INFORMATION SHEET

ORDER NO. R5-2008-XXXX
THERMALITO IRRIGATION DISTRICT
WATER TREATMENT PLANT
BUTTE COUNTY

Background

The Thermalito Irrigation District (hereafter Discharger) operates a potable water treatment plant (WTP) in Oroville, at 535 Table Mountain Boulevard, in Butte County. The WTP is located in Section 6, T19N, R4E, MDB&M. The WTP is located on a 3.8-acre site, on the north side of the Thermalito Power Canal, approximately a quarter mile east of State Route Highway 70. The Discharger submitted a report of waste discharge (RWD) on 19 June 2006 to expand the WTP capacity from 6 million gallons per day (MGD) to 10 MGD. On 14 November 2007, a supplemental RWD was submitted. The WTP was originally constructed in 1973 with a capacity of 3 MGD and was expanded to a capacity of 6 MGD in 1995. A 4 MGD microfiltration (MF) plant is currently under construction, with startup scheduled for 2008. The WTP has never had Waste Discharge Requirements. The WTP serves 2,811 connections, approximately 1/3 of which are in Oroville and 2/3 in unincorporated areas of Butte County.

The water source for the WTP is the Thermalito Power Canal. The Discharger has a water right to 7,200 acre-feet of water from Concow Reservoir. This water is diverted through Concow Creek to Lake Oroville and ultimately to the Thermalito Power Canal. The Discharger also has four supply wells to augment drinking water supply. Average annual rainfall for the Oroville area from 1953 to 2007 was 28.67 inches. The annual average pan evaporation rate for Chico is 67.63 inches.

The land immediately adjacent to the WTP is either vacant or is used for cattle grazing. The Department of Water Resources owns the vacant land south of the WTP, from the WTP property to the Thermalito Power Canal. Groundwater in the vicinity of the plant is unknown. A geotechnical investigation occurred in September 2005. Exploratory trenches were excavated to a depth of eight and a half feet and no groundwater was encountered. Soils described in the geotechnical report showed sandy clays, slightly cemented sandy gravel, and clayey gravels.

A domestic well is located on site; it is tested daily for residual chlorine, quarterly for bacteria, and annually for general minerals and nitrates.

Current Treatment Plant

The existing WTP consists of: raw water pump station, 6 MGD pressure filter system, treatment building, hypochlorite tanks, one million gallon clearwell, and two unlined settling ponds. When the pressure filter system is operated, aluminum sulfate (alum) is dosed between 8 and 17 parts per million (ppm) and a non-ionic polymer filter aid is dosed below 0.06 ppm. The alum is positively charged, which attracts the negatively charged contaminants in the untreated water. Combined alum-contaminant particles grow in size and form floc. The polymer helps the filter media in holding the floc within the confines of the filter media. Two banks of three pressure filters each are currently in operation. Each bank has a capacity of

3 MGD. Each filter is 8 feet in diameter and 30 feet long. The water is then sent through the pressure filters to remove the floc, polymer, alum, and contaminants. The filter media is comprised of coal anthracite, sand, gravel, and rocks. During the rainy season, the pressure filters are periodically turned off when raw water turbidities are too high for the pressure filters to operate. The turbidity episodes usually last up to 48 hours, during which time the WTP utilizes four supply wells to meet water demand. Once the water is filtered, it is disinfected with sodium hypochlorite and transferred to a one million gallon clearwell. From the clearwell, the water is pumped directly to the distribution system or to the 2.5 million gallon storage tank located a quarter mile due north of the WTP. Residual chlorine is monitored continuously at the distribution line from the clearwell; the residual chlorine level is maintained at 0.8 mg/L. The filter media is backwashed when a predetermined pressure differential is reached. Approximately 170,000 gallons per day of backwash wastewater is produced when the pressure filters are run at full capacity. The backwash wastewater is discharged to two unlined settling ponds. The supernatant from the first pond is transferred to the second unlined pond for additional settling. The water from second pond is recycled back into the raw water intake.

WTP Expansion Project

The expansion will consist of installing a 4 MGD microfiltration (MF) plant; the plant can deliver up to 4.5 to 4.8 MGD for sustained periods of time. After the MF plant is operational, one of the two banks of pressure filters will be maintained in standby mode and the other bank of pressure filters will be for emergency use only. When customer demand exceeds the MF plant treatment capacity, but is less than 6 MGD, the Discharger will utilize their supply wells to meet demand. One bank of three pressure filters will only be used when demand exceeds 6 MGD. The MF system will produce filtered water without the use of coagulants or other filter aid material because the MF membranes are a permanent barrier for particles and other solids in water. The recovery rate of the MF plant is expected to be a minimum of 97% during peak raw water turbidity conditions. At a flow rate of 4.8 MGD, the backwash wastewater generated will be approximately 144,000 gpd. At normal raw water turbidities (less than 2 NTU), the recovery rate is expected to be 98%, which equates to approximately 96,000 gpd backwash wastewater. Approximately 1 mg/L of chlorine will be present in the backwash wastewater. The MF racks will backwash about every 30 minutes.

The membranes in the MF plant will require a chemical cleaning (CIP) approximately every one and a half to two months. Each CIP requires the use of 2,000 gallons of blended caustic and sodium hypochlorite and 2,000 gallons of citric acid solutions (both less than 2% in strength). After the CIP, the solutions will be neutralized in the neutralization tank. Sodium bisulfite will be used to neutralize the chlorine in the sodium hypochlorite. Citric acid will be added as needed to neutralize the caustic. The neutralization process will produce sodium citrate, sodium hydrosulfate, and water. The sodium citrate and sodium hydrosulfate concentrations in the return flow from the backwash ponds to the WTP would be 0.07 mg/L and 0.0007 mg/L, respectively. After neutralization, the 4,000 gallons of CIP waste will be discharged to the backwash ponds over a period of at least 30 days. The waste will only be discharged when the membranes are being backwashed to optimize dilution in the ponds. To

ensure complete neutralization of the chlorine, the Discharger will be required to monitor residual chlorine levels in the backwash ponds.

Wastewater Storage and Disposal

Backwash wastewater is discharged to two unlined evaporation/settling ponds. The ponds have a cumulative capacity of 353,000 gallons (allowing for two feet of freeboard, one foot of solids accumulation, and a maximum daily rainfall of 5.06 inches). The net available volume of the north pond is 190,000 gallons and 163,000 gallons for the south pond. The dimensions of the north pond are 238 feet long by 32 feet wide (bottom) by 6.7 feet deep. The dimensions of the south pond are 290 feet long by 16 feet wide (bottom) by 7 feet deep. The ponds are constructed in clayey soil and therefore do not percolate rapidly. The accumulation of fine particulate matter from the treatment process on the pond bottoms also retards percolation.

The backwash wastewater is allowed to settle for approximately 12 hours before it is recycled back into the raw water intake of the WTP. 100% of the backwash wastewater produced in 24 hours is recycled within 24 hours. The recycle rate of flow is limited to a maximum of 10% of the raw water flow, to comply with drinking water regulations. At 4.8 MGD, the maximum allowable recycle volume is 480,000 gallons, more that twice the maximum amount to be discharged to the ponds from the MF plant (144,000 gpd). One bank of pressure filters generates 85,000 gpd of backwash wastewater. If both the MF plant and one bank of pressure filters are run at a full capacity of 7.8 MGD, approximately 229,000 gpd of backwash wastewater will be generated, which is significantly less than the allowable 10% recycle rate flow of 780,000 gallons.

The RWD included a ‘one-day’ water balance because all the backwash wastewater generated in one day is recycled in one day. The maximum amount of backwash wastewater that will be generated in a day is 229,000 gallons, if both the MF plant and one bank of pressure filters are operated. The total storage capacity of the settling/evaporation ponds is 353,000 gallons (allowing for two feet of freeboard, one foot of solids accumulation, and a maximum daily rainfall of 5.06 inches). Therefore the settling/evaporation ponds are adequately sized for the WTP. The WDR contains a provision that requires the Discharger to develop a *Contingency Plan* for the ponds in the event that the wastewater encroaches within two foot of freeboard.

Sludge Removal and Disposal

Sludge is removed from the ponds every 12 to 18 months. One pond is taken out of service and is drained and dried. The dried sludge is removed from the pond in late spring and disposed of at a landfill. If water demand and backwash wastewater exceeds the storage capacity of the pond in use, water demand is supplemented by the Discharger’s supply wells.

On 1 December 2005, the backwash pond sludge and virgin soil were analyzed for aluminum. The results show that the aluminum concentration is much higher in the sludge (98,700 ug/kg) than in the virgin soil (17,400 ug/kg). Once the MF system is operational and the use of the

pressure filter system decreases or is eliminated, it is expected that aluminum levels in the sludge will significantly decrease.

The Discharger also sampled the sludge for Title 22 metals on 26 October 2006; the results showed that the concentrations of metals in the sludge is significantly lower than hazardous waste levels. The Monitoring and Reporting Program requires the Discharger to sample the sludge for Title 22 metals and aluminum when a discrete amount of sludge is removed from the ponds.

Basin Plan, Beneficial uses, and Regulatory Considerations

Surface water drainage is to the Thermalito Power Canal, a tributary to the Feather River. The *Water Quality Control Plan for the California Regional Water Quality Control Board Central Valley Region, Fourth Edition* (Basin Plan), designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for all waters of the Basin. Beneficial uses often determine the water quality objectives that apply to a water body. For example, waters designated as municipal and domestic supply must meet the maximum contaminant levels (MCLs) for drinking waters. The Basin Plan sets forth the applicable beneficial uses (industrial, agricultural, and domestic supply in this instance) of groundwater, procedure for application of water quality objectives, and the process for and factors to consider in allocating waste assimilation capacity.

Antidegradation

The antidegradation directives of Section 13000 of the California Water Code (CWC) require that waters of the State that are better in quality than established water quality objectives be maintained "consistent with the maximum benefit to the people of the State." Waters can be of high quality for some constituents or beneficial uses and not others. Policies and procedures for complying with this directive are set forth in the Basin Plan (including by reference State Water Board Resolution No. 68-16, "Statement of Policy With Respect to Maintaining High Quality Waters in California," or "Antidegradation" Policy).

Resolution 68-16 is applied on a case-by-case, constituent-by-constituent basis in determining whether a certain degree of degradation can be justified. It is incumbent upon the Discharger to provide technical information for the Regional Water Board to evaluate that fully characterizes:

- All waste constituents to be discharged;
- The background quality of the uppermost layer of the uppermost aquifer;
- The background quality of other waters that may be affected;
- The underlying hydrogeologic conditions;
- Waste treatment and control measures;
- How treatment and control measures are justified as best practicable treatment and control;
- The extent the discharge will impact the quality of each aquifer; and
- The expected degree of degradation.

In allowing a discharge, the Regional Water Board must comply with CWC Section 13263 in setting appropriate conditions. The Regional Water Board is required, relative to the groundwater that may be affected by the discharge, to implement the Basin Plan and consider the beneficial uses to be protected along with the water quality objectives essential for that purpose. The Regional Water Board need not authorize the full utilization of the waste assimilation of the groundwater (CWC 13263(b)) and must consider other waste discharges and factors that affect that capacity.

Some degradation of the groundwater for certain constituents is consistent with maximum benefit to the people of California because the technology, energy, and waste management advantages of municipal water treatment plants far outweigh the environmental impact of a community that would otherwise be reliant on numerous domestic wells. Economic prosperity of local communities is of maximum benefit to the people of California, and therefore sufficient reason to accommodate this wastewater discharge provided terms of reasonable degradation are defined and met.

Trihalomethanes (a by-product of chlorination of the filtered water) is a constituent that could potentially affect water quality. Trihalomethanes are volatile and most will be lost to the atmosphere during backwash and settling; in addition, trihalomethanes will be monitored in the backwash wastewater. Groundwater monitoring would not be relevant at the WTP, as there is little recharge to groundwater due to the low-permeability of the ponds and the complete recycling of wastewater. Based on the good chemical character of the raw water treated at the WTP, the installation of a MF plant (which uses no coagulant or polymers), the use of two settling ponds with low permeability, and complete recycling of the backwash wastewater generated in one day within one day, the discharge poses little threat to groundwater quality.

On 18 April 2006, a Mitigated Negative Declaration (MND) was adopted by the Discharger and a Notice of Determination was recorded with Butte County for the expansion of the WTP shortly thereafter. The Regional Water Board has considered the MND prepared for the facility. Compliance with the requirements of this Order will mitigate or avoid environmental effects to water quality.

Proposed Order Terms and Conditions

The proposed Order establishes a dry monthly average backwash wastewater discharge flow limit of 170,000 gpd for the current pressure filtration system. The Order also establishes a dry monthly average backwash wastewater discharge flow limit of 229,000 gpd for the WTP once the MF plant is operational.

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. The Regional Water Board and staff, in recent years, have been increasing their efforts on obtaining all necessary information to implement State Water Board and Regional Water Board policies, and assuring that discharge and receiving water information is timely as well as

representative and accurate, 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, e.g. in the case of a Discharger's failure to submit required monitoring or technical reports.

The proposed Order requires the Discharger to conduct monitoring of: backwash wastewater, settling/evaporation ponds, and the sludge removed from the ponds.

JMM 2/19/08