INFORMATION SHEET

ORDER NO. _____
VALLEY WASTE DISPOSAL COMPANY
AND CAWELO WATER DISTRICT
KERN FRONT NO. 2 TREATMENT PLANT – RESERVOIR B
KERN COUNTY

I. INTRODUCTION

Valley Waste Disposal Company (hereafter VWDC) owns and operates an oil field produced water reclamation facility (Kern Front No.2 treatment plant) serving oil field operators in the Kern Front oil field. The site is south of James Road and Oil Fields Road near Bakersfield. Produced water from the oil field is treated to remove oil, grease, and inorganic sediments and then conveyed to the Cawelo Water District (CWD) for reclamation on farm land, and for groundwater recharge within the CWD. VWDC and CWD are hereafter collectively referred to as the Discharger. During periods when the CWD's water storage and conveyance facilities are shut down for maintenance, VWDC stores produced water in storage ponds on VWDC's property. The Discharger has submitted a Report of Waste Discharge (RWD) dated 29 June 2000 in application for a permit renewal to discharge pollutants under the National Pollutant Discharge Elimination System (NPDES) from its Kern Front No. 2 treatment plant into CWD Reservoir B. Information supplementing the RWD was provided on 24 August 2000.

The Kern Front oil field encompasses an area of about 8.6 square miles (5,495 acres) in the eastern half of T28S, R27E, MDB&M, about 3 miles north of Oildale in Kern County. Discovered by Standard Oil Company in 1917, the field was developed by a number of different oil companies, and in 1929 the field reached a maximum oil production level of 4.5 million bbls/year. Production subsequently diminished to its current level of 2.2 million bbls/year. Like wells in other nearby oil fields such as the Kern River Oil Field, and Mount Poso Oil Field, wells in the Kern Front Oil Field produce large quantities of water commingled with recovered oil. In 1952 the ratio of produced water to bbls oil produced was about 5:1[1]. In 1973, the ratio was about 8.5:1[2], and in 1994 the water to oil ratio was about 13.4:1.

VWDC was formed around 1932 to serve oil companies in management of production wastes. It began operating its Kern Front oil field facility in 1955 when it diverted the conveyance channel to a gravel pit on the south side of James Road in Section 27, T28S, R27E. VWDC first became regulated by the Regional Water Board when Waste Discharge Requirements (WDRs) Order No. 74-233 was adopted in March 1974. Order No. 74-233 allowed for a maximum discharge of 0.84 mgd to 20 acres of percolation/evaporation ponds. In 1980, VWDC constructed a pipeline to CWD Reservoir B and submitted an RWD in support of an application for an NPDES permit. WDRs Order No. 81-113, the first NPDES permit, then regulated VWDC's discharge to its percolation ponds and the discharge to the CWD Reservoir B. Order No. 81-113 was updated and renewed by WDRs Order No. 90-162. Order No. 90-162 was then updated and renewed by WDRs Order No. 96-009, and Order No 96-009 was updated and renewed by WDRs Order No. R5-2006-0124. Most of the year VWDC conveys all of its wastewater to the CWD, but VWDC stores the water in ponds for up to four weeks per year when it is necessary to accommodate Reservoir B shutdown and related maintenance activities in the CWD.

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[1] Division of Oil and Gas, *Summary of Operations, California Oil Fields*, Vol. 38, No. 2, 1952, p. 31
[2] Division of Oil and Gas, *California Summary of Operations*, Vol. 59, No. 2, 1973, p. 99

In June 1970, the Department of Water Resources (DWR) submitted a *Report on Poso Creek Water Quality Evaluation, Kern County*. The report evaluated the effect of produced water discharges from the Mt. Poso, Poso Creek, Round Mountain, and Kern Front Oil Fields on the Poso Creek Basin. The quality of the oil field discharges from the various oil fields impacting the basin varied widely. Mt. Poso and Round Mountain generated produced water with chlorides of 500 to 1,100 mg/L. Discharges for the Poso Creek oil field generated produced water with chloride concentrations from 215 to 715 mg/L. Chloride concentrations in produced water from the Kern Front oil field ranged from 60 to 100 mg/L. In 1969, chlorides in oil field discharges (720 mg/L average) totaled 26,050 tons, corresponding roughly to 75,000 tons of salt. Measured chlorides in groundwater samples from a well near the center of CWD indicated that chloride in groundwater increased from less than 20 mg/L in 1916 to over 600 mg/L in 1969. This report served as a basis for a Regional Water Board policy Resolution adopted on 23 November 1970. Resolution 71-122 limited the maximum EC, chloride, and boron concentration in oil field "waste waters discharged to Poso Creek or its tributaries and to... unlined sumps..." to 1,000 µmhos/cm, 200 mg/L and 1.0 mg/L, respectively. The Regional Water Board's implementation of Resolution 71-122 effectively stopped uncontained discharge of oil field wastewater with unacceptably high salt concentrations in an area it called the Poso Creek subarea (which is not to be confused with the Poso Creek Hydrologic Area).

Follow-up sampling by the CWD shows the impact of the high salt oil field discharges persisted in 1980. CWD's 1980 chloride concentration map shows a degraded area along Lerdo Highway with chloride concentrations exceeding 400 mg/L.

The Water Quality Control Plan for the Tulare Lake Basin (Basin Plan) contains water quality objectives for surface and groundwaters in the Basin. The Basin Plan incorporates the Poso Creek policy (Resolution 71-122). The Basin Plan notes the entire basin is closed, meaning that salts discharged within the basin remain there. It recognizes that salt in basin groundwater will increase over time and adopts a strategy of controlled degradation (as opposed to prevention). As a measure of the acceptable rate of degradation the Basin Plan establishes as a water quality objective a maximum annual degradation rate no greater than 6 µmhos/cm per year for the Poso Groundwater Hydrographic Unit (Hydrologic Area Nos. 558.70, 558.80, and 558.90). The VWDC discharge occurs in the Poso Creek area, which is in turn within the North Kern Hydrologic area (558.80) of the Poso Groundwater Hydrographic Unit.

In 1982, the Regional Water Board adopted Resolution No. 82-136, amending the Basin Plan to allow VWDC and other similar discharges to exceed Basin Plan effluent limits to facilitate use for irrigation and other beneficial uses where the exception would not cause exceedance of a water quality objective. The Basin Plan, therefore, provides some flexibility to allow agricultural use of oil field wastewater when Basin Plan salinity limits to be exceeded provided the discharger first successfully demonstrates to the Regional Water Board that the proposed discharge will not substantially affect water quality nor cause a violation of a water quality objective.

VWDC receives oil production wastewater at its Kern Front No. 2 treatment plant from companies operating oil wells in the Kern Front oil field. The treatment plant is in the western half of Section 27, T28S, R27E, MDB&M. The companies presently conveying oil field produced water to VWDC via pipeline for final treatment and disposal are Bellaire Oil Company (Bellaire) and Vintage Production California, LLC, a Delaware corporation (Vintage)(Formerly Oxy USA, Inc.). VWDC currently receives about 4.0 million gallons per day (mgd) of produced water from Vintage and Bellaire. Approximately 85% of the produced water received by VWDC originates from Vintage.

Vintage currently discharges its produced water to VWDC through a pipeline. Vintage historically discharged produced water to VWDC through series of unlined channels before construction of the pipeline and it retains an active NPDES permit for this. Discharge of up to 4.0 mgd of produced water to the unlined channels is regulated by WDRs Order No. 96-277 (NPDES No. CA0083852). On 16 May 2001, Vintage submitted a RWD to renew Order No. 96-277. Order No. 96-277 was administratively extended on 19 November 2001 and a new order is currently being drafted. At the historic discharge rate to the unlined channels, over half of the discharged produced water percolated, evaporated, and evapotranspirated before reaching VWDC. Vintage ceased discharge to the unlined channels in July 2003 but recently resumed intermittent discharges. Vintage also recently advised that it wishes to reduce this allowed discharge to 2.75 mgd. Vintage also disposes of a portion of its produced water through deep well injection using Class II injection wells. Class II wells are regulated by the California Division of Oil, Gas, and Geothermal Resources.

Vintage uses steam injection to assist in crude oil extraction. Increases in the price of crude oil over the past several years have made it economical for Vintage to employ steam more extensively in its oil extraction operations. Use of steam tends to leach salts such as boron and chlorides out of the formations, and increases the EC of produced water. Vintage's increased use of steaming will increase the overall volume of produced water and the salinity and concentrations of boron and chlorides in produced water discharged to VWDC. To implement its plan, VWDC has requested that the permit allow the increased flow and greater effluent limitations for EC and boron.

Wastewater received by VWDC is treated for the removal of oil and grease and inorganic sediment. Four unlined ponds, in series, provide initial gravity separation. Floating oil and grease in the ponds is periodically skimmed and removed. VWDC proposes to add a second Wemco air flotation unit to supplement its existing Wemco unit. The two Wemco units will provide final polishing for VWDC's effluent. The Wemco units use air flotation techniques combined with chemical coagulants and mechanical agitation to remove free oil and grease. After final polishing, wastewater is discharged to a concrete-lined storage pond and then pumped to Reservoir B. The two Wemco units will have a combined total design treatment capacity of 7.4 mgd. Oil and grease removed by the Wemco units is transferred to a concrete-lined collection sump. According to a sludge management plan submitted on 29 March 1996, oil and grease that accumulates in the sump is removed with a vacuum truck approximately three times per year and returned to the oil field operators to be processed as crude oil.

VWDC conveys its treated wastewater from the storage pond through a 20-inch, 3.4-mile pipeline to the CWD's Reservoir B. Reservoir B is an integral part of the CWD's water distribution system, which

consists of 5.3 miles of lined canal and 38 miles of pipeline ranging in size from 15" to 60." Reservoir B supplies irrigation water used in the CWD via the Distribution Canal.

On 24 February 1995, the Regional Water Board adopted WDRs Order No. 95-031 (NPDES Permit No. CA0082295) for Texaco Exploration and Production Inc. (Texaco) and CWD. Order No. 95-031 allows Texaco to discharge up to 18 mgd (five-year average) of oil-field produced water from the Kern River oil field into Reservoir B. CWD is required by Order No. 95-031 to manage the water through management practices and blending to ensure protection of applicable beneficial uses. In July 1999, Texaco submitted an RWD in support of renewing Order No. 95-031. The July 1999 RWD proposes increasing the permitted maximum daily discharge to 27.3 mgd. Order No. 95-031 was administratively extended on 19 January 2000, and a new order is currently being drafted. In 2001 Texaco merged with Chevron U.S.A., Inc. Texaco subsequently changed its name to ChevronTexaco and then to Chevron U.S.A., Inc. (Chevron). In early 2007 Chevron informally requested that Order No. 95-031 be revised to increase the permitted maximum daily discharge into Reservoir B to approximately 33.5 mgd.

Produced water from Chevron and VWDC discharged to Reservoir B is blended with water from other surface and groundwater supplies of CWD to meet the effluent and receiving water limits set forth in this Order and Order No. 95-031. Surface water blended into Reservoir B consists of Kern River, State Water Project, and Central Valley Project waters delivered from the Beardsley Canal through Lerdo Pumping Station B. Through use of its Distribution Canal, in the winter months when irrigation demand is low CWD discharges the blended water to Poso Creek, a water of the United States, in a manner intended to maximize recharge of groundwater within the CWD.

The CWD's Reservoir B, Distribution Canal, and other facilities may be shut down for maintenance or emergency reasons for up to four weeks each year. At such times, VWDC is unable to discharge to Reservoir B and instead diverts its wastewater to on-site storage ponds. The fourteen on-site storage ponds reportedly have 300 acre-feet (98 million gallons) of combined available storage capacity. Fifteen of the sixteen storage ponds are unlined. Stored wastewater not lost to percolation or evaporation is delivered to CWD's Reservoir B upon resumption of its operation.

II. BENEFICIAL USES OF THE RECEIVING WATER

The Basin Plan identifies the following beneficial uses for Poso Creek: agricultural supply, water contact and non-contact water recreation, warm and cold water freshwater habitat, wildlife habitat, groundwater recharge, and freshwater replenishment.

Based on USGS Professional Report 437B and interpretation by CWD's consulting geologist, the Poso Creek recharge area extends across the CWD and is characterized as sandy surface soils overlying greater than 550 feet of continental deposits. The continental deposits consist of sandy soils with several gravel layers, and exhibit high percolation rates. Unless flow entering the CWD at the upstream gauging station is in sufficient volume to exceed the evaporation rates and infiltrative and percolative capacity of the recharge area, all waters in Poso Creek will recharge the groundwater within the CWD.

The CWD covers approximately 45,000 acres and is between State Highway 99 on the west and Highway 65 on the east. The CWD was formed for the purpose of obtaining a "supplemental or partial water supply" and delivering it for irrigation of crops within the CWD. The CWD uses imported surface water conjunctively with pumped groundwater and produced water to irrigate the agricultural lands of the CWD. Water in the CWD is used for agricultural supply.

III. DESCRIPTION OF EFFLUENT

Data from the discharge monitoring reports submitted from 2001 through 2006 characterize the discharges as follows:

Discharge 001 (from VWDC into CWD Reservoir B)

Constituent	Units	Average Value
Flow	mgd	1.89
Electrical Conductivity @ 25 °C	µmhos/cm	1010
Chloride	mg/L	71.7
Boron	mg/L	0.73
Oil and Grease	mg/L	10.0

Discharge 002 (from Reservoir B into Distribution Canal)

Irrigation Season (April – September)

Constituent	Units	Average Value
Flow	mgd	88.3
Electrical Conductivity @ 25 °C	µmhos/cm	311
Chloride	mg/L	43.3
Boron	mg/L	0.27

Discharge 002 (from Reservoir B into Distribution Canal)

Non-Irrigation Season (October – March)

Constituent	Units	Average Value
Flow	mgd	26.2
Electrical Conductivity @ 25 °C	µmhos/cm	676
Chloride	mg/L	100.8
Boron	mg/L	0.71

Discharge 003 (from Distribution Canal into Poso Creek)

Constituent	Units	Average Value
Electrical Conductivity @ 25 °C	µmhos/cm	761
Chloride	mg/L	101.4
Boron	mg/L	0.77

IV. SUMMARY OF CHANGES TO CURRENT ORDER

This Order includes changes from the Current Order. A summary of the key changes follows.

Effluent Limitations

Flow: WDRs Order No. R5-2006-0124 limited the daily maximum flow of produced water at Discharge 001 to 4.3 mgd. The Discharger has approved a negative declaration pursuant to CEQA for increased discharge flows from VWDC and Chevron. The proposed Order increases the daily maximum flow limit at Discharge 001 to 7.4 mgd.

EC: WDRs Order No. R5-2006-0124 requires that the EC of the treated produced water discharged to Reservoir B not exceed a daily maximum of 1,200 µmhos/cm and a monthly average of 1,100 µmhos/cm. This exceeds effluent limitations prescribed by the Basin Plan for produced water discharges in the Poso Creek area. For the reasons described below, the proposed Order includes an annual average EC limit of 1,030 umhos/cm at Discharge 001. CWD must manage Reservoir B to ensure compliance with the of 1,000 umhos/cm EC limitations at Discharges 002 and 003. CWD must also ensure that water in Poso Creek exiting the CWD does not exceed an EC of 700 umhos/cm and that use of produced water from all sources is blended and balanced with fresh water sources in a controlled manner that ensures water quality policies are met. Blending of surface water and groundwater to promote beneficial reuse of wastewater in water short areas, as is the case here, is allowed by the Basin Plan if consistent with other water quality policies (e.g., provide the expected level of treatment, comply with water quality objectives).

V. PERMIT CONDITIONS

Basis for Groundwater Limitations

Basin Plan water quality objectives to protect the beneficial uses of groundwater include numeric objectives and narrative objectives, including objectives for chemical constituents, toxicity of groundwater, and taste and odor. The toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants, or animals. The chemical constituent objective states groundwater shall not contain chemical constituents in concentrations that adversely affect any beneficial use or that exceed the maximum contaminant levels (MCLs) in Title 22, CCR. The Basin Plan requires the application of the most stringent objective necessary to ensure that groundwaters do not contain chemical constituents, toxic substances, radionuclides, or taste and odor producing substances in concentrations that adversely affect domestic drinking water supply, agricultural supply, or any other beneficial use.

State Water Resources Control Board Resolution 68-16 (Antidegradation Policy) requires the Regional Water Board in regulating discharge of waste to maintain high quality waters of the State until it is demonstrated that any change in quality will be consistent with 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 the Regional Water Board's policies (e.g., quality that exceeds water quality objectives). Resolution 68-16 requires that the constituents contributing to degradation be regulated to meet best practicable treatment or control to assure that pollution or nuisance will not occur and that the highest water quality consistent with the maximum benefit to the people of the State will be maintained.

With respect to salinity, the Basin Plan acknowledges that due to the closed nature of the Tulare Lake Basin, degradation of groundwater by salts is unavoidable without an effective means for removing salts from the Basin. The Basin Plan sets forth a plan to protect groundwater in the Basin by requiring that salinity increases be kept to a minimum through measures on controllable factors that are practicable and economically feasible. For the Poso Groundwater Hydrographic Unit, the water quality objective that establishes the allowable rate of degradation from all sources is an EC increase of no more than 6 μmhos/cm per year. The area of the Poso Groundwater Hydrographic Unit is considerably greater than the area of the CWD.

On 1 June 1994, the USEPA, US Bureau of Reclamation, State Water Board, Department of Water Resources, Department of Health Services, Conference of Directors of Environmental Health, and Water Reuse Association of California signed a *Statement of Support for Water Reclamation* and resolved that agencies would reduce reclamation disincentives and regulatory constraints on water reclamation. The Regional Water Board concurs with this statement and supports the efficient use of the State's limited water supplies provided the beneficial uses of water are maintained and water quality objectives are met.

Groundwater throughout CWD: The California Legislature enacted A.B. 3030 during the 1992 session, subsequently codified in California Water Code §10750, *et seq.* Water Code §10750 states, in part, that:

> "Any local agency, whose service area includes a groundwater basin, or a portion of a groundwater basin, that is not subject to groundwater management pursuant to other provision of law or a court order, judgment, or decree, may, by ordinance, or by resolution if the local agency is not authorized to act by ordinance, adopt and implement a Groundwater Management Plan pursuant to this part within all or a portion of its service area."

Water Code §60224 empowers the CWD to take any action needed for protection and preservation of ground water supplies within the CWD including:

- The prevention of contaminants from entering CWD groundwater supplies;
- The removal of contaminants from groundwater supplies of the CWD;
- The location and characterizing of contaminants which may enter the groundwater supplies of the CWD;
- The identification of parties responsible for contamination of groundwater; and
- The performance of engineering studies.

The CWD adopted a Ground Water Management Plan (Plan) on July 21, 1994 that establishes a policy of efficient water use, conservation, and management. Action elements in the Plan include:

- Acquire and import available, supplemental surface water for crop irrigation and groundwater recharge.
- Continue the application for appropriation of Poso Creek water and develop Poso Creek as a groundwater recharge facility within the CWD.
- Facilitate conjunctive use operations by the importation and recharge use of supplemental water.
- Construct and operate CWD wells.
- Monitor well construction and abandonment as administered by Kern County.

Monitoring elements of the Plan include:

- Semi-annual monitoring of groundwater levels of wells within the CWD.
- Semi-annual preparation of maps of equal elevation of water in wells.
- Monitor groundwater quality at 5-year intervals and prepare maps of electrical conductivity, chloride, and boron concentrations.
- Operate and maintain the Poso Creek gauging station above State Highway 65.

To sustain existing irrigated agriculture, CWD supplements its existing limited surface water supplies and overdrafted groundwater with the reclamation of produced water using treated VWDC wastewater (and treated produced water from other sources) as described herein. Through its Plan, the CWD proposes to manage water used within its boundaries in a manner that meets Basin Plan objectives.

In March 2007, the Discharger and Chevron submitted a study entitled, *Cawelo Water District, Valley Waste Disposal Company, Chevron, Technical Study Update for the Proposed Modification of Waste Discharge Requirements for Discharges Into Reservoir "B" and Poso Creek* (hereafter Study) in support of proposed oilfield production water flow and EC increases from VWDC and proposed production water flow increases from Chevron to CWD Reservoir B. The Study states that VWDC does not expect the average quality of its discharge to change. The Study also examines proposed flow increases from the Schaefer Oil Company system as part of the over all balance (not an NPDES discharge). The Study employs a salt/volume balance model to demonstrate that the potential impacts to groundwater from the proposed increases in oil field production water discharges, if properly managed, will not cause groundwater underlying the CWD to exceed the maximum average annual increase of 6 umhos/cm per year allowed for the Poso Groundwater Hydrographic Unit by the Basin Plan. The CWD lies within the Poso Groundwater Hydrographic Unit. The Study employs the following assumptions:

- Generally, the annual average EC levels of the oil field production water discharges from Valley Waste Disposal, Chevron, and Schaefer Oil Company to the CWD system will remain near their respective ten-year median values.
- All imported salts migrate to the underlying groundwater mass and are evenly mixed throughout the underlying groundwater mass.

- About 10% of the imported surface and produced waters seep into the underlying groundwater through the reservoirs in the distribution system.
- About 15% of the blended water applied for irrigation percolates to the underlying groundwater.
- The groundwater basin underlying the CWD is replenished by an annual inflow of 22,000 acre-feet of subsurface water from the east with an EC of 200 umhos/cm (TDS of 115 mg/L).

The Study examined six scenarios, which are discussed in more detail and summarized in the tables below.

Scenario 1: Current Conditions

Scenario 1 examines the potential annual incremental increase in groundwater EC due to current operating conditions. The volume and quality of surface water imported into CWD and the effluent flows and EC values for the oil field production water discharges to Reservoir B are based on historical ten-year median values during the period from 1996 through 2005.

Table Scenario 1

	Flow rate		Salt concentration		Salt loading
	(mgd)	(acft/year)	EC (µmhos/cm)	TDS (mg/L)	(ton/year)
Valley Waste	1.4	1,589	1,030	588	1,270
Chevron	16.5	18,432	940	486	12,164
Schafer	1.1	1,238	955	558	939
surface water		64,185	190	107	9,298
subsurface		22,000	200	115	3,447
	total inflow:	107,444		total salts:	27,118

TDS increase (+mg/L): 1.36
EC increase (+µmhos/cm) : 2.36

As shown, the model predicts that groundwater EC will increase by 2.36 µmhos/cm per year.

Scenario 2: 2005 Water Year

Scenario 2 is based on oilfield production water flows and surface water imports that reflect the conditions that occurred in 2005, when surface water supplies available to the CWD were about 4800 acre feet higher than the ten year average. Oilfield production water EC levels were based on the ten-year median values.

Table Scenario 2

	Flow rate		Salt concentration		Salt loading
	(mgd)	(acft/year)	EC (µmhos/cm)	TDS (mg/L)	(ton/year)
Valley Waste	3.4	3,812	1,030	588	3,046
Chevron	15.2	17,096	940	486	11,282
Schafer	1.15	1,293	955	558	980
surface water		68,959	190	107	9,990
subsurface		22,000	200	115	3,447

total inflow: 113,160 total salts: **28,745** **TDS increase (+mg/L): 1.54**

EC increase (+µmhos/cm) : 2.67

Under Scenario 2, the model predicts that the groundwater EC will increase by 2.67 umhos/cm per year.

Scenario 3: Proposed Conditions

In Scenario 3, oil field production water effluent flows are increased to those included in the Reports of Waste Discharge submitted by VWDC, Chevron, and the Schaefer Oil Company. The production water EC values are assumed to mirror historic ten-year median values.

Table Scenario 3

	Flow rate		Annual average salt concentration		Salt loading
	(mgd)	(acft/year)	EC (µmhos/cm)	TDS (mg/L)	(ton/year)
Valley Waste	7.4	8,304	1,030	588	6,636
Chevron	33.5	37,593	940	486	24,809
Schafer	2.15	2,424	955	558	1,838
surface water		64,185	190	107	9,298
subsurface		22,000	200	115	3,447

total inflow: 134,506 total salts: **46,028** **TDS increase (+mg/L) : 3.45**

EC increase (+µmhos/cm) : 5.98

Under this scenario, the predicted annual average increase in groundwater is 5.98 µmhos/cm, which is consistent with the Basin Plan water quality objective that limits the annual average incremental increase in groundwater to 6 umhos/cm.

Scenario 4: Proposed Conditions (2005 Water Year)

In Scenario 4, oil field production water effluent flows are maintained at those included in the Reports of Waste Discharge submitted by VWDC, Chevron, and the Schaefer Oil Company, and the surface water imports are assumed to reflect the conditions that occurred in 2005. The production water EC values are again assumed to mirror historic ten-year medina values.

Table Scenario 4

	Flow rate		Salt concentration		Salt loading
	(mgd)	(acft/year)	EC (µmhos/cm)	TDS (mg/L)	(ton/year)
Valley Waste	7.4	8,304	1,030	588	6,636
Chevron	33.5	37,593	940	486	24,809
Schafer	2.16	2,424	955	558	1838
surface water		68,959	190	107	9,990
Subsurface		22,000	200	115	3,447

total inflow: 139,280 total salts: **46,720** **TDS increase (+mg/L): 3.16**

EC increase (+µmhos/cm) : 5.48

Under Scenario 4, the model predicts that the average annual increase in groundwater EC will be 5.48 umhos/cm.

Scenario 5: Proposed Conditions (2005 Water Year)

In Scenario 5, the oilfield production flows are set at 75% of the maximum flows permitted and surface water imports are assumed to equal those that occurred in 2005. Oilfield production water EC values are set at the ten-year median values.

Table Scenario 5.

	Flow rate		Salt concentration		Salt loading
	(mgd)	(acft/year)	EC (µmhos/cm)	TDS (mg/L)	(ton/year)
Valley Waste	5.53	6,200	1,030	588	4,954
Chevron	25	28,000	940	486	18,487
Schafer	1.1	1,800	955	558	1365
surface water		68,959	190	107	9,990
Subsurface		22,000	200	115	3,447
	total inflow:	126,959		total salts:	**38,234**

TDS increase (+mg/L): 2.62

EC increase (+µmhos/cm) : 4.54

Under these conditions, the model indicates that the average EC of groundwater will increase by 4.54 umhos/cm per year.

Scenario 6. Proposed Conditions (2005 Water Year/Increased EC)

In Scenario 6, the oilfield production flows are set at 75% of the maximum daily flows requested and surface water imports are assumed to equal those that occurred in 2005. Oilfield production water EC values are set 10% higher than the ten-year median values.

Table Scenario 6.

	Flow rate		Salt concentration		Salt loading
	(mgd)	(acft/year)	EC (µmhos/cm)	TDS (mg/L)	(ton/year)
Valley Waste	5.53	6,200	1,130	645	5,435
Chevron	25	28,000	1030	532	20,251
Schafer	1.1	1,800	1050	614	1501
surface water		68,959	190	107	9,990
Subsurface		22,000	200	115	3,447
	total inflow:	126,959		total salts:	**40,624**

TDS increase (+mg/L): 3.06

EC increase (+µmhos/cm) : 5.31

Under these conditions, the model indicates that the average EC of groundwater will increase by 5.31 umhos/cm per year.

The Study concludes that when all oilfield producers are discharging at maximum annual permitted quantities, the CWD will need to continue to import about 65,000 acre-feet of surface water and discharge approximately 10,000 acre-feet to Poso Creek for groundwater recharge to ensure the annual incremental increase in groundwater EC remains less than 6 umhos/cm. It also shows the proposed discharges will be consistent with this limit as long as the long-term average EC values of produced water discharges from VWDC and Chevron remain near their ten-year median values. The Study states that a salt load computation will need to be made regularly to determine whether restrictions on the discharge of oilfield produced water discharges to CWD Reservoir B will be required in any year to stay under the incremental EC increase limit.

Implicit in the study results is that the CWD can to some degree manage its system by reducing the volume of the oil field production discharges it accepts, or by importing additional high quality surface water when available to create some assimilative capacity in the underlying aquifer for times when full surface water deliveries are not available. ~~Given the water short nature of the area, it would be prudent to allow the CWD such flexibility.~~ Also implicit in the Study is that changes in groundwater EC take place over long periods of time and that daily and monthly average EC spikes are not likely to contribute to violations of the Basin Plan incremental EC increase objective as long as VWDC maintains the long term average EC of its discharge at or below 1030 umhos/cm and Chevron maintains the long term average of its discharge at or below 940 umhos/cm.

Given the above, it is reasonable to include in this Order discharge specifications that enable VWDC to discharge at a flow of 7.4 mgd and limit its annual average effluent EC to of the VWDC discharge to CWD Reservoir B to 1,030 umhos/cm. ~~It is also reasonable to allow exceptions to the annual average EC limitation of known magnitude provided that CWD can show through quarterly computations consistent with the model in a given year that the importation of surface water and/or better quality oilfield production water from Chevron have resulted in unused assimilative capacity for salinity. Conversely, it is reasonable and appropriate to require CWD to report how it will limit oilfield production water discharges should adequate dilution water in the form of high quality surface water or better quality oilfield production water be unavailable. This Order includes a provision that implements these restrictions.~~

Additionally, in a meeting between Regional Water Board staff and CWD, VWDC, and Vintage, it became apparent that those discharging to VWDC have not investigated potential methods to reduce the salinity of discharges into VWDC and subsequently into the CWD. It is, therefore, appropriate to require VWDC to investigate whether there are measures that could be implemented to reduce the salinity of produced water it accepts (e.g., injection of produced water from the saltier wells). This Order requires VWDC to conduct a Salinity Evaluation and Minimization Plan.

The Discharger submitted a groundwater monitoring report on 1 February 2005 that analyzed the quality of groundwater throughout the CWD. The 1 February report states that the average EC of groundwater

in the CWD decreased from 711.3 µmhos/cm to 662.2 µmhos/cm between 1999 and 2004. This indicates improved groundwater quality. However, due to the large number of monitoring wells, the variability of well construction specifications and screening intervals, the depth to groundwater, and discontinuous wells sampled each year, the monitoring is not a reliable indicator at this point of the effect reclamation of produced water has had or will have on the quality of groundwater underlying the CWD. Because the majority of water applied within the CWD evapotranspires though crops, only the fraction of applied water that leaches salts from the root zone leaches to groundwater. With a 400-foot soil column, it will be some time before even standard monitoring wells would reveal increases in salts that can be attributed to current operations. Thus control of potential impacts must rely on analysis of discharge management

Summary of Effluent Limitations/Discharge Specifications

The following summarizes Discharge Specifications and Effluent Limitations in the proposed permit. The bases for these requirements are described below.

Discharge Specifications:

1. Effluent from Discharge 001 (from VWDC into Reservoir B) shall not exceed the following limits:

Constituents	Units	Monthly Average	Daily Maximum	Annual Average
Flow	mgd	---	4.3	---
Electrical Conductivity	µmhos/cm	---	---	1,030
Chloride	mg/L	---	200	---
Boron	mg/L	1.5	1.6	---
Oil and Grease	mg/L	---	35	---

2. Effluent from Discharge 002 (from Reservoir B outfall into the Distribution Canal) shall not exceed the following limits:

Constituents	Units	Monthly Average	Daily Maximum
Electrical Conductivity	µmhos/cm	---	1,000
Chloride	mg/L	---	200
Boron	mg/L	---	1.0

Effluent Limitations:

1. Effluent from Discharge 003 (from the Distribution Canal outfall into Poso Creek) shall not exceed the following limits:

Constituents	Units	Monthly Average	Daily Maximum
Electrical Conductivity	µmhos/cm	---	1,000
Chloride	mg/L	---	200
Boron	mg/L	---	1.0
Arsenic	µg/L	---	10
Oil and Grease	mg/L		Non-Detect

2. Discharge 003 shall not have a pH less than 6.5 nor greater than 8.3.

3. Survival of aquatic organisms in 96-hour bioassays of undiluted waste from Discharge 003 shall be no less than:

   Minimum for any one bioassay: ----------70%
   Median for any three or more consecutive bioassays: ----------90%

Technology-Based Limitations

Oil and Grease: The Discharger receives wastewater from facilities subject to 40 CFR § 435.50, Oil and Gas Extraction Point Source Category, Agricultural and Wildlife Water Use Subcategory. These regulations establish a daily maximum effluent oil and grease limitation of 35 mg/L that is applicable to VWDC.

Reasonable Potential Analysis

Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard. Based on information submitted as part of the RWD, in studies, and as directed by monitoring and reporting programs the Regional Water Board finds that the discharge does have a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard for pH, arsenic, conductivity, chloride, boron, and toxicity. Effluent limitations for these constituents are included in this Order.

pH: The Basin Plan includes numeric water quality objectives that the pH "*...not be depressed below 6.5 nor raised above 8.3.* Effluent limitations for pH are included in this Order and are based on the Basin Plan objectives for pH.

Arsenic: The Basin Plan includes a water quality objective that "*waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses.*" Groundwater recharge is a beneficial use of the receiving stream with the groundwater having a municipal supply beneficial use. The USEPA Primary Maximum Contaminant Level (MCL) of 10 µg/L for arsenic. Pursuant to the Safe Drinking Water Act, California Department of Health Services (DHS) must revise the arsenic MCL in Title 22 CCR to be as low or lower than the USEPA MCL. VWDC discharges into Reservoir B reportedly have arsenic concentrations of up to 55 µg/L. Chevron discharges into Reservoir B reportedly have arsenic concentrations of up to 19 µg/L. Water pumped into the Reservoir B from the

Beardsley Canal reportedly has arsenic concentrations of approximately 6 µg/L. There is currently no data on the concentrations of arsenic in actual discharges from the CWD distribution system into Poso Creek. Under conditions where VWDC and Chevron are discharging at capacity, the concentration of arsenic in the discharge to Poso Creek (Discharge 003) could exceed the MCL. Applying the Basin Plan's "Policy for Application of Water Quality Objectives," to protect the future municipal and domestic water use of groundwater, it is reasonable to apply the USEPA MCL for arsenic to discharges to Poso Creek as water discharge to the creek is managed to recharge groundwater. An Effluent Limitation for arsenic is included in this Order and is based on protection of the beneficial use of groundwater recharge and municipal and domestic water supply, the Basin Plan water quality objective for chemical constituents, and toxicity, and the USEPA Primary MCL.

Conductivity, Boron, and Chlorides

The Basin Plan encourages the reclamation of oilfield wastewater where its quality is appropriate for reuse. The Basin plan authorizes salinity limits of 1,000 µmhos/cm for conductivity, 200 mg/L for chlorides, and 1.0 mg/L for boron for discharges to land within the Poso Creek Subarea (i.e. CWD). The Basin Plan further states that, "Discharges of oil field wastewater that exceed the above maximum salinity limits may be permitted to unlined sumps, stream channels, or surface waters if the discharger successfully demonstrates to the Regional Water Board in a public hearing that the proposed discharge will not substantially affect water quality nor cause a violation of water quality objectives."

EC: VWDC has requested that the limitations for EC from Discharge 001 be raised to a daily maximum of 1,300 µmhos/cm and a monthly average of 1,250 µmhos/cm. The Study was submitted to support these increases in discharge EC and flow rates and show that they comply with Basin Plan objectives. Calculations in the Study relied on 10-year average EC values from VWDC (1,030 µmhos/cm) and Chevron (940 µmhos/cm). As groundwater reflects the average of discharge character and as the average character used for VWDC for the demonstration is 1,030 µmhos/cm, it is appropriate to apply this as an annual average EC limitation for VWDC at Discharge 001 to ensure compliance with Basin Plan objectives. Maximum daily and average monthly EC limits are not necessary and are not included. It has been demonstrated by the Study that the annual average EC will maintain compliance with Basin Plan objectives. The 1,000 µmhos/cm EC limitations/specifications at Discharges 002 and 003 are consistent with the Basin Plan limitations for discharges to land within the Poso Creek Subarea and oil field discharges to surface waters within the Tulare Lake Basin.

~~The above notwithstanding, as this project involves discharges of produced water from two sources (VWDC and Chevron), changes in the discharge from one source may affect the ability of CWD to maintain compliance with Basin Plan objectives. This Order requires the CWD to demonstrate quarterly that the discharges it manages will comply with the groundwater limitation for incremental EC increase to groundwater underlying the CWD or explain how produced water discharges will be restricted or otherwise managed to ensure compliance.~~ This Order ~~also~~ includes a reopener that allows the Regional Water Board to adjust flow and EC discharge specifications and effluent limitations should the Study assumptions prove inadequate or dependent discharge limits require reassessment.

Boron: Boron limitations in WDRs Order No. R5-2006-0124 at Discharge 001 are 1.6 mg/L (daily maximum) and 1.5 mg/L (monthly average). The proposed Order maintains these current boron limitations. Regional Water Board staff calculations indicate that the proposed boron effluent limitations have little potential to cause additional increases in the concentration of boron in groundwater underlying the CWD above current conditions. The proposed Order requires the CWD to manage the discharges to Reservoir B so that discharges from Reservoir B comply with the limits authorized by the Basin Plan. Thus, the boron discharged to Reservoir B should not significantly impact groundwater quality or cause a violation of water quality objectives. Therefore, the boron limitations at Discharge 001 are proposed to remain at 1.6 mg/L (daily maximum) and 1.5 mg/L (monthly average). The 1.0 mg/L boron limitation/specification at Discharges 002 and 003 are consistent with the Basin Plan limitations for discharges to land within the Poso Creek Subarea and oil field discharges to surface waters within the Tulare Lake Basin.

Chloride: Chloride limitations in WDRs Order No. R5-2006-0124 at Discharge 001 are 100 mg/L (monthly average) and 125 mg/L (daily maximum). The proposed Order includes a discharge specification for chloride of 200 mg/L at Discharge 001 consistent with the Basin Plan. The 200 mg/L chloride limitations/specifications for Discharges 002 and 003 are consistent with the Basin Plan limitations for discharges to land within the Poso Creek Subarea and oil field discharges to surface waters within the Tulare Lake Basin.

At the request of the North Kern Water Storage District, the Regional Water Board conducted public hearings in 1985 to determine appropriate quality for water used for irrigation of crops in the Poso Creek Subarea. At the time, produced water was discharged to Beardsley Canal, the main canal for surface water being conveyed to North Kern Water Storage District and CWD. The Regional Water Board adopted the following receiving water limits as appropriate for supply waters used to irrigate citrus and other sensitive crops grown in the two districts:

EC	700 µmhos/cm
Chloride	106 mg/L
Boron	0.5 mg/L

The proposed Order considers that CWD, in keeping with its responsibility and authority to provide water to its customers that is suitable for irrigation of all crops grown in the District, has the ability to control the quality by the blending of supply waters. Further, as a groundwater management agency and discharger under this Order, it has the authority and responsibility to comply with waste discharge requirements that implement the Basin Plan. Thus it may use its discretion to provide supply water of higher quality than prescribed by the Regional Water Board in its distribution system. However, ground and surface water not solely for the use of CWD, such as ground and surface waters that flow from CWD into the North Kern Water Storage District downgradient of CWD, must be consistent with the receiving water quality prescribed by the Regional Water Board since 1985. The proposed Order requires the CWD to ensure that discharges to Poso Creek do not cause the water in the creek that exits the CWD to exceed EC, chloride and boron levels of 700 umhos/cm, 106 mg/L, and 0.5 mg/L, respectively.

Acute Whole Effluent Toxicity

The Basin Plan includes a narrative objective for toxicity, requiring that all waters be maintained free of toxic substances in concentrations that are lethal to or produce other detrimental physiological responses in human, plant, animal, or aquatic life. Detrimental response includes but is not limited to decreased growth rate, decreased reproductive success of resident or indicator species, and/or significant alternations in population, community ecology, or receiving water biota. Acute whole effluent toxicity limits are included in the Order and are based on interpretation the narrative water quality objective for toxicity in the Basin Plan.

Basis for Provisions

Provisions are included the Order to ensure compliance with requirements in the Order pursuant to the CWA, CWC, implementing regulations, and the Basin Plan.

Basis for Self-Monitoring Requirements

The Monitoring and Reporting Program is issued pursuant to California Water Code Sections 13383 and 13267. The Discharger shall not implement any changes to this Program unless and until the Regional Water Board or Executive Officer issues a revised Monitoring and Reporting Program.

Sample collection, storage, and analyses shall be performed according to 40 CFR Part 136 or other methods approved and specified by the Executive Officer of the Regional Water Board. All samples shall be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each sample shall be recorded on the sample chain of custody form. All analyses shall be performed in accordance with the Standard Provisions, Provisions for Monitoring.

Water and waste analyses shall be performed by a laboratory approved for these analyses by DHS or a laboratory waived by the Executive Officer from obtaining a certification for these analyses by the DHS. The director of the laboratory whose name appears on the certification or his or her laboratory supervisor who is directly responsible for analytical work performed shall supervise all analytical work, including appropriate quality assurance/quality control procedures in his or her laboratory, and shall sign all reports of such work submitted to the Regional Water Board.

For California Toxics Rule (CTR) constituents (priority pollutants), the Discharger shall report sample results as required by the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of the California (State Implementations Plan or SIP) Section 2.4. The Discharger's laboratory must meet minimum levels in the SIP Appendix 4.

REOPENER

The conditions of discharge in this Order were developed based on currently available technical information, currently available discharge and surface water quality information, applicable water quality laws, regulations, policies, and plans, and are intended to assure conformance with them. Additional information must be developed and documented by the Discharger as required by schedules set forth in this Order. It may be appropriate to reopen this Order if applicable laws and regulations change, or if new information necessitates the implementation of new or revised limitations to protect water quality consistent with the Basin Plan.

TITLE 27

Except for the oil and grease discharged to the concrete tank, this discharge is exempt from the requirements of *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste,* as set forth in Title 27, CCR, Division 2, Subdivision 1, section 20005, et seq., (hereafter Title 27) pursuant to Section 20090(b) for the following reasons:

a. The Regional Board is issuing these waste discharge requirements, which implement the Basin Plan;

b. The Discharger will comply with these waste discharge requirements; and

c. The wastewater does not need to be managed according to Title 22 CCR, Division 4.5, and Chapter 11, as a hazardous waste.

The oil and grease removed from produced water is a designated waste as defined in Title 27 and subject to the full containment specifications therein. However, the concrete tank that contains the oil and grease is a fully enclosed facility of limited extent and operated in a manner that precludes discharge of the designated waste, which is prohibited by this Order. Accordingly, it is exempt from the prescriptive and performance specifications of Title 27 pursuant to section 20090(i) thereof and discharge is authorized by the proposed Order.

ANTIDEGRADATION

In the Basin Plan, this Regional Water Board adopted criteria for the area managed by the CWD, which is in the Poso Groundwater Hydrographic Unit. Specifically this Regional Water Board has considered degradation that could be caused by discharges of oilfield wastewater to land, groundwater, and surface water and determined degradation that results from discharges that comply with EC, chloride, and boron effluent limits of 1,000 µmhos/cm, 200 mg/L, and 1.0 mg/L, respectively, is reasonable and appropriate. The Basin Plan also indicates that greater effluent limits may be considered if a discharger first demonstrates to this Regional Water Board that the discharge with higher limits will not substantially affect water quality or cause it to exceed water quality objectives. The Study demonstrates that the proposed increases in flow and EC limits with proper management will not cause violation of a water quality objective.

The CWD must secure freshwater and manage the blended discharges so they will not substantially affect water quality and violate a water quality objective, including ensuring the annual blended discharge does not cause or contribute to more than 6 µmhos/cm increase in groundwater in any year. Consistent with the Basin Plan and of maximum benefit the people of the State, the discharge as conditioned in the proposed Order is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution 68-16.

CEQA

The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000 et seq.) in accordance with CWC Section 13389.

The CWD adopted a negative declaration pursuant to the provisions of CEQA for the increased volumes of produced water delivered to its irrigation system on 12 April 2007. The discharge as proposed will not have a significant impact on the environment.

GEA: 5/16/07~~5/15/07~~