

INFORMATION SHEET

ORDER NO. R5-2009-_____
CITY OF BAKERSFIELD
WASTEWATER TREATMENT PLANT NO. 3
KERN COUNTY

The City of Bakersfield (Discharger) is expanding Wastewater Treatment Plant No. 3 (WWTP No. 3), which serves the western portion of the incorporated Bakersfield metropolitan area (City) west of Highway 99 in Kern County. WWTP No. 3 is regulated by Waste Discharge Requirements Order 5-01-105 (WDR), which authorizes the discharge to land of up to 16 mgd of undisinfectated secondary-treated effluent to four unlined effluent storage ponds and to nearby lands for recycling.

Background

When it opened in 1972, WWTP No. 3 was regulated by Waste Discharge Requirements (WDR) Order 72-92, which permitted a flow of 3.5 million gallons per day (mgd). Several WDRs have been issued since then, up to the current permitted flow of 16 mgd.

The existing wastewater treatment facility provides primary and secondary treatment of incoming wastewater, consisting of two bar screens, a wet well, two aerated grit chambers, four primary clarifiers, four trickling filter units, four secondary clarifiers, four effluent storage ponds (total capacity of about 1,000 acre-feet), six anaerobic digesters, an equalization lagoon, and about 20 acres of unlined sludge drying beds. Chemical addition of ferric chloride and polymers is conducted to enhance the primary settling process and increase the plant efficiency.

The Discharger is in the process of expanding/upgrading WWTP No. 3 and the project is anticipated to be completed by April 2010. Upon completion of the expansion project, WWTP No. 3 will have a Daily Dry Weather Average Flow of up to 32 mgd and a Peak Hourly Flow of 64 mgd.

Solids/Biosolids Disposal

Solids removed by the bar screens and materials collected from the grit chamber are disposed of at a sanitary landfill.

Sludge is pumped from the primary and secondary clarifiers and treated by anaerobic digestion prior to being transferred to onsite drying beds. The digested sludge is discharged to the drying beds for drying for at least 90 days. The drying beds have decant facilities, but no underdrains and they are unlined. After drying, the biosolids are stockpiled within the drying beds until removal for land application. The dried biosolids are transferred and applied to the City's WWTP No. 2 reclamation area, where they are used as soil amendment and fertilizer for non-human consumption crops. The existing 20 acres of sludge drying beds will be removed during the expansion and not replaced. After expansion, the Discharger will mechanically dewater the sludge and it will be transported to the biosolids reclamation area adjacent WWTP No. 2.

The Discharger's *Final Biosolids Management Plan* dated 26 September 1997 describes its management plan for biosolids applied to the reclamation area. The Discharger conducts

quarterly sampling of the biosolids and monitors the cumulative loading of metals in the biosolids applied pursuant to 40 CFR Part 503.

The Discharger prepares Annual Land Management reports that document the amount of and to what fields biosolids were applied. According to data presented in the 2007 Annual Land Management report, the Discharger applied 3,832 dry US tons of biosolids generated from both WWTP No. 2 and WWTP No. 3 in 2007. The reclamation area farmland is currently leased to the Progressive Associates Group to farm the acreage until 2015.

Groundwater Conditions

Historically, groundwater monitoring indicated that the discharge had caused exceedances of some groundwater limitations, particularly constituents of salinity (e.g., EC, chloride, and sodium) and nitrate. Much of this was from the discharge of yeast processing waste that has since been discontinued. Effluent was blended with industrial waste from the yeast plant from the early 1970s until 1984. Order 83-016 was issued to the yeast plant in 1983. From 1985 through 2002, yeast processing waste was discharged to 400 acres of City-owned land south of the facility. A salinity reduction plan was submitted in October 2001 and the discharge of the high strength waste ceased completely in 2002. The investigation and cleanup of impacts from the previous discharges, that also involve other parties, will be addressed by a separate Cleanup and Abatement Order.

Two groundwater zones exist beneath WWTP No. 3: a discontinuous perched zone and an unconfined aquifer. Historically, depths to perched groundwater have ranged from about 11 to 38 feet bgs.

The existing monitoring well network for the unconfined aquifer is comprised of nine groundwater-monitoring wells designated MW-1 through MW-9 (Attachment A). Depth to unconfined groundwater in 2007 and 2008 ranged from about 126 to 149 feet bgs. The direction of groundwater flow is somewhat variable due to mounding under the effluent storage ponds. Regional flow is to the east/southeast.

Based on the regional direction of flow, MW-9 appears to be directly upgradient of WWTP No. 3, while MW-1 appears to be cross-gradient. MW-4 is on the upgradient edge, but is likely affected by the WWTP due to mounding around the storage ponds. MW-2 and MW-3 are directly adjacent to and south of WWTP No. 3. MW-6 is adjacent to and south of the storage ponds. MW-8 is about a third of a mile south of MW-6 in the 400-acre area used previously for the disposal of municipal and industrial (yeast plant) wastewater. MW-5 and MW-7 monitor the southern extent of the WWTP No. 3 property and are about two thirds of a mile south of the treatment plant and storage ponds.

The following table summarizes averages of selected constituents from the monitoring wells since November 2002 (except MW-9, which was installed in 2005).

SODIUM (mg/L)							
	2002	2003	2004	2005	2006	2007	2008
Well	<u>Background Wells</u>						
MW-1	40	49	46	44	45	48	46
MW-4	40	48	48	52	56	58	59
MW-9	---	---	---	48	50	53	56
	<u>Downgradient Wells</u>						
MW-2	66	69	71	76	77	76	76
MW-3	72	74	78	84	76	75	80
MW-5	169	158	178	193	158	130	120
MW-6	85	83	87	108	101	95	---
MW-7	65	45	44	83	86	67	71
MW-8	142	133	105	96	88	85	---

CHLORIDE (mg/L)							
	2002	2003	2004	2005	2006	2007	2008
Well	<u>Background Wells</u>						
MW-1	30	30	39	52	64	68	65
MW-4	53	60	66	63	66	68	73
MW-9	---	---	---	31	43	46	49
	<u>Downgradient Wells</u>						
MW-2	74	81	79	76	76	76	77
MW-3	72	70	78	75	74	72	75
MW-5	266	258	302	275	210	155	155
MW-6	71	78	84	82	80	75	---
MW-7	196	98	101	177	170	113	118
MW-8	209	175	120	103	83	86	---

ELECTRICAL CONDUCTIVITY (umhos/cm)							
	2002	2003	2004	2005	2006	2007	2008
Well	<u>Background Wells</u>						
MW-1	689	700	731	810	880	858	867
MW-4	667	770	684	738	795	805	841
MW-9	---	---	---	639	703	698	732
	<u>Downgradient Wells</u>						
MW-2	895	943	777	843	848	833	857
MW-3	747	738	622	739	753	748	766
MW-5	2060	2000	2177	2028	1675	1325	1288
MW-6	823	765	681	907	930	855	---
MW-7	1410	813	621	1265	1275	883	974
MW-8	1580	1450	1127	899	825	808	---

Initially, MW-1 and MW-4 were intended to serve as upgradient monitoring wells, but increasing nitrate concentrations (possibly from upgradient turf farms) in those two wells led to the installation of MW-9 in 2005. Background water quality is currently represented by samples collected from MW-9. Comparing results from MW-9, effluent concentrations indicate the discharge will degrade groundwater quality beneath WWTP No. 3. Background

groundwater quality in MW-9 is about 700 umhos/cm, while effluent averages about 800 umhos/cm.

Inorganic concentrations in MW-5 are elevated when compared to the results for background well MW-9. Previous studies have determined that the cause was the discharge of effluent blended with industrial waste from a yeast plant, which occurred from the early 1970s until 1984. In 1985, the industrial user was issued separate WDRs and from 1985 through 2002, discharged industrial waste to 400 acres of City-owned land south and directly adjacent WWTP No. 3. These practices resulted in an impact to both soil and groundwater that is still observed in downgradient wells MW-5 and MW-7.

Groundwater monitoring shows EC levels in MW-5 as high as 2,500 micromhos per centimeter (umhos/cm), but which have since decreased to 1,200 umhos/cm. The decrease is likely the result of the improved effluent quality since 2002 and the elimination of the industrial discharge. MW-3 is downgradient and directly adjacent the southeast corner of the existing storage ponds and has had EC as high as 1,000 umhos/cm. However, current EC values in MW-3 are about 780 umhos/cm. The quality of water in MW-3 appears to best represent current conditions downgradient of WWTP No. 3 and the effluent storage ponds.

Inorganic concentrations in MW-7, while not as high as those in MW-5, are elevated when compared to background concentrations. Inorganic concentrations in MW-8 are currently similar to background concentrations reported for MW-9. However, when monitoring began in 2002 and 2003, inorganic concentrations in MW-8 were similar to those in MW-5. Concentrations in MW-8 are currently similar to ambient concentrations reported for MW-3.

Compliance History

Out of twenty four monitoring events between January 2007 and December 2008, the Discharger exceeded the following:

- Monthly average BOD limit of 40 mg/L twenty two times
- Monthly average CBOD limit of 35 mg/L nine times
- Monthly average TSS limit of 40 mg/L four times
- Calculated limit for EC (500 umhos/cm plus the EC of the source water) once
- Flow limit of 16 mgd twelve times

It is anticipated that the expansion of WWTP No. 3 will bring the effluent back into compliance with the effluent limits. The Discharger has indicated that the new activated sludge system and the upgraded secondary clarifiers will be online shortly, and an improvement in effluent quality is expected once the new units are online.

The Discharger typically submits complete monitoring reports in a timely manner. There were no late or incomplete reports submitted in 2007 or 2008.

The WWTP has been inspected four times since February 2000 and three Notices of Violation (NOV) were issued. A February 2000 inspection found improper disposal of solid waste. A follow up inspection in November 2000 found the improper disposal had ceased and that no

further action was warranted. An April 2004 NOV was prepared in response to a sewage overflow that occurred in November 2003. A 17 July 2008 NOV was issued for exceeding the CBOD, TSS, and flow limits. That NOV concluded the violations would be addressed by the expansion of WWTP No. 3 and no further action was requested.

Basin Plan, Beneficial Uses, and Regulatory Considerations

The Basin Plan indicates the greatest long-term problem facing the entire Tulare Lake Basin is increasing salinity in groundwater, a process accelerated by man's activities and particularly affected by intensive irrigated agriculture. The Basin Plan recognizes that degradation is unavoidable until there is a long-term solution to the salt imbalance. The Regional Water Board encourages proactive management of waste streams by dischargers to control addition of salt through use, and has established an incremental EC limitation of 500 $\mu\text{mhos/cm}$ as a measure of the maximum permissible addition of salt constituents through use.

Discharges to areas that may recharge good quality groundwaters shall not exceed an EC of 1,000 $\mu\text{mhos/cm}$, a chloride content of 175 mg/L, or boron content of 1.0 mg/L.

Antidegradation

State Water resources Control Board Resolution 68-16 requires the Regional Water Boards to maintain high quality waters of the State until it is demonstrated that any change in quality will be consistent with the maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in State and Regional Water Board policies (e.g., quality that exceeds water quality objectives).

The current WDRs considered Resolution 68-16 and found that some degradation by typical waste constituents was in the best interest of the people of the State. The WDRs also included groundwater limitations in an effort to ensure the discharge did not result in water quality less than prescribed in the Basin Plan.

The groundwater limitations specified in WDRs Order 5-01-105 are the following, or background quality if, due to natural causes, background is greater:

Previous Groundwater Limitations

<u>Constituent</u>	<u>GW Limitation (mg/L, except EC and THMs)</u>
Boron	0.7
Chloride	106
Iron	0.3
Manganese	0.05
Sodium	69
EC ($\mu\text{mhos/cm}$)	900
Total Coliform	ND
TDS	500
Total N	10

<u>Constituent</u>	<u>GW Limitation (mg/L, except EC and THMs)</u>
Nitrite	1
Nitrate	10
Ammonia	0.5
THMs (ug/L)	100

Recent values in MW-3, which is directly downgradient of the treatment facility and appears to best represent current conditions, indicate that, with the exception of sodium, the current discharge is resulting in groundwater beneath the facility meeting the existing groundwater limitations.

For sodium, the current WDRs set the groundwater limitation at 69 mg/L, which is based on protection of sprinkler-irrigated, salt-sensitive crops. However, review of various reports (USDA, *Soil Survey of Kern County: Northwestern Part*; Ayers and Westcott, *Water Quality for Agriculture*; Asano, *Wastewater Reclamation and Reuse*) and land use maps showing crops grown in the region, indicates soils in the area are not conducive to growing salt-sensitive crops and that salt sensitive crops are not grown in the area around the facility.

The predominant soil in the vicinity of the treatment facility is the Cajon sandy loam, which is described as a Class IIIs-4 soil. Class III soils are soils with severe limitations that reduce the choice of plants or require special conservation practices. The 's' designates the soil as shallow, droughty, or stony, and the '4' indicates it has a low water capacity in sandy areas. The Cajon sandy loam is reportedly suitable for growing crops such as alfalfa, cotton, and sugar beets.

The area also contains the Kimberlina fine sandy loam, which is described as a Class IIs-6 soil and is saline/alkaline. Class II soils have moderate limitations and are reportedly suitable for salt tolerant crops such as cotton, alfalfa, and barley.

Ayers and Westcott indicate sodium concentrations up to 70 mg/L have no restrictions for salt-sensitive crops and concentrations from 70 to 210 mg/L have only slight to moderate restrictions. Asano provides numerical guidelines for irrigation of salt-sensitive crops and reports that sodium concentrations less than 100 mg/L have slight to no restrictions for irrigation of salt-sensitive crops.

Based on the information above, a numerical sodium limit is not necessary because sodium concentrations in groundwater will not restrict its use for agricultural or drinking water and accordingly will not unreasonably affect present and anticipated beneficial uses or result in groundwater quality exceeding water quality objectives.

The Order establishes new groundwater limits for WWTP No. 3 that are performance based and will not unreasonably threaten present and anticipated beneficial uses or result in groundwater quality that exceeds water quality objectives set forth in the Basin Plan. The

Order contains requirements for a groundwater assessment for assuring that the highest water quality consistent with the maximum benefit to the people of the State will be achieved.

Generally, although the Discharger is proposing an increase in flow, the quality of effluent will improve after the WWTP expansion. Therefore, degradation of groundwater should actually be less than authorized under the current WDRs and the future discharge will have less impact on water quality than the previously permitted discharge. Expansion of the WWTP will reduce nitrate as nitrogen concentrations in the effluent to less than the Primary MCL of 10 mg/L. The EC of the discharge will be less than the lowest recommended Secondary MCL of 900 $\mu\text{mhos/cm}$. Although greater than the groundwater limit in the previous WDRs, sodium concentrations average about 80 mg/L, which does not restrict usage for the area's agriculture or as a drinking water source. Overall, degradation of groundwater should actually be less than authorized under the current WDRs.

The proposed WDRs do not include specific limits for all of the constituents in the current WDRs since:

- a. Most of the constituents have MCLs, which are specified by the Basin Plan and included under [Groundwater Limitations, G.1.a](#) of Order R5-2009-____;
- b. Some of the limits were duplicative (e.g., EC and TDS);
- c. [Groundwater Limitation G.1.b](#) will provide a mechanism to ensure that constituents without an MCL do not threaten to unreasonably degrade groundwater; and
- d. To prevent too many false positive violations, the list of regulatory limits should be limited to the best indicators of a groundwater problem that would be caused by the discharge.

However, groundwater will continue to be monitored for all the constituents for which limits are being dropped.

In summary, the future discharge will have less impact on water quality than the previously permitted discharge. Expansion of the WWTP will reduce nitrate as nitrogen concentrations in the effluent to less than the Primary MCL of 10 mg/L. The EC of the discharge will be less than the lowest recommended Secondary MCL of 900 $\mu\text{mhos/cm}$. Although greater than the groundwater limit in the previous WDRs, sodium concentrations average about 80 mg/L, which does not restrict usage for the area's agriculture or as a drinking water source. Additionally, the Order contains requirements for a groundwater assessment for assuring that the highest water quality consistent with the maximum benefit to the people of the State will be achieved.

This Order establishes new groundwater limits for WWTP No. 3 that are performance based and will not unreasonably threaten present and anticipated beneficial uses or result in groundwater quality that exceeds water quality objectives set forth in the Basin Plan

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.

Title 27 Section 20090(a) exempts discharges of domestic sewage to land from Title 27 containment standards provided the Regional Water Board has issued waste discharge requirements or waived such issuance; the discharge is in compliance with the Basin Plan; and the waste need not be managed according to Title 22, CCR, Division 4.5, Chapter 11, as a hazardous waste.

Discharges of domestic sewage and effluent can be treated and controlled to a degree that will not result in unreasonable degradation of groundwater. For this reason, the Discharger has been conditionally exempted from Title 27. Treatment and storage facilities for sludge that are part of the WWTF are considered exempt from Title 27 under section 20090(a), provided that the facilities not result in a violation of any water quality objective. However, residual sludge (for the purposes of the proposed Order, sludge that will not be subjected to further treatment by the WWTF) is not exempt from Title 27. Solid waste (e.g., grit and screenings) that results from treatment of domestic sewage and industrial waste also is not exempt from Title 27. This residual sludge and solid waste are subject to the provisions of Title 27.

Accordingly, the municipal discharge of effluent and the operation of treatment or storage facilities associated with a municipal wastewater treatment plant can be allowed without requiring compliance with Title 27, but only if the resulting degradation of groundwater is in accordance with the Basin Plan.

CEQA

The Discharger prepared an Initial Study/Environmental Checklist for the proposed expansion to 32 mgd in March 2006 that concluded an EIR was required. The Discharger prepared and circulated a draft EIR in October 2006 and certified it on 10 January 2007.

The EIR identified significant and potentially significant threats to hydrology and water quality, and included mitigation measures to alleviate the anticipated threats. Staff has reviewed the EIR and concurs with the findings and mitigation measures therein.

Proposed Order Terms and Conditions

Discharge Prohibitions, Effluent Limitations, Discharge Specifications, and Provisions

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

The proposed Order would keep the flow limit to 16 mgd until the expansion activities are complete and the Discharger is compliant with the effluent limits.

The proposed Order would carry over the previous Order's effluent limits for CBOD of 35 mg/L (monthly average), and 70 mg/L (daily maximum) and for BOD and TSS of 40 mg/L (monthly average), and 80 mg/L (daily maximum) until 1 September 2009. After 1 September 2009, the effluent limits will include BOD and TSS limits of 40 mg/L (monthly average), and 80 mg/L (daily maximum). These limitations are based on Basin Plan minimum performance standards for municipal facilities.

The proposed Order includes an effluent limit for total nitrogen of 10 mg/L. The Discharger has requested that only effluent discharged to the storage ponds at the WWTF be subject to the 10 mg/L effluent limitation, and that effluent used for irrigation purposes at the I-5 Reclamation site and for landscaping purposes be allowed at a higher concentration. The Discharger reports that this will allow for considerable energy savings and will limit the amount of fertilizer applied to support the crops grown. Effluent Limit B. 5 sets a total nitrogen limit of 10 mg/L, but Provision H.12 allows for higher total nitrogen concentrations to irrigated areas, provided the Discharger demonstrates that total nitrogen concentrations greater than 10 mg/L will not contribute to the degradation of the underlying groundwater at the reclamation area.

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

The proposed WDRs would prescribe groundwater limitations that implement water quality objectives for groundwater from the Basin Plan. 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 Regional Water Board to require monitoring and technical reports as necessary to investigate the impact of a waste discharge on waters of the State. In recent years there has been an increased emphasis on obtaining all necessary information, assuring the information is timely as well as representative and accurate, and thereby improving accountability of any discharger for meeting the conditions of discharge. Section 13268 of the CWC authorizes assessment of civil administrative liability where appropriate.

The proposed Order includes influent, effluent, perched groundwater, unconfined groundwater, pond, and water supply 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.

JSP/DKP 6/9/09