

## **Draft Endnotes for Draft Groundwater Recharge Reuse Regulations**

*These draft endnotes accompany the draft recharge regulations currently being developed by the California Department of Public Health's Drinking Water Program. The draft recharge regulations address the supplementation of groundwater by surface spreading or subsurface injection of treated municipal wastewater prior to eventual extraction via drinking water wells for potable use.*

*The latest version of the draft regulations is here:*

<http://www.cdph.ca.gov/healthinfo/environhealth/water/Pages/Waterrecycling.aspx>

### **ENDNOTE 1.**

#### **§60320.030. Control of Regulated Chemicals and Physical Characteristics**

##### **New Regulated Contaminants**

Subsection (a)(1) refers to regulated contaminants.

Among contaminants that are likely to have MCLs in the future are chromium-6, and 1,2,3-trichloropropane.

### **ENDNOTE 2.**

#### **§60320.047. Additional Constituent Monitoring**

##### **Analytical Methods for Unregulated Chemicals.**

Subsection (a) states that the GRPP shall conduct the following and report any detections.

Some of the chemicals will have analytical methods that are available. Some may not.

CDPH views the use of drinking water methods as most appropriate, since they are generally more sensitive than wastewater methods. However, this may not always be possible, since there may be characteristics of the wastewater (e.g., high total dissolved solids) that may make the use of drinking water methods difficult.

GRRPs should select methods for non-regulated chemicals according to the following approach.

1. Use CDPH-approved drinking water methods, if available.

2. Use CDPH-recommended methods for chemicals in subsection (f) (e.g., 1,2,3-TCP).
3. If there is no CDPH-recommended drinking water method for a chemical, and more than a single EPA-approved method is available, consult with CDPH to determine to determine the appropriate EPA-approved method.
4. If there is no EPA-approved method for a chemical, and more than one method is available from the scientific literature (e.g., peer-reviewed journals), consult with CDPH to determine an appropriate method.
5. If no approved method is available for a specific chemical, the GRRP's laboratory may develop or use its own methods and should provide the analytical methods to CDPH for review.
6. If the only method available for a chemical is for wastewater analysis (e.g., a chemical listed as a priority pollutant only), sample and analyze for that chemical in the treated wastewater immediately prior to reverse osmosis treatment to increase the likelihood of detection. Use this approach until the GRRP's laboratory develops a method for the chemical in drinking water, or until a CDPH-approved or -recommended or EPA-approved drinking water method is available.
7. If no method is available for a specific contaminant, as may be the case for certain endocrine disrupting chemicals, pharmaceutical, personal care products, or other chemicals indicating the presence of wastewater (see Endnote 5), the GRRP should propose an alternative contaminant that might be used as an indicator or surrogate for the contaminant of interest, or an alternate sampling program that addresses the contaminant of concern, or the category of the contaminant of concern.

### **ENDNOTE 3.**

#### **§60320.047. Additional Constituent Monitoring**

##### **Selected chemicals with CDPH notification levels for possible analysis.**

Subsection (a)(1)(C) refers to chemicals with state notification levels that CDPH has specified. These chemicals are selected from CDPH's chemicals with notification levels; chemicals already included in analysis required under subsections (f)(1)(A) or (B) are not included here.

These chemicals have either been detected at least once in drinking water supplies over the past few years, or if not detected, they are of interest for some specific reason [e.g., formaldehyde is of interest because it may be a byproduct of certain treatment processes]. These would likely include boron, chlorate, 1,4-

dioxane, formaldehyde, N-nitrosodimethylamine (NDMA), 1,2,3-trichloropropane, and vanadium.

**ENDNOTE 4.**

**§60320.047. Additional Constituent Monitoring**

**Additional chemicals for analysis**

Subsection (a)(1)(D) refers to other chemicals that CDPH has specified. These chemicals would likely include: chromium-6, diazinon, and nitrosamines for which US EPA has developed analytical methods.

**ENDNOTE 5.**

**§60320.047. Additional Constituent Monitoring**

**Pharmaceuticals, endocrine disruptors, and other wastewater indicator chemicals.**

Subsection (a)(3) refers pharmaceuticals, endocrine disruptors and other indicators of the presence of municipal wastewater as specified by the Department.

CDPH is interested in collecting information that relates to the presence of the listed categories of contaminants in municipal wastewater that may be found in recycled water.

The specific contaminants targeted for monitoring will likely vary among GRPPs, depending on their individual engineering reports and characteristics of their groundwater basins, as well as the GRPP's efforts that have been taken to address the presence of endocrine disrupting chemicals, pharmaceutical, and personal care products in recycled water, and its efforts to assure that their presence in recycled water is at levels that are protective of the public health.

Monitoring for these chemicals—or categories of chemicals—is a diligent way of assessing and verifying recycled water quality characteristics, which can be useful in addressing issues of public perception about the safety of recharge projects.

Further, should there be positive findings of these types of chemicals, the recharge agency and CDPH can give the result due consideration as to whether it is of concern or not. Just what such consideration might entail would depend on what is known and what is not known about the particular chemical, including its potential health effects at the given concentration, the source of the chemical, as

well as possible means of better control to limit its presence, treatment strategies if necessary, and other appropriate actions.

***NOTE: Such monitoring is not for compliance purposes, but for informational use only.***

If a GRPP has additional reports for its own project using prior data that address the types of chemicals discussed in this Endnote, or reports for its own project addressing the effectiveness of the treatment processes in limiting the release of endocrine disruptor, pharmaceuticals, or personal care chemicals into recharge water, those reports should be made available to CDHS to assist in developing an approach that would build upon or supplement the already available information.

A GRPP that has little monitoring information should plan on collecting more analytical data related to endocrine disrupting chemicals, pharmaceuticals, personal care products and other chemicals that are indicators of wastewater in its recharge water.

A GRPP that can demonstrate a history of sampling, analysis, and related research—as well as an on-going program of monitoring and research—on endocrine disrupting chemicals, pharmaceuticals and personal care products, or appropriate indicator or surrogate chemicals in its recharge water will likely be encouraged to continue its research efforts, and likely have no contaminants specified by CDPH for analysis under this section.

GRPPs will not be required to conduct an ongoing monitoring program for contaminants under this section, unless good indicator or surrogate chemicals can be identified through this monitoring, and analytical methods are available to perform that monitoring.

Depending on the results of analyses and other information discussed above, required monitoring may be of short duration (e.g., twice a year for two or three years). If good indicator or surrogate chemicals with available analytical methods can be identified, requirements for their monitoring will be considered. This notwithstanding, CDPH recommends an ongoing monitoring program to address public concerns about the presence in wastewater about these types of chemicals.

A monitoring program could include sampling and analysis for representatives of these categories of contaminants (including surrogates or specific chemicals indicators):

- Hormones. CDPH at this time does not recommend specific chemicals. However, GRPPs should investigate chemicals that could represent either female or male hormones, or surrogates that could represent both.

- "Industrial" endocrine disruptors: CDPH at this time does not recommend specific chemicals. However, GRPPs should investigate chemicals such as bisphenol A, nonylphenol and nonylphenol polyethoxylate, octylphenol and octylphenol polyethoxylate, and polybrominated diphenyl ethers, or surrogates that could represent one or more industrial endocrine disruptors.
- Pharmaceuticals: CDPH at this time does not recommend specific chemicals. However, GRPPs should investigate chemicals such as acetaminophen, amoxicillin, azithromycin, carbamazepine, ciprofloxacin, dilantin, gemfibrozil, ibuprofen, lipitor, meprobamate, sulfamethoxazole, trimethoprin, and salicylic acid, or surrogates that could represent one or more pharmaceuticals.
- Personal Care Products: CDPH at this time does not recommend specific chemicals. However, GRPPs should investigate chemicals such triclosan and N,N-diethyl-*m*-toluamide (DEET), or surrogates that could represent one or more personal care products.
- Other chemicals that may suggest the presence of wastewater: CDPH at this time does not recommend specific chemicals. However, GRPPs should investigate chemicals such as caffeine, iodinated contrast media, fire retardants such as tris(2-chloroethyl) phosphate (TCEP), or surrogates that could represent one or more chemicals that suggest the presence of wastewater.

There are no drinking water standards for the contaminants listed above and no standards are anticipated. In addition, analytical methods may not be widely available (See Endnote 2).

## **ENDNOTE 6.**

Endnote 6 is no longer in use.

**Endnote 7. §60320.020. Control of Nitrogen Compounds.**

Table summarizing text of Section 60320.020 (Control of Nitrogen Compounds)\*

	<b>Method 1</b>	<b>Method 2</b>	<b>Method 3</b>
Compliance point and monitoring	<ul style="list-style-type: none"> <li>Recycled water, or a blend of recycled water and diluent water, in or above the mound</li> <li>Samples analyzed for total nitrogen</li> <li>Reduced monitoring available</li> </ul>	<ul style="list-style-type: none"> <li>Recycled water or a blend of recycled water and diluent water either:                             <ul style="list-style-type: none"> <li>prior to surface spreading or subsurface injection, or</li> <li>from within a mound or vadose zone prior to reaching the GW table</li> </ul> </li> <li>Samples analyzed for total nitrogen, nitrate, nitrite, ammonia, organic nitrogen, DO, and BOD</li> <li>Reduced monitoring available</li> </ul>	<ul style="list-style-type: none"> <li>Groundwater downgradient of the recharge area</li> <li>Samples analyzed for nitrate and nitrite</li> </ul>
Standard(s)	<ul style="list-style-type: none"> <li>5 mg/L total N as an average</li> <li>10 mg/L total N as a maximum frequency</li> </ul>	<ul style="list-style-type: none"> <li>10 mg/L total nitrogen or</li> <li>Limits established in the engineering report for other constituent</li> </ul>	MCLs for nitrate and nitrite
Frequency of sampling	2 per week	As established by the Department and specified in the operations plan	<ul style="list-style-type: none"> <li>Specified in the engineering report and operations plan.</li> <li>Relatively frequent monitoring at locations between the recharge area and down gradient domestic wells is required.</li> </ul>
Consequence of failure	<ul style="list-style-type: none"> <li>Investigate, correct and notify if the average of two consecutive samples &gt;5 mg/L</li> <li>Suspend recharge of recycled water if the 4-week average of all samples &gt;5 mg/L <u>or</u> if more than 25% of samples collected in any two week period exceed 10 mg/L.</li> </ul>	<ul style="list-style-type: none"> <li>Investigate, correct and notify based on an average of two consecutive samples over the total nitrogen standard or standard for another constituent.</li> <li>Suspend surface spreading and subsurface injection of recycled water until the average of two consecutive samples meets all limits</li> </ul>	<ul style="list-style-type: none"> <li>Notify the Department and RWQCB.</li> <li>Suspend surface spreading and subsurface injection unless demonstrated that the groundwater no longer exceeds the MCLs.</li> </ul>
Rationale	Method 1 relies on such a low limit for the total N in the recycled water that the chance that the NO <sub>2</sub> or NO <sub>3</sub> MCL could be exceeded is minute.	Method 2 relies on: <ol style="list-style-type: none"> <li>A low enough limit for the total N in the recycled water that the chance that a NO<sub>2</sub> or NO<sub>3</sub> MCL could be exceeded is low, combined with</li> <li>A set of limits determined for the specific GRRP and explained in the Engineering Report for nitrite, organic nitrogen and /or ammonia necessary to limit oxidation to NO<sub>2</sub> or NO<sub>3</sub>, and some set of minimum levels for an excess DO over BOD requirement in the recycled water and/or a DO requirement in the groundwater as necessary to prevent reduction of NO<sub>3</sub> to NO<sub>2</sub></li> </ol>	Method 3 relies on: <ol style="list-style-type: none"> <li>A demonstration that historic recharge with water containing comparable levels of nitrogen has not caused a problem,</li> <li>Evidence that recharge water can be tracked and monitored throughout the flow path, and</li> <li>Monitoring to show that the MCLs in for NO<sub>2</sub> and NO<sub>3</sub> are met in the groundwater.</li> </ol>

\*Note: This table provides a summary of the regulatory requirements and is not intended to be comprehensive.