

ATTACHMENT 1

STAFF REPORT

For

Proposed Modifications of Waste Discharge Requirements Order No. R1-2007-0013

And

Monitoring and Reporting Program No. R1-2007-0013 (9/20/2007 revision)

For

Town of Windsor Wastewater Treatment, Reclamation, and Disposal Facility

The Town of Windsor (hereinafter Discharger) currently discharges municipal wastewater under Waste Discharge Requirements Order No. R1-2007-0013 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0023345 adopted on June 14, 2007. The Discharger's wastewater treatment facility provides tertiary treatment and ultraviolet light disinfection for an average dry-weather design flow of 2.25 million gallons per day (mgd).

The Discharger has requested that the Regional Water Board make the following modifications to the existing Order:

1. Modification of final copper effluent limitations based on the Discharger's development of a discharger-specific water effect ratio (WER), as allowed by Provision VI.C.7 of the Discharger's Permit. The Discharger's request is to reevaluate reasonable potential for copper based on inclusion of the discharger-specific WER and use of effluent hardness, and if necessary to derive final copper effluent limitations utilizing the WER and effluent hardness.
2. Modification of the Permit to add the Geysers Project as a new permitted discharge, with an average daily flow capacity of 0.53 mgd to 0.75 mgd and to reflect the reliability and increased disposal capacity that the Geysers Project provides by adding two new tables, 9a (Projected Storage and Irrigation Capacities for Treatment Capacity Increases with 0.53 MGD Diversion to Geysers Project) and 9b (Projected Storage and Irrigation Capacities for Treatment Capacity Increases with 0.75 MGD Diversion to Geysers Project). Accordingly, the Discharger requests that the permitted capacity of the Town's WWTF be increased from 1.6 mgd to 1.9 mgd.

The remainder of this Staff Report provides the background information and rationale for granting the proposed modifications to Order No. R1-2007-0013.

REQUEST TO MODIFY FINAL COPPER EFFLUENT LIMITATIONS

Order No. R1-2007-0013 specifies both interim and final effluent limitations for copper that were calculated based on limited monitoring data collected by the Discharger prior to adoption of the Order. The interim limitation of 17 ug/L was based on treatment plant performance and expired on May 18, 2010. The final effluent limitations are included in a table in Attachment E-1 to Order No. R1-2007-0013 and are to be calculated based on receiving water hardness at the time that effluent copper samples are collected. The interim effluent limitations and a compliance schedule were included in Order No. R1-2007-0013 based on a demonstration by the Discharger that immediate compliance with the final, CTR-based effluent limitations was infeasible. The Discharger proposed to implement several tasks designed to identify (1) the source of copper and any necessary source control measures and (2) a means to comply with final copper effluent limitations. The final copper effluent limitations established in Order No. R1-2007-0013 are more stringent than the interim effluent limitation and are based on the California Toxics Rule and the State Implementation Policy for Toxics Control.

After evaluating potential sources of copper, the Discharger determined that source water treatment and onsite wastewater treatment alone were not enough to achieve compliance with final effluent limitations for copper. The Discharger proposed to conduct a WER study to develop a site-specific copper multiplier for the discharge in accordance with USEPA's guidance document titled *Streamlined Water Effect Ratio Procedure for Discharges of Copper* (EPA-822-R-01-005), published in March 2001. Order No. R1-2007-0013 required the discharger to submit a WER study workplan by May 1, 2008 and to complete the WER study and submit study results by November 1, 2009 for Executive Officer approval.

In accordance with the compliance schedule in Order No. R1-2007-0013, the Discharger submitted the WER study workplan on April 30, 2008 and the WER study results on October 28, 2009 (report titled *Town of Windsor Wastewater Treatment, Reclamation, and Disposal Facility Copper Water-Effect Ratio Study*.)

The water quality objective for copper specified in the California Toxics Rule for inland surface waters is in the form of an equation that includes a site-specific WER multiplier factor. The WER reflects any effect that local site water constituents have on increasing or decreasing the bioavailability and toxicity of copper. Application of the WER multiplier, where available, allows for site-specific adjustment of the copper objective. In turn, the copper objective becomes the basis for developing appropriate effluent limitations. In the absence of a site-specific WER multiplier, the CTR uses a value of one. Order No. R1-2007-0013 established final copper effluent limitations based on the CTR objective assuming a WER multiplier of one, since no site-specific data were available to justify a different multiplier.

Regional Water Board staff has reviewed the Discharger's WER study report and have determined that the WER test results were developed in accordance with the methodology in EPA's guidance document and that the results of the study are within the expected range for a WER for a municipal wastewater discharge. The study results determined that the WER for total recoverable copper and dissolved copper, in the receiving waters affected by Windsor's discharge are 3.42 and 3.24, respectively. Regional Water Board staff conducted a reasonable potential analysis of Windsor's discharge, utilizing the total recoverable copper WER of 3.42 because the CTR requires that development of hardness-dependent metal effluent limitations to be for the total recoverable metal. The reasonable potential analysis is described in the following section.

In addition, the Discharger submitted a January 4, 2010 memorandum providing the technical basis for implementation of a Discharger-specific copper WER and requesting that the Regional Water Board consider the use of effluent hardness for conducting the reasonable potential analysis and establishment of copper effluent limitations, if necessary. The January 4, 2010 memorandum includes graphical presentations to demonstrate that use of effluent hardness for calculation of effluent limitations and compliance determination will always result in copper concentrations that are below water quality objectives and is always protective of water quality. The methodology used in the technical memorandum is the same methodology presented in a 2006 Study that will be further described in this Staff Report.

Reasonable Potential Analysis for Copper

Section 1.3 of the SIP requires the Regional Water Board to use all available, valid, relevant and representative receiving water and effluent data and information to conduct a RPA. The RPA conducted for this permit modification utilized hardness and copper data collected by the Discharger as identified in the following table:

Data Used for RPA

Date	Copper (ug/L)		Hardness (mg/L CaCO ₃)			Notes	
	Effluent	Down-stream Receiving Water	Upstream Receiving Water	Effluent	Down-stream Receiving Water		Upstream Receiving Water
9/19/01				150			
2/25/02	11		3.4			190	
10/9/02	14		2.0			250	No Discharge
11/13/02	9.8		4.3			110	No Discharge
11/12/03				150			
9/9/04				150			
11/9/04	<50						
9/19/04				140			
7/12/06				180			

Date	Copper (ug/L)			Hardness (mg/L CaCO ₃)			Notes
	Effluent	Down-stream Receiving Water	Upstream Receiving Water	Effluent	Down-stream Receiving Water	Upstream Receiving Water	
12/19/07	<0.7				146		
1/9/08	<0.7				50		
2/6/08	<0.7				69		
3/5/08	11			140	120	120	
12/10/08			0.85			175	WER Sampling
12/26/08	22	18	19	150	70	70	
2/3/09			1.67	171		144	ND/WER Sampling
2/19/09	<6			140	68	68	
3/4/09			5.18	130	64	64.6	
3/24/09	9		5.01			66.7	
5/11/09							
5/11/09							
1/13/10	<4				78		
1/25/10	<4	<4	<4	140	64	56	
1/27/10	<4	<4	<4	130	64	64	
1/29/10	<4	<4	<4	140	76	76	
2/3/10	<4				110		
3/1/10	<4						
3/3/10	<4						
3/6/10	<4				140		
4/26/10	10				140		

The California Toxics Rule and the National Toxics Rule contain water quality criteria for seven metals that vary as a function of hardness, the lower the hardness, the lower the water quality criteria. The hardness-dependent metal criteria include cadmium, **copper**, chromium III, lead, nickel, silver, and zinc.

Effluent limitations for the discharge must be set to protect the beneficial uses of the receiving water for all discharge conditions. Effluent limitations must be set using a reasonable worst-case condition in order to protect beneficial uses for all discharge conditions. The SIP does not address how to determine hardness for application to the equations for the protection of aquatic life when using hardness-dependent metals criteria. It simply states, in Section 1.2, that the criteria shall be properly adjusted for hardness using the hardness of the receiving water. The CTR requires that, for waters with a hardness of 400 mg/L (as CaCO₃), or less, the actual ambient hardness of the surface water must be used. It further requires that the hardness values used must be consistent with the design discharge conditions for design flows and mixing zones (See 40 CFR 131.38(c)(4)(i)). The CTR does not define whether the term “ambient”, as applied in the regulations, necessarily requires the consideration of the upstream as opposed to downstream hardness conditions.

State Water Board Order No. WQO-2008-0008 (City of Davis) further interpreted the SIP by stating “...*the regional water boards have considerable discretion in the selection of hardness. Regardless of which method is used for determining hardness, the selection must be protective of water quality criteria, given the flow conditions under which a particular hardness exists....Regardless of the hardness used, the resulting limits must always be protective of water quality under all flow conditions.*”

The point in the receiving water affected by the discharge is downstream of the discharge. As the effluent mixes with the receiving water, the hardness of the receiving water can change. Therefore, it is appropriate to use the ambient hardness downstream of the discharge that is a mixture of the effluent and receiving water for the determination of the CTR hardness-dependent metals criteria. A 2006 Study¹ (attached to this Staff Report) demonstrates that using the lowest recorded receiving water hardness for establishing water quality criteria is not always protective of the receiving water under various mixing conditions (e.g., when the effluent hardness is less than the receiving water hardness). The 2006 Study demonstrates that for certain hardness-dependent metals, including copper, any mixture of receiving water that is compliant with water quality objectives for that metal and effluent that is compliant with water quality objectives for that metal, will always result in compliance with water quality objectives. The 2006 Study also demonstrates that it is always protective to determine reasonable potential, and calculate effluent limitations, if needed, based on effluent hardness. The methodology presented in a 2006 study has received acceptance within the State and Regional Water Boards and by USEPA.

The 2006 study evaluated the relationships between hardness and the CTR metals criterion that is calculated using the CTR metals equation. The equation describing the total recoverable regulatory criterion, as established in the CTR, is as follows:

$$\text{CTR Criterion} = \text{WER} \times e^{m[\ln(H)]+b} \quad (\text{Equation 1})$$

Where:

- WER = the discharger-specific water effect ratio
- H = Hardness
- b = metal- and criterion-specific constant
- m = metal- and criterion-specific constant

The constants “m” and “b” are specific to both the metal under consideration, and the type of total recoverable criterion (i.e., acute or chronic). The metal-specific values for these constants are provided in the CTR at paragraph (b)(2), Table 1.

¹ *Emerick, R.W.; Booroum, Y.; & Pedri, J.E., 2006. California and National Toxics Rule Implementation and Development of Protective Hardness Based Metal Effluent Limitations. WEFTEC, Chicago, Ill.*

The relationship between hardness and the resulting criterion in Equation 1 can exhibit either a downward –facing (i.e., concave downward) or an upward-facing (i.e., concave upward) curve depending on the values of the criterion-specific constants. The curve shapes for acute and chronic criteria for the metals are as follows:

Concave Downward: cadmium (chronic), chromium (III), copper, nickel, zinc. The finding of the 2006 Study with regard to concave downward metals will be discussed further, since copper is being re-evaluated for reasonable potential.

Concave Upward: cadmium (acute), lead, and silver (acute). The findings of the 2006 Study with regard to concave upward metals will not be discussed at this, as no concave upward metals are being evaluated at this time.

For those contaminants where the regulatory criteria exhibit a concave downward relationship as a function of hardness, use of the lowest recorded effluent hardness for establishment of water quality objectives is fully protective of all beneficial uses regardless of whether the effluent or receiving water hardness is higher. Use of the lowest recorded effluent hardness is also protective under all possible mixing conditions between the effluent and the receiving water (i.e., from high dilution to no dilution).

Because Order R1-2007-0013 requires compliance with effluent limitations at the end of the discharge pipe, effluent hardness is an appropriate and protective hardness to use in adjusting the water quality criteria. Therefore, for the concave downward metal, copper, which is the subject of this January 27, 2011 Permit modification, the reasonable worst-case ambient hardness can be estimated by using the lowest effluent hardness. The lowest water quality copper criteria was calculated for this Order using Equation 1 with the following values:

- WER = 3.42, the discharge specific water effect ratio established by the Discharger's WER Study;
- Minimum effluent hardness (H) of 130 mg/L as CaCO₃, based on 13 samples obtained by the Discharger;
- $m = 0.8545$, the CTR established constant for calculation of criteria continuous (acute) concentrations for copper
- $b = -1.702$, the CTR established constant for calculation of criteria continuous (acute) concentrations for copper.

This calculation resulted in a lowest water quality copper criteria of 39.92 ug/L for copper with which to compare the maximum effluent concentration to.

In addition, a separate calculation was done to identify the lowest water quality copper criteria to compare the maximum background receiving water copper concentration to. This calculation was performed using the following values:

- WER = 3.42, the discharge specific water effect ratio established by the Discharger's WER Study;
- Minimum upstream receiving water hardness (H) of 56 mg/L as CaCO₃, based on 13 samples obtained by the Discharger;
- $m = 0.8545$, the CTR established constant for calculation of criteria continuous (acute) concentrations for copper
- $b = -1.702$, the CTR established constant for calculation of criteria continuous (acute) concentrations for copper.

This calculation resulted in a lowest water quality copper criteria of 19.44 ug/L.

To begin the RPA, Regional Water Board staff identified the maximum observed effluent (MEC) and ambient background (B) concentrations for copper and compared this data to the most stringent applicable water quality criterion (C) for copper. Drawing from the data in the above table, the MEC is 22 ug/L and the ambient background concentration of copper is 19 ug/L. The lowest WER-adjusted CTR criterion for copper in the effluent is 39.92 ug/L, at a hardness concentration of 130 mg/L. The lowest WER-adjusted CTR criterion for copper in the downstream receiving water, at a hardness concentration of 56 mg/L is 19.44 ug/L. Since the MEC of 22 ug/L does not exceed the lowest CTR criterion of 39.92 ug/L and the ambient background concentration of copper of 19 ug/L does not exceed the lowest receiving water CTR criterion of 19.44 ug/L, reasonable potential does not exist for copper.

Based on the information presented in the October 9, 2009 WER study report and the January 4, 2010 technical memorandum, Regional Water Board Staff recommends that the Regional Water Board amend Order No. R1-2007-0013 to include the recommended changes identified in Order No. R1-2011-0006. The recommended changes include the use of effluent hardness and the Discharger's site-specific WER for conducting the reasonable potential analysis for copper which resulted in a determination of no reasonable potential for copper and removal of copper effluent limitations from Order No. R1-2007-0013.

REQUEST TO MODIFY ORDER TO INCLUDE GEYSERS PROJECT DISCHARGE AND INCREASE PERMITTED CAPACITY

Order No. R1-2007-0013 currently identifies two means for the Discharger to handle its effluent: (1) discharge to Mark West Creek during the period of October 1 through May 14 each year and (2) water reclamation during the period of May 15 and September 30 and other periods when weather conditions allow reclamation to occur in accordance with permit requirements. The Order recognizes the fact that the Discharger's wastewater treatment plant average dry-weather design capacity is 2.25 million gallons per day (mgd) and that the current reclamation system design capacity is 1.6 mgd. The reclamation system consists of storage ponds, urban and agricultural recycled water

irrigation system, and delivery of reclaimed water to Windsor High School for toilet flushing.

The Order recognizes that the Discharger is currently operating at the rated capacity of its water reclamation system, thus Discharge Prohibition III.H limits the Discharger to treating no more than 1.6 mgd. Discharge Prohibition III.H of Order No. R1-2007-0013 currently states: "The ADWF of waste into the Discharger's Facility in excess of 1.6 mgd, as determined from the lowest consecutive 30-day mean daily flow, is prohibited, unless the Discharger demonstrates that it has storage and reclamation capacity to handle a higher ADWF, not to exceed 2.25 mgd." The Order further recognizes that the Discharger is working on expanding its reclamation system in order to justify increasing wastewater flows to the WWTF. Section IV.C.4 of the Order allows for the possibility of increasing the use of additional treatment capacity at the WWTF upon demonstration by the Discharger that increased storage and irrigation capacity are increased in accordance with Table 9 of the Order (Projected Storage and Irrigation Capacities for Reclamation System Capacity Increases).

On July 21, 2010, the Discharger submitted a Report of Waste Discharge (ROWD) requesting that the Regional Water Board modify Order No. R1-2007-0013 to include the Geysers Project as a new permitted discharge, associated additions to Table 9 of the Order, and authorization for increased capacity. The ROWD includes a July 14, 2010 Memorandum that provides supporting documentation for this request which is summarized in the following paragraphs.

On November 5, 2008, the Town formally decided to move forward with the Geysers Recharge Pipeline Connection Project (Geysers), by letter to the Regional Water Board Executive Officer dated February 11, 2009. The project consists of initially delivering an annual average flow of 0.53 mgd of recycled water to the Geysers (0.70 mgd in October through May and 0.20 mgd in June through September). Based on the terms of the agreement, the Town has the ability to increase deliveries to a maximum annual average flow of 0.75 mgd (0.92 mgd in October through May and 0.42 mgd in June through September).

The technical memorandum includes a water balance to model the Discharger's existing treatment, discharge, and storage system to demonstrate the reliability of the Discharger's current storage, disposal and reclamation system and to identify the additional reliability that would be provided by the Discharger's connection to the Geysers pipeline. The water balance model demonstrates that, with the Geysers Project, the WWTF can effectively treat and reuse/dispose higher influent flows and improve the storage reliability that the Discharger currently has. By diverting effluent to the Geysers Project, the Discharger effectively increases its storage capacity by creating a new point of discharge. In light of this additional storage capacity reliability, the Discharger is requesting a 0.3 mgd increase in its permitted treatment capacity. The Geysers Project would actually provide the Discharger with the ability to divert 0.7

mgd to the Geysers pipeline during the discharge season (October through May) which is greater than the requested increase in treatment capacity. The volume of effluent discharged to Mark West Creek is not expected to increase because the requested increase in permitted treatment capacity is less than the new, additional discharge to the Geysers Project.

If the volume of effluent discharged to Mark West Creek is expected to result in a decrease of flow in any portion of Mark West Creek, the Discharger must file a petition with the State Water Board, Division of Water Rights, and receive approval for such a change (California Water Code section 1211). This requirement is identified as Provision VI.B of Order No. R1-2007-0013.

The Discharger's prior permit, Order No. R1-2002-0013 also authorized discharges of up to 0.75 mgd to the Geysers pipeline owned and operated by the City of Santa Rosa. The Geysers Project was evaluated and identified as a discharge alternative in the Discharger's October 2000 Environmental Impact Report (EIR) for the Town of Windsor Water Reclamation Master Plan for Treatment Storage and Disposal. The EIR identified several mitigation measures to ensure protection of water quality in relation to the construction and operation of its proposed pump station and pipeline to convey Windsor's disinfected, tertiary treated effluent to the Geysers pipeline. Mitigation measures include, use of appropriate geotechnical design standards for construction of the pipeline to reduce the potential for spills from pipe breakage during an earthquake, construction of the pump station and pipeline in areas that have little slope will reduce the potential for spills related to pipe breakage causing erosion, and use of standard construction BMPs under a Storm Water Pollution Prevention and Pollution Plan. These mitigation measures are already identified in Fact Sheet Section III.B of Order No. R1-2007-0013 because the specified mitigation measures also apply to other aspects of the Discharger's non-NPDES discharge system, such as storage ponds and other pipeline construction.

Based on the information presented in the July 14, 2010 technical memorandum and the environmental analysis in the Discharger's 2000 EIR, Regional Water Board Staff recommends that the Regional Water Board amend Order No. R1-2007-0013 to include the recommended changes identified in Order No. R1-2011-0006. The recommended changes include the addition of the Geysers recharge pipeline discharge point, acknowledgement of the additional storage and disposal capacity reliability provided by the addition of the Geysers Project, and an increase in the Discharger's permitted treatment capacity from 1.6 mgd to 1.9 mgd.