analytical methods, and length of study.
- d. The pilot plant study shall evaluate the efficacy of the selected treatment process train to reliably meet all reclaimed water quality requirements. The study shall evaluate the effect direct recharge of reclaimed water would have on the ground water aquifer, including the capability to meet ground water quality criteria required by the lead agency.
- e. The reclaimed water shall be subjected to microbiological testing to evaluate the efficacy of the selected treatment process train to produce reclaimed water that does not contain measurable levels of pathogenic bacteria, parasites, and viruses.
- f. Toxicological testing of the reclaimed water may be required to evaluate health risks related to human consumption of the water.

#### 7. **Requirements for Withdrawal of Recharged Water**

- a. ***For any naturally occurring underground geological formation where water is collected and stored for subsequent use as part of an underground artificial storage and recovery project, a reservoir permit must be issued by Ecology. To qualify for issuance of a reservoir permit an underground geological formation must meet standards for review and mitigation of adverse impacts identified, for the following***

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<sup>14</sup> 1997 WRR Standards, Section 3, Article 5, Section 9 (b)(1)(i)

<sup>15</sup> 1997 WRR Standards, Section 3, Article 10

*issues:*<sup>16</sup>

- (i) Aquifer vulnerability and hydraulic continuity;*
  - (ii) Potential impairment of existing water rights;*
  - (iii) Geotechnical impacts and aquifer boundaries and characteristics;*
  - (iv) Chemical compatibility of surface waters and groundwater;*
  - (v) Recharge and recovery treatment requirements;*
  - (vi) System operation;*
  - (vii) Water rights and ownership of water stored for recovery; and*
  - (viii) Environmental impacts.*
- b. *Any withdrawal facilities constructed solely for the purpose of extracting reclaimed water from the underground shall comply with chapter 173-136 WAC and chapter 173-150 WAC.*
- c. *When recharge water is withdrawn for nonpotable purposes, it may be withdrawn at any time and at any distance from the point of recharge.*
- d. *For direct recharge projects, when recharge water is withdrawn as a source of drinking water supply:*
- i. Minimum retention time. The reclaimed water shall be retained underground for a minimum of 12 months prior to withdrawal.*
  - ii. Minimum distance. The minimum horizontal separation distance between the point of direct recharge and withdrawal as a source of drinking water supply shall be 2,000 feet.*
- e. *For surface or vadose zone percolation projects, when recharge water is withdrawn as a source of drinking water supply:*<sup>17</sup>
- i. Minimum retention time. The reclaimed water shall be retained underground for a minimum of 6 months prior to withdrawal.*

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<sup>16</sup> *Language added to RCW 90.46.120 requires that a permit for recovery of reclaimed water from aquifer storage and recovery shall be reviewed under the standards established under RCW 90.03.370(2). This language has been incorporated into the draft rule.*

<sup>17</sup> The 1997 WRR Standards are silent on this issue. USEPA guidelines suggest a minimum of 6 months retention time in the underground to assure adequate pathogen reduction.

- ii. ***Minimum distance. The minimum horizontal separation distance between the point of surface or vadose zone recharge and withdrawal as a source of drinking water supply shall be 2,000 feet.***
  
  - f. ***The permittee or person(s) who maintains control over the facilities where the recharged water is withdrawn shall prevent the withdrawal of ground water within the area required to achieve the minimum retention time in the underground and minimum horizontal separation distances.***
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**Note: Submittals for Direct Aquifer Recharge (this is the shaded content from Part II)**

1. All engineering reports proposing direct aquifer recharge projects shall
  - (a.) Provide a process description and diagram of the additional reverse osmosis treatment facilities, RO brine management facilities, direct recharge / pumping facilities and monitoring well facilities.
  - (b.) Provide a hydrogeologic study of the ground water aquifer proposed to receive the reclaimed water including:<sup>18</sup>
    - i. The impact of the recharge project on potable ground water.
    - ii. The source, area of recharge, quality, hydrostratigraphy, aquifer characteristics, and ground water flow patterns for all ground water within the ground water basin receiving recharged reclaimed water;
    - iii. All wells or areas that will be affected by the proposed project and describe the ground water quality in the aquifer receiving the reclaimed water;
    - iv. All well(s) subject to the highest reclaimed water contribution and shortest reclaimed water retention time in the underground;
    - v. The possibility of premature discharge of ground water to the surface, landslides, or other slope failures resulting from the proposed project
    - vi. Quantitative descriptions of the soil, soil layers, aquifer transmissivity, aquifer hydraulic conductivity, rate and direction of flow, aquifer boundaries, historic ground water levels, and aquifer storage capacity of the aquifer.
    - vii. Identification of the agency responsible for preventing the withdrawal of potable ground water within areas restricted by specified minimum separation distances and minimum retention time requirements.

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<sup>18</sup> From 1997 WRR Standards.

- viii. Description of the methods of determination and results for minimum retention time in the underground and minimum horizontal separation between the point of direct recharge and withdrawal of potable ground water.
- ix. The number and location of monitoring wells.
- x. A water quality monitoring plan for treated wastewater, reclaimed water and ground water withdrawn from monitoring wells.

**Questions:**

- *Should this also apply to percolation projects?*
- *Could this part be stamped by a licensed hydrogeologist instead of an engineer*

All engineering reports proposing recovery from aquifer storage of reclaimed water shall be reviewed under the technical standards established under RCW [90.03.370\(2\)](#).<sup>19</sup>

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<sup>19</sup> This requirement was added to RCW 90.46.120 in 2007. The implementing regulation for RCW 90.03.370(2) is [Ch. 173-157 WAC](#), which also states that it does not apply to reclaimed water. Requirements likely must either be listed within this regulation or amend Ch 173-157 WAC for requirements applicable to reclaimed water aquifer recovery projects.