

INFORMATION SHEET

ORDER NO. R5-2009-_____
STARWOOD-MIDWAY POWER PLANT
FRESNO COUNTY

Starwood Power-Midway, LLC, (Starwood) submitted a Report of Waste Discharge, dated 6 May 2008, to obtain Waste Discharge Requirements (WDRs) for the discharge of industrial process wastewater to land. Starwood proposes the discharge of wastewater to an unlined surface impoundment at a 120 megawatt natural gas-fired peaking-power electrical generation plant, the Starwood-Midway Power Plant (Facility).

The 5.57-acre Facility is in Section 5, T15S, R13E, MDB&M, and is 12 miles southwest of the City of Mendota in western Fresno County. Starwood, owner and operator of the Facility, has a signed lease agreement with the property owner, PAO Investments, LLC. Both Starwood and PAO Investments are jointly referred to as the Discharger.

Source Water

The source water for the Facility is reclaimed agricultural backwash water from Baker Farming Company, LLC (Baker Farms). The backwash water is conveyed to the Facility by an underground pipeline from a 30 acre-foot collection basin about 1.5 miles southeast of the Facility.

Baker Farms irrigates about 7,000 acres using 24,000 acre-feet of water annually from the California Aqueduct. About 160 acre-feet of backwash water is produced annually from the irrigation water. Baker Farms and Starwood have a 7-year contract for Baker Farms to provide backwash water to Starwood.

The Facility will require about 10.2 acre-feet of backwash water annually for 400 hours and 102 acre-feet annually for 4,000 hours of electric generation.

Water Treatment

The Facility water treatment system consists of a sand filter, a reverse osmosis (RO) treatment unit, a demineralizer unit, a RO water storage tank, and two demineralized water storage tanks.

Wastewater

The wastewater is reject water from the RO treatment system, backwash/rinse water from the maintenance of the RO multimedia filter and demineralizer unit, and drainage/overflow water from the RO/demineralized water storage tanks. The RO system supplier estimates an annual RO reject wastewater volume of 4.38 acre-feet for 400 hours and 43.8 acre-feet for 4,000 hours of electric generation. The RO system supplier predicted the concentration of selected chemical constituents in the RO reject wastewater based on the quality of the backwash water and treatment using the proposed RO membrane. The predicted concentrations are in Table I.

Surface Impoundment Design

Wastewater is conveyed via pipes from a Facility water treatment system to the surface impoundment for disposal by evaporation and percolation. The impoundment is designed to hold four feet of wastewater (about 1.8 acre-feet) with two feet of freeboard.

Groundwater

The Corcoran Clay divides the groundwater system into an upper semi-confined zone and a lower confined zone. The Corcoran Clay is at a depth of about 660 to 785 feet beneath ground surface (bgs) in a monitoring well boring at the nearby Panoche Energy Center.

There are seven offsite groundwater wells within ½ mile of the Facility. Five of these wells monitor groundwater with two wells monitoring the upper semi-confined zone and three wells monitoring the lower confined zone. An industrial supply well extracts groundwater from the upper semi-confined zone. An inoperable irrigation well is completed in the lower confined zone. Irrigation wells within 2 miles of the Facility are completed in the lower confined zone.

Starwood has installed three groundwater monitoring wells at the Facility to monitor the upper zone at the water table. The upgradient well, MW-1, is about 330 feet southwest, and the downgradient wells, MW-2 and MW-3, are 10 to 15 feet east of the impoundment. Since March 2008, Starwood has collected five groundwater samples from the wells.

Analytical Results

The range of analytical results for selected constituents in the groundwater, source water, and predicted RO reject wastewater, and numerical water quality objectives, in milligrams per liter, except where noted, are shown in Table I below:

Table I
Source Water, Predicted RO Reject Wastewater, and Baseline Groundwater Analytical Results with Municipal and Agricultural Water Quality Objectives

Constituent	Source Water	Predicted RO Reject Wastewater	Baseline Groundwater (Range of samples)	Water Quality Objectives	
				Municipal	Agricultural ¹
Arsenic	0.0023	0.0076	0.039 – 0.063	0.010 ²	<0.05 – 12
Barium	0.035	0.120	0.011 – 0.022	1 ²	-
Bicarbonate ³	84	271	73 – 85	-	-
Boron	0.27	0.38	3.0 – 3.2	-	<0.5 – 15
Calcium	36	119	580 – 640	-	-
Carbonate ³	<1	2.3	<1	-	-
Chloride	69	306	880 – 1,100	250 – 600 ⁴	<106 – >355
Electrical Conductivity ⁵	500	1,650	5,800 – 7,000	900 – 2,200 ⁴	<700 – >3,000
Fluoride	0.12	0.39	<0.1– 0.32	2.0 ²	1
Iron	0.064	0.21	<0.05	0.3 ⁴	5
Magnesium	15	50	390 – 420	-	-
Nitrate (as NO ₃)	15	43	1,000 – 1,100	45 ²	-
Potassium	4	11	11 – 13	-	-
Selenium	0.0037	0.012	0.88 – 1.4	0.05 ²	0.02
Silica	20	65	45 – 48	-	-
Sodium	54	176	690 – 760	-	<69 – >207
Sulfate	59	196	2,200 – 2,500	250 – 600 ⁴	-
TDS ⁶	310	1,242	5,200 – 6,300	500 – 1,500 ⁴	<450 – >2,000

- ¹ Ayers R.S. and Westcot D.W., 1985, *Water Quality for Agriculture*
- ² Primary MCL – Title 22 Drinking Water Standards
- ³ Alkalinity as CaCO₃
- ⁴ Secondary MCL – Title 22 Drinking Water Standards
- ⁵ Specific Conductance measured in micromhos per centimeter at 25^o Centigrade
- ⁶ Total dissolved solids

The data in Table I indicate the following:

- (1) Baseline groundwater concentrations of boron, chloride, electrical conductivity (EC), nitrate, selenium, sodium, sulfate, and total dissolved solids (TDS) exceed their respective numeric water quality objectives for municipal and domestic supply (MUN) and/or agricultural supply (AGR),
- (2) Predicted RO reject wastewater concentrations of arsenic, boron, calcium, chloride, EC, magnesium, nitrate, selenium, sodium, sulfate, and TDS are less than their respective baseline groundwater concentrations; and,
- (3) Predicted RO reject wastewater concentrations of barium, bicarbonate and carbonate (considered one constituent, bicarbonate, because their occurrence is pH dependent), fluoride, and silica exceed their respective baseline groundwater concentrations.

Antidegradation Analysis

State Water Board Resolution No. 68-16 prohibits degradation of groundwater unless it has been shown that the degradation is consistent with the maximum benefit to the people of the State; the degradation will not unreasonably affect present and anticipated future beneficial uses; the degradation does not result in water quality less than that prescribed in state and regional policies, including violation of one or more water quality objectives; and, the discharger employs Best Practicable Treatment or Control (BPTC) to minimize degradation.

The discharge of wastewater to the impoundment could potentially cause degradation of the upper semi-confined groundwater for barium, bicarbonate, fluoride, and silica. The anticipated groundwater degradation caused by barium, bicarbonate, fluoride, and silica is in the best interest of and consistent with the maximum benefit to the people of the State. This determination is supported by the following:

- (a) Operation of the Facility will supply a more reliable electrical supply to the State during periods of peak power use;
- (b) Operation of the Facility provides increased employment in the area;
- (c) The Discharger will utilize reclaimed irrigation backwash water that would have been lost to evaporation and percolation if the Facility were not constructed;
- (d) The upper semi-confined groundwater is not known to be used within several miles of the Facility except for one industrial supply well and irrigation wells are completed in the lower confined groundwater;
- (e) Any groundwater degradation anticipated by barium, bicarbonate, fluoride, and silica is de-minimus compared to the improvement in groundwater quality by the chloride, nitrate, sodium, sulfate, and TDS constituent concentrations in the discharge;
- (f) The predicted concentrations of barium and fluoride in the discharge do not exceed their water quality objectives. Water quality objectives have not been established for

bicarbonate and silica. However, their predicted concentrations in the RO reject wastewater are not at levels that adversely affect the beneficial uses of the upper semi-confined groundwater; and,

- (g) The discharge will not unreasonably affect present and anticipated future beneficial uses of the upper semi-confined groundwater.

Monitoring Requirements

The proposed Order includes a Monitoring and Reporting Program required pursuant to Section 13267 of the California Water Code. A single groundwater monitoring well upgradient from and two monitoring wells downgradient from the impoundment will be sampled quarterly. The backwash water, RO reject wastewater, and wastewater in the impoundment will also be sampled quarterly. Monitoring reports will be submitted quarterly.

CEQA

Central Valley Water Board staff reviewed the *Application for Certification* submitted by Starwood to the California Energy Commission (CEC), the lead agency under a CEQA-equivalent process. Comments to the CEC concerning water quality were provided in correspondence dated 20 December 2006.

On 16 January 2008, the CEC adopted Order No. 08-0116-02 which adopts the *Commission Decision*, approves the *Application for Certification* for the Facility, and grants a certificate to construct and operate the Facility. The *Commission Decision* includes a finding which states that implementation of the Conditions of Certification described in the Water Resources section of the document will result in potential water resource impacts being mitigated to insignificance.

Reopener

The proposed Order was developed based on currently available technical information and applicable water quality laws, regulations, policies, and plans. 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.