

INFORMATION SHEET

ORDER R5-2015-XXXX
DELHI COUNTY WATER DISTRICT
WASTEWATER TREATMENT FACILITY
MERCED COUNTY

The Delhi County Water District (District) owns and operates a wastewater treatment facility (WWTF) that serves about 2,300 residential and commercial connections in the unincorporated community of Delhi. The current WWTF was constructed in 1997 to replace an older WWTF at the same location.

Background

The current WWTF opened in 1998. Waste Discharge Requirements (WDRs) Order 97-013 authorizes the discharge to land of up to 0.8 million gallons per day (mgd) of undisinfected secondary effluent to evaporation/percolation ponds. Based on the engineer's design criteria, the WDRs include a monthly average limit of 40 milligrams per liter (mg/L) for both 5-day biochemical oxygen demand (BOD) and total suspended solids (TSS), and allow an increase in flow up to 1.0 mgd once additional disposal capacity is provided. The WDRs do not contain salinity effluent limits.

The WWTF uses the Advanced Integrated Wastewater Pond System technology designed by Oswald Engineering Associates, Inc., and in 1998 the WWTF consisted of a headworks, two advanced facultative ponds with one fermentation pond in each advanced facultative pond that is divided into three cells, one high rate pond, two algal settling ponds, a maturation pond, and four evaporation/percolation ponds. The District has made improvements to the WWTF system since 1998 including, but not limited to, installing chemical coagulation equipment and upflow tube settlers in the outlet structures of the algal settling ponds and dividing the maturation pond into three separate cells with tube settlers in the outlet structures, and installing a center dividing wall in the high rate pond to form two separate high rate ponds in accordance with the original design of the WWTF.

Effluent Characteristics

Historically, the discharge from the WWTF has had difficulty meeting the effluent limits for BOD and TSS. The effluent BOD and TSS limits for the discharge include a daily average of 40 mg/L and a daily maximum of 80 mg/L. From 2006 through 2007, the average BOD and TSS results were 104 mg/L and 90 mg/L, respectively. To address the BOD and TSS concentrations in effluent, the District began adding coagulants in 2008 and embarked on upgrading the WWTF as described above. With the combination of coagulants and the improvements to the WWTF, effluent quality for BOD and TSS has improved, as shown on the following table.

Effluent Data - 2012 through June 2014

<u>Date</u>	<u>BOD</u> <u>Milligrams per</u> <u>Liter</u>	<u>TSS</u> <u>Milligrams per</u> <u>Liter</u>	<u>Electrical</u> <u>Conductivity</u> <u>Micromhos per</u> <u>centimeter.</u>	<u>Total</u> <u>Nitrogen</u> <u>Milligrams per</u> <u>Liter</u>
2012	15 (7 - 31)	17 (7 - 22)	855 (770 - 931)	21 (7 - 28)

Effluent Data - 2012 through June 2014 (continued)

<u>Date</u>	<u>BOD</u> Milligrams per <u>Liter</u>	<u>TSS</u> Milligrams per <u>Liter</u>	<u>Electrical Conductivity</u> Micromhos per centimeter	<u>Total Nitrogen</u> Milligrams per <u>Liter</u>
2013	11 (7 - 15)	13 (9 - 20)	749 (650 - 821)	17 (7 - 26)
2014	16 (9 - 20)	20 (15 - 22)	736 (693 - 766)	26 (18 - 33)
Averages	14	16	784	20
<u>Limit</u>	40/80	40/80	---	---

The EC results have improved as well averaging 855 umhos/cm in 2012 and showing a steady decreasing trend to an average of 736 umhos/cm for the first half of 2014. Total nitrogen results are however, higher than anticipated. The WWTF is designed to treat total nitrogen to 10 mg/L, but the average is currently double the design treatment concentration for total nitrogen as discussed in greater detail below.

Solids and Sludge/Biosolids Disposal

Solids removed by the WWTF bar screens are disposed of at the Merced County landfill. WDR Order 97-013 contains sludge disposal specifications that indicate the District must report any change in the use or disposal practices of sludge to the Executive Officer in at least 90 days in advance of the change and that the use and disposal of sewage sludge shall comply with State laws and regulations. The District sells dried algae to Algix, a Mississippi based company that makes biodegradable products with algal solids. The United States Environmental Protection Agency has approved the sale of the dried algal solids.

Groundwater Occurrence

The WWTF and evaporation/percolation ponds are within the Turlock groundwater sub basin that forms a part of the San Joaquin Valley Groundwater Basin. The Basin is reported to contain three general primary water bearing zones: an uppermost unconfined aquifer (Modesto Formation); a semi-confined aquifer (Turlock Lake Formation); and a confined aquifer beneath the Corcoran Clay layer.

Groundwater in the vicinity of the WWTF is about 30 to 40 feet bgs and generally flows to the south/southeast towards the Merced River situated about a mile south/southeast of the WWTF. However, the direction of groundwater flow varies locally due to mounding caused by the discharge of wastewater to the evaporation/percolation ponds and water deliveries in the TID canal present along the northern boundary of the WWTF.

The District has installed six groundwater monitoring wells since 1995 to create the existing groundwater monitoring well network. All of the monitoring wells are set in the upper unconfined aquifer. In 1995, prior to construction of the new WWTF, the District installed three monitoring wells (MW 1 through MW 3) to characterize groundwater influenced by the former WWTF. At the time of installation, the interpreted direction of groundwater flow was to

the west/southwest and MW-1 was installed as an upgradient well at the northeast corner of the WWTF property adjacent to a canal. MW-1 is still upgradient of the WWTF, but it is adjacent to a Tulare Irrigation District canal that affects water quality (improves) in MW-1. MW-2 and MW-3 were installed as down to crossgradient wells to monitor groundwater south and west of the percolation ponds of the former WWTF. MW-2 is directly adjacent to, but upgradient of, the existing evaporation/percolation ponds. Analytical results from this well currently provide upgradient groundwater quality results for the WWTF. However, MW-2 will be downgradient of the proposed evaporation/percolation pond and groundwater quality in this well will no longer represent upgradient groundwater quality. MW-3 is downgradient of the lined advanced facultative ponds and is adjacent the algal drying beds. The algal drying beds were installed in 2008, but were not lined. In 2012, the algal drying beds were lined and equipped with an underdrain to remove leachate, which is pumped back into the WWTF.

Groundwater elevations were found to be highly variable due to mounding from the percolation ponds and the discharge from the Turlock Irrigation District canal. In 1997, the District installed an additional well (MW-4) at the southwest corner of the site and adjacent to the evaporation/percolation ponds. Again, groundwater elevation data from the four wells indicated that the groundwater direction was variable and was influenced by the use of the percolation ponds and nearby irrigated agriculture. In November 2008, well MW-5 was installed southeast of the WWTF as an intended upgradient well in an effort to establish background groundwater quality. However, based on groundwater elevations and analytical results obtained from MW-5, the District's groundwater consultant determined MW-5 was actually downgradient of the WWTF and showed signs of groundwater degradation (TDS, EC, nitrates as nitrogen) from the WWTF. The District installed MW-6 in December 2009 directly in the center of the evaporation/percolation ponds to assess groundwater quality directly beneath them and to evaluate those findings with respect to the concentrations observed in the other wells.

Groundwater Conditions

The average results from 2012 through the first quarter of 2014 (nine quarterly monitoring events) are presented in the following table. Results shown in bold exceed the respective maximum contaminant level (MCL).

Groundwater Results

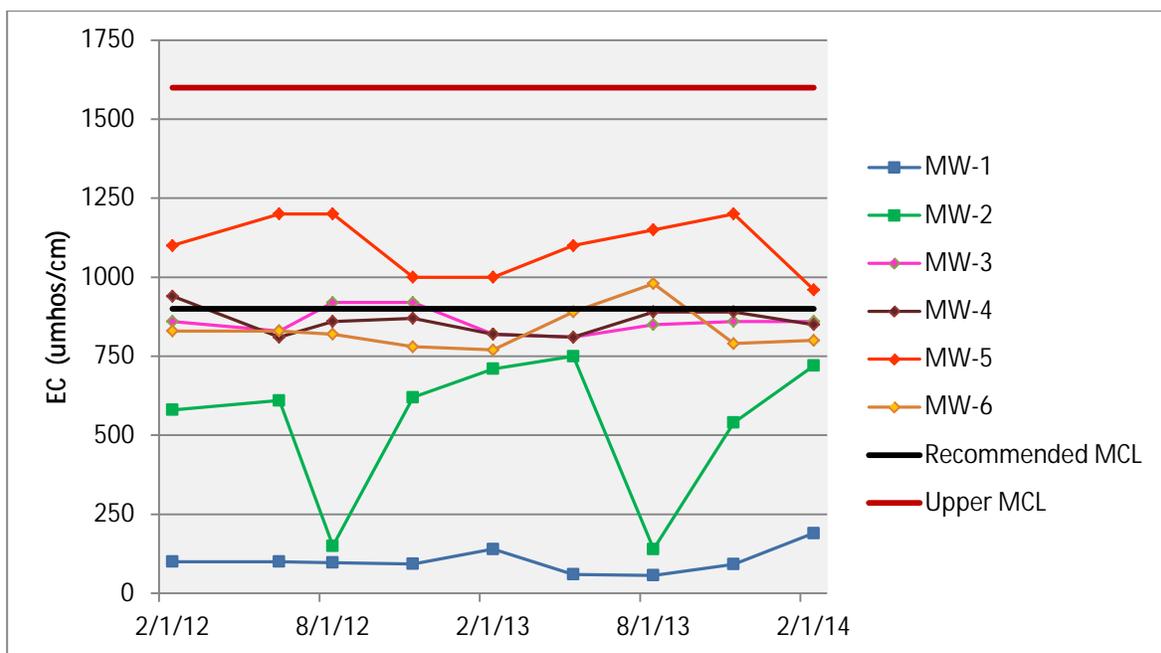
<u>Constituent</u>	<u>Units</u>	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>	<u>MW-5</u>	<u>MW-6</u>	<u>MCL</u> ¹
EC	umhos/cm	103	536	865	869	1,062	832	900/1600
TDS	mg/L	92	353	573	573	719	483	500/1000
Nitrate as nitrogen	mg/L	3.1	7.1	23	15	10.4	6.6	10
Sodium	mg/L	4.0	69	104	112	77	110	---
Chloride	mg/L	3.9	69	108	117	114	107	250/500

¹. Where there are two numbers the first number represents the Recommended MCL and the second number represents the Upper MCL. Values shown in bold font exceed the respective MCL.

Groundwater results are compared to various water quality objectives to assess degradation/pollution. Water quality objectives are discussed in detail in the *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition, revised October 2011 (Basin Plan)*. Typical water quality objectives include State drinking water primary and secondary MCLs.

The results from the down gradient wells (MW-3 through MW-5) shown in the above table are all greater than the results from MW-2, indicating the discharge has degraded groundwater. However, most of the increases do not exceed water quality objectives with the exception of EC, TDS, and nitrate as nitrogen.

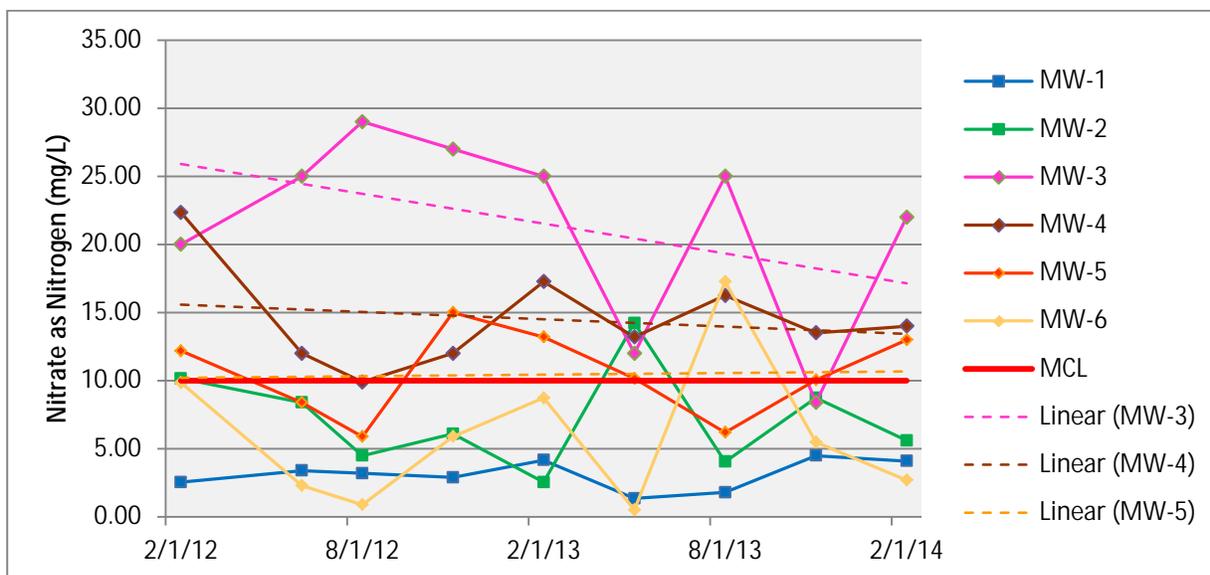
The highest EC results are from downgradient MW-5 with the average result (1,062 umhos/cm) exceeding the recommended MCL of 900 umhos/cm, but it is less than the upper Secondary MCL of 1,600 umhos/cm for EC. Review of effluent EC data indicates the EC results in MW-5 are likely the result of past EC concentrations in effluent. The average EC of the discharge in 2007 was 1,070 umhos/cm, while the average EC of the discharge in 2013 was 736 umhos/cm. The EC results in downgradient wells MW-3 through MW-5 appear to be the result of past discharges from the WWTF or an offsite source. The average EC results in MW-3 and MW-4 are less than the recommended Secondary MCL of 900 umhos/cm. With the exception of MW-2, all of the EC concentrations are generally stable without significant variation in concentration. The significant variation in MW-2 is likely due to the water deliveries in the TID canal to the north.



The average TDS results are similar to the EC results, but all of the TDS results in downgradient wells exceed the recommended Secondary MCL of 500 mg/L and are less than the upper Secondary MCL of 1,000 mg/L. MW-5 has the highest average TDS result, and

based on historical data, the results in the downgradient wells appears to be due to the past discharge to the evaporation/percolation ponds having higher TDS results than the current discharge.

Nitrate as nitrogen concentrations exceed the MCL in downgradient wells MW-3 and MW-4, and are equal to the MCL in MW-5. The highest concentrations are in MW-3 (average 23 mg/L), but overall, the concentrations are decreasing in MW-3, as shown on the graph below. Nitrate as nitrogen concentrations in groundwater decrease as one moves southeast with the average concentration in MW-4 being 15 mg/L, and nitrate as nitrogen results from MW-4 also exhibit an overall decreasing trend in concentration. Nitrate as nitrogen in MW-5 has typically been right at the MCL and now averages 10 mg/L.



Monitoring of nitrate as nitrogen, nitrite as nitrogen, total Kjeldahl nitrogen (TKN), ammonia, and total nitrogen is included in Monitoring and Reporting Program R5-2015-XXXX for both effluent and groundwater monitoring, and Provision G.6 requires the District to either treat the effluent to the total nitrogen limit of 10 mg/L or demonstrate that a higher value will be protective of the underlying groundwater.

Source Water

Source water is supplied by four groundwater supply wells and the data was presented in 2012 and 2013 Consumer Confidence Reports for the City of Delhi. Source water quality for 2012 and 2013 are summarized in the following table. The first number listed is the average concentration and the values within the parentheses underneath are the range of the reported results.

Supply Water Results

	Sodium <u>mg/L</u>	Chloride <u>mg/L</u>	Arsenic <u>ug/L</u>	Nitrate as Nitrogen <u>mg/L</u>	Electrical Conductivity <u>umhos/cm</u>	Total Dissolved Solids <u>mg/L</u>
2012	37 (29 – 42)	23 (11 – 27)	5.43 (2.6 – 6.9)	6.4 (1.4 – 10.4)	373 (290 – 420)	290 (190 – 360)
2013	35 (na)	24 (na)	4.2 (na)	6.4 (1.3 – 8.7)	430 (na)	290 (na)

Compliance History

The District has a long history of submitting self-monitoring reports and/or groundwater monitoring reports that are incomplete and/or late. The District did not submit quarterly groundwater monitoring reports in 2009 or the first two quarters of 2010. The District provided all of the reports in question upon request. The submittal of the SMRs and groundwater monitoring reports improved with generally no late reports through 2013. However, in 2014, no SMRs were received until 14 July 2014 (January through May 2014 SMRs were submitted late), and only one of three groundwater monitoring reports had been submitted as of December 2014.

Discharge Specification B.5 of WDRs Order 97-013 requires the effluent to meet the following limits for biochemical oxygen demand (BOD) and total suspended solids (TSS):

<u>Constituents</u>	<u>Units</u>	<u>Monthly Average</u>	<u>Daily Maximum</u>
BOD/TSS	mg/L	40	80

The District routinely exceeded the limits for BOD and TSS (BOD and TSS averaged 104 mg/L and 90 mg/L, respectively, in 2006 and 2007) until 2008 when the District began using coagulants. The District has since completed upgrades to the WWTF and the discharge has been compliant with the BOD and TSS limits, with no exceedances of the limits since July 2011.

The record indicates the WWTF has been inspected five times since June 1994 and three Notices of Violation (NOVs) were issued in 1999 (two) and another in 2007. The violations that led to the NOVs typically included:

- Violation of Discharge Specification B.5, exceeding the BOD and TSS effluent limits; and
- Violation of Provision E.1, failing to comply with Monitoring and Reporting Program 97-013 (late and/or incomplete SMRs).

Except as noted above, the discharge has, since January 2012, generally complied with the effluent limits in WDR Order 97-013, but the District still submits its SMRs late.

Basin Plan, Beneficial Uses, and Regulatory Considerations

The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition, revised October 2011* (Basin Plan) designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting waters of the Basin, and incorporates, by reference, plans and policies adopted by the State Water Board. The beneficial uses of the underlying groundwater are municipal and domestic supply, agricultural supply, industrial service supply and industrial process supply.

Antidegradation

State Water Board Resolution 68-16, the *Statement of Policy with Respect to Maintaining High Quality of Water in California* (Antidegradation Policy), requires the regional water boards to maintain high quality water of the State until it is demonstrated that any change in quality will not result in water quality less than that described in State and Regional Water Board policies or exceed water quality objectives, will not unreasonably affect beneficial uses and is consistent with the maximum benefit to the people of the State.

Degradation of groundwater by some of the typical waste constituents released with discharge from a municipal wastewater utility after effective source control, treatment, and control is consistent with maximum benefit to the people of the State. The technology, energy, and waste management advantages of municipal utility service far exceed any benefits derived from a community otherwise reliant on numerous concentrated individual wastewater systems, and the impacts on water quality will be substantially less. Economic prosperity of valley communities and associated industry is of maximum benefit to the people of the State, and therefore, sufficient reason to accommodate growth and groundwater degradation provided terms of the Basin Plan are met.

This Order establishes terms and conditions to ensure that the authorized discharge will not further degrade groundwater, or unreasonably affect present and anticipated future beneficial uses of groundwater. This Order is consistent with the Anti-Degradation Policy since: (a) the Discharger has implemented Best Practicable Treatment or Control to minimize degradation, (b) the degradation will not unreasonably affect present and anticipated beneficial uses of groundwater, or result in water quality less than water quality objectives, and (c) the limited degradation is of maximum benefit to the people of the State.

Title 27

Title 27, CCR, Section 20005 et seq. (Title 27) contains regulations to address certain discharges to land. Title 27 establishes a waste classification system, specifies siting and construction standards for full containment of classified waste, requires extensive monitoring of groundwater and the unsaturated zone for any indication of failure of containment, and specifies closure and post-closure maintenance requirements. Generally, no degradation of groundwater quality by any waste constituent in a classified waste is acceptable under Title 27 regulations.

The discharge of effluent and the operation of treatment or storage facilities associated with a sewage treatment and storage facility can be allowed without requiring compliance with

Title 27, provided any resulting degradation of groundwater is in accordance with the Basin Plan and the waste need not be managed as hazardous waste. The discharge appears to have polluted groundwater with nitrate as nitrogen, but the existing and proposed algal drying beds are/will be lined and equipped with leachate return systems that send the leachate back into the algal settling ponds of the WWTF.

CEQA

For the existing WWTF, the Discharger adopted a Negative Declaration in February 1996 in accordance with the California Environmental Quality Act (Public Resources Code Section 21000, et seq.). For the proposed improvements to the WWTF, the District adopted a Mitigated Negative Declaration (SCH #2014021035) in accordance with the California Environmental Quality Act (CEQA) on 11 June 2014. Central Valley Water Board staff reviewed the Mitigated Negative Declaration and concurred that the proposed project would be an improvement to the previous discharge.

Proposed Order Terms and Conditions

Discharge Prohibitions, Effluent Limitations, Discharge Specifications, and Provisions

The proposed Order would prohibit discharge to surface waters and water drainage courses.

The proposed Order would keep the monthly average daily discharge flow limit at 0.8 mgd, until the District complies with the requirements of Provision G.3, at which time the flow can be increased to 1.2 mgd.

The proposed Order would prescribe effluent limits for BOD and TSS of 40 mg/L (monthly average), and 80 mg/L (daily maximum).

The discharge requirements regarding dissolved oxygen and freeboard are consistent with Central Valley Water Board policy for the prevention of nuisance conditions, and are applied to all such facilities.

The proposed Order prescribes groundwater limitations that ensure the discharge does not affect present and anticipated beneficial uses of groundwater. The limitations require that the discharge not cause or contribute to exceedance of these objectives or natural background water quality, whichever is greatest.

Monitoring Requirements

Section 13267 of the CWC authorizes the Central Valley Water Board to require monitoring and technical reports as necessary to investigate the impact of a waste discharge on waters of the State. Water Code Section 13268 authorizes assessment of civil administrative liability where appropriate.

The proposed Order includes influent, effluent, groundwater, pond, source water, and solids and algal solids/biosolids monitoring. The monitoring is necessary to evaluate the extent of the potential degradation from the discharge.

Reopener

The conditions of discharge in the proposed Order were developed based on currently available technical information and applicable water quality laws, regulations, policies, and plans, and are intended to assure conformance with them. The proposed Order would set limitations based on the information provided thus far. If applicable laws and regulations change, or once new information is obtained that will change the overall discharge and its potential to impact groundwater, it may be appropriate to reopen the Order.