

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER R5-2012-XXXX

WASTE DISCHARGE REQUIREMENTS
FOR
VALLEY WATER MANAGEMENT COMPANY AND CAWELO WATER DISTRICT
PRODUCED WATER RECLAMATION PROJECT
KERN FRONT NO. 2 TREATMENT FACILITY
KERN FRONT OIL FIELD
KERN COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Central Valley Water Board) finds that:

1. Valley Water Management Company ([Valley Water](#)), formerly Valley Waste Disposal Company, receives oil production produced water at its Kern Front No. 2 Treatment Facility ([Kern Front Facility](#)) from companies operating oil wells in the Kern Front Oil Field. The Kern Front Facility is in the western half of Section 27, Township 28 S, Range 27 E, Mount Diablo Base & Meridian ([MDB&M](#)), as shown on [Attachment A](#), which is attached hereto and made part of this Order by reference. Produced water from the oil field is treated at its Kern Front Facility, and then conveyed via pipeline to Cawelo Water District's ([District](#)) Reservoir B. At Reservoir B, treated oil field produced water is blended with surface water and pumped groundwater and used to irrigate farmland within the District. During the non-irrigation season, when irrigation demand is low, the District used to discharge excess blended water to Poso Creek, but this discharge has ceased.
2. The District covers approximately 45,000 acres and is generally between State Highway 99 and Highway 65 as shown on [Attachment A](#). Reservoir B is in Section 17, Township 28 S, Range 27 E, MDB&M, and the former discharge point to Poso Creek is in Section 30, Township 27 S, Range 27 E, MDB&M ([Attachment](#)

- A). Valley Water and the District are hereafter collectively referred to as the Discharger.
3. Discharges to Reservoir B, from Reservoir B to the District's distribution system, and to Poso Creek were previously regulated by Waste Discharge Requirements Order (WDRs) R5-2006-0124 [National Pollutant Discharge Elimination System (NPDES) Permit No. CA0081311], adopted by the Central Valley Water Board on 7 December 2006. On 22 June 2007, the Central Valley Water Board adopted Order R5-2007-0066 (NPDES Permit No. CA0081311), which replaced Order R5-2006-0124.
 4. Discharges of the blended oil field produced water to Poso Creek exceeded the arsenic limit of 10 ug/L set forth in WDRs R5-2007-0066 and failed aquatic toxicity tests. The Central Valley Water Board issued Time Schedule Order (TSO) R5-2011-0901 to provide a time schedule for the Discharger to either cease discharge to Poso Creek by 1 November 2011, or to implement alternative measures to comply with the existing arsenic effluent limitation. The TSO includes an interim effluent limitation effective through 31 October 2011. The Discharger is eliminating its discharge to Poso Creek and will instead discharge the blended oilfield produced water to lands for irrigation, or to the Famoso Basins of the Famoso Groundwater Banking Project.
 5. The Famoso Basins are in Section 8, Township 27 S, Range 26 E, Mount Diablo Base & Meridian as shown on Attachment B, which is attached hereto and a part of this Order.
 6. For the purposes of this Order, the Famoso Groundwater Banking Project includes Reservoir B, the Distribution Canal, the S5 Lateral, the interconnection pipeline,

Conduit "F", Pump Station "E" and "F", and 374 acres of recharge basins. Existing District facilities will be utilized to convey treated oil field produced water from Reservoir B to the Famoso Basins. The Distribution Canal will transport water north from Reservoir B approximately 3-1/2 miles to the Cawelo S5 Lateral, a 30-inch cement mortar-lined and coated pipeline that services agricultural lands within the District service area. A 30-inch diameter C905 Class 200 PVC interconnection pipeline, constructed in 2010, connects the Cawelo S5 Lateral to District Conduit "F" approximately 3 miles to the northwest. The 30-inch and 36-inch Conduit "F" pipeline is utilized to convey the water approximately 1-1/2 miles to the Famoso Basins. Water flows down gradient from the Distribution Canal through these pipelines to the forebay of Pump Stations "E" and "F", and then flows into the basins through a series of pipelines and inter-levee transfer structures. The Famoso Basins include 374 acres of recharge area in seven basins, with an operational storage capacity of 834 acre-feet with two feet of levee freeboard. Emergency storage capacity is 1,208 acre-feet with one-foot of levee freeboard.

7. During the irrigation season, discharge of blended oil field produced water from Reservoir B will be used to meet agricultural irrigation demands in the District. During the non-irrigation season, discharge from Reservoir B will be used by the District for off-season irrigation demand when a demand exists. When there is insufficient off-season irrigation demand, discharge from Reservoir B will be delivered to the Famoso Basins for groundwater recharge. The maximum permitted discharge flow rate from Valley Water will be 14.8 million gallons per day (mgd). All water delivered by the District for irrigation purposes during both irrigation and non-irrigation seasons will meet the water quality criteria established by the District for irrigation water. Water delivered during the non-irrigation season for groundwater recharge through the Famoso Basins will be blended by the District with surface

water supplies, to the extent they are available, and pumped groundwater. Both Valley Water and the District are entities that discharge to groundwater underlying the Famoso Basins and are collectively responsible for compliance with this Order.

Background

8. The District was formed for the purpose of obtaining a “supplemental or partial water supply” and delivering it for irrigation of crops within the District. The District uses imported surface water, pumped groundwater, and treated oil field produced water from Valley Water and others to provide and meet irrigation needs of the agricultural lands of the District.
9. Valley Water has been operating in the Kern Front Oil Field since 1955, and has operated in its current configuration with storage and treatment ponds and conveyance to the District since 1980. [Attachment C](#) provides a flow schematic of the treatment process at the Kern Front Facility. In March 1980, Valley Water and the District executed an agreement whereby reclaimed produced water is provided to the District for beneficial use. Valley Water and the District executed an updated agreement in March 2000.
10. Valley Water receives oil field produced water at the Kern Front Facility from companies operating oil wells in the Kern Front Oil Field. The companies presently conveying oil field produced water to Valley Water 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.). Valley Water currently receives about 5.2 mgd of produced water from Vintage and Bellaire. Approximately 85% of the produced water received by Valley Water originates from Vintage.

11. Vintage has approximately 500 wells that are used to extract an oil and water mixture. The oil and water mixture is delivered primarily to four treatment stations: Fano, NTP, Rob B Dehy, and Section 23. Treatment at these facilities is designed to accomplish oil water separation and to minimize lost product through carryover into the produced water discharge system. The treatment includes mechanical separation, sedimentation, and air floatation (Wemco units). Discharge from the four treatment facilities averages 8.5 mgd of produced water. Approximately 24% of the produced water is disposed of by deep well injection using Class II injection wells (Class II wells are regulated by the California Division of Oil, Gas, and Geothermal Resources). An additional 24% is recycled for oil field reinjection. The remaining 52%, 4.4 mgd, is conveyed to Valley Water via pipeline.

12. Produced water received by Valley Water at the Kern Front Facility is treated to remove oil and grease and inorganic sediment. Four ponds, in series, provide initial gravity separation. Floating oil and grease in the ponds is periodically skimmed and removed. Valley Water currently employs two Wemco air flotation units to provide final polishing. The Wemco units use air flotation techniques combined with chemical coagulants and mechanical agitation to remove free oil and grease. After final polishing, produced water is discharged to a concrete-lined storage pond and then pumped to the District's Reservoir B.

13. Reservoir B is an integral part of the District's water distribution system and supplies irrigation water used in the District via the Distribution Canal. Treated oil field produced water received from Valley Water and others (See Findings 15 and 16 below.) is blended with water from other surface and groundwater supplies to meet agricultural irrigation water quality requirements established by the District. Surface water blended in Reservoir B consists of Kern River water, State Water Project water, and Central Valley Project water delivered from the Beardsley Canal through Lerdo Pumping Station B. The District is required to manage the water through management practices and blending to ensure protection of applicable beneficial uses.

Existing Discharge

14. The Discharger's self-monitoring reports from January 2010 to December 2010 characterize the Valley Water discharge to Reservoir B (**Discharge 001**) as follows:

<u>Constituent</u>	<u>Units</u> ¹	<u>Average Value</u>
Flow	mgd	5.2
Electrical Conductivity @ 25°C	umhos/cm	789
Arsenic	ug/L	79.3
Boron	mg/L	1.08
Chloride	mg/L	86.8
Sodium	mg/L	148.6

1. mgd = million gallons per day; umhos/cm = micromhos per centimeter ; ug/L = micrograms per liter; and

15. Reservoir B also receives oil field produced water from Chevron USA, Inc. (Chevron) serving the Kern River Oil Field. Discharge of produced water from Chevron is regulated under a separate Order. In December 2007, the Central

Valley Water Board adopted Order No. R5-2007-0170 (NPDES Permit No. CA0082295) for Chevron and the District. The Order allows Chevron to discharge up to 33.5 mgd of treated oil field produced water to Reservoir B.

16. Discharges from Chevron into Reservoir B from January 2010 through December 2010 exhibited the following characteristics:

<u>Constituent</u>	<u>Units¹</u>	<u>Average Value</u>
Flow	mgd	22
Electrical Conductivity @ 25°C	umhos/cm	772
Arsenic	ug/L	16.2
Boron	mg/L	0.78
Chloride	mg/L	116
Sodium	mg/L	120

1. mgd = million gallons per day; umhos/cm = micromhos per centimeter; ug/L = micrograms per liter; and
 mg/L = milligrams per liter

17. Surface water deliveries to Reservoir B from Lerdo Pumping Station B for January 2010 through December 2010 exhibited the following characteristics:

<u>Constituent</u>	<u>Units¹</u>	<u>Average Value</u>
Flow	mgd	40
Electrical Conductivity @ 25°C	umhos/cm	127
Arsenic	ug/L	4.2
Boron	mg/L	0.12
Chloride	mg/L	12
Sodium	mg/L	12

1. mgd = million gallons per day; umhos/cm = micromhos per centimeter; ug/L = micrograms per liter; and
 mg/L = milligrams per liter

18. Blended water from Reservoir B has been historically discharged to the Distribution Canal and subsequently used for irrigation during the summer months. In winter when irrigation demand is low, discharge was to Poso Creek. The Discharger's self-monitoring reports from January 2010 through December 2010 characterize the Reservoir B discharge (**Discharge 002**) as follows:

April through September

<u>Constituent</u>	<u>Units¹</u>	<u>Average Value</u>
Flow	mgd	72
Electrical Conductivity @ 25°C	umhos/cm	313
Boron	mg/L	0.30
Chloride	mg/L	42.3
Sodium	mg/L	56.8

1. mgd = million gallons per day; umhos/cm = micromhos per centimeter; ug/L = micrograms per liter; and mg/L = milligrams per liter

October through March

<u>Constituent</u>	<u>Units¹</u>	<u>Average Value</u>
Flow	mgd	28
Electrical Conductivity @ 25°C	umhos/cm	610
Boron	mg/L	0.67
Chloride	mg/L	92.7
Sodium	mg/L	114.8

1. mgd = million gallons per day; umhos/cm = micromhos per centimeter; ug/L = micrograms per liter; and mg/L = milligrams per liter

Proposed Discharge to Famoso Basins

19. On 25 January 2010, the Discharger submitted a Report of Waste Discharge (RWD) for discharges of blended oil field produced water to the Famoso Basins. The RWD was deemed incomplete. In a letter dated 17 February 2010, the Central Valley Water Board notified the Discharger that it must submit the following items to complete the RWD: (1) specific technical information regarding the size, location, and capacities of the basins and an engineering demonstration that the basins are sized to accommodate all groundwater recharge flows, wastewater flows, and ancillary precipitation flows associated with a 100-year wet year; (2) an engineering demonstration that wastewater from the basins will not percolate through basin levees into Poso Creek; and (3) a complete Antidegradation Analysis demonstrating the proposed discharges satisfy the provisions of State Water Resources Control Board Resolution 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California (Antidegradation Policy)*.

20. On 7 October 2010, the Discharger submitted the *Famoso Groundwater Banking Project Operation Study*, demonstrating that the basins are sized to accommodate “all groundwater recharge flows, waste water flows, and ancillary precipitation flows associated with a 100-year wet year.” Central Valley Water Board staff requested some modifications to the report on 21 December 2010; the modifications were submitted on 4 February 2011.

21. On 28 June 2010, the Discharger submitted a *Geotechnical Investigation Report*, which demonstrated that wastewater from the basins will not percolate through basin levees into Poso Creek. Central Valley Water Board staff requested some

modifications to the report on 21 December 2010; the modifications were submitted on 4 February 2011.

22. On 30 June 2011, the Discharger submitted a report titled *Famoso Basins Antidegradation Analysis Report* (Analysis Report) to demonstrate the proposed discharge to Famoso Basins satisfies the provisions of the Antidegradation Policy. Arsenic transport in the unsaturated zone was modeled based on site-specific soil adsorption studies. The site-specific studies indicate arsenic will be retained on soil surfaces in the vadose zone and is not anticipated to change the groundwater quality during the life of the project, or even reach groundwater during the 30 year review period.

23. On 26 October 2011, the Discharger submitted *Famoso Basins Antidegradation Analysis Report, Addendum* (Addendum). The Addendum evaluated the anticipated recharge conditions and included direct rainfall on the Famoso Basins, streambed percolation from Poso Creek, diversion of Poso Creek and other surface water flows into the Famoso Basins during wet years, and diversion of purchased water into the Famoso Basins during dry years. The revised model of the Addendum indicates discharge to the Basins, as managed by the District, will result in water quality over the entire water column that is between background concentrations and appropriate groundwater quality limits described in more detail below. The projected recharge concentrations and the groundwater limits are listed in the following table:

Projected Famoso Basin Recharge Concentrations¹

	Chloride <u>mg/L²</u>	Boron <u>mg/L²</u>	EC <u>umhos/cm³</u>	Sodium <u>mg/L²</u>
30-year Maximum	123	0.75	718	102

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30-year Average	104	0.62	624	87
10-year Average	104	0.55	621	86
Groundwater Limits	175	0.75	1,000	115

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- 1) Based on a data set of annual calculations.
 - 2) mg/L = milligrams per liter.
 - 3) umhos/cm = micromhos per centimeter.

24. The model projects the following groundwater concentrations in existing agricultural wells downgradient of the Famoso Basins

Projected Groundwater Quality¹

	Chloride	Boron	EC	Sodium	Arsenic ⁴
	<u>mg/L²</u>	<u>mg/L²</u>	<u>umhos/cm³</u>	<u>mg/L²</u>	<u>ug/L⁵</u>
Projected Groundwater Quality	113	0.64	679	92	3.4

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- 1) Values shown are the maximum values of chloride, boron, EC, and sodium from wells 7R, 18E, or 6P1 taken from the 30-year dataset that includes concentrations calculated every 4 months
 - 2) mg/L = milligrams per liter
 - 3) umhos/cm = micromhos per centimeter
 - 4) Groundwater concentration of arsenic is taken from the 30 June 2011 Analysis Report
 - 5) ug/L = micrograms per liter

Comparing these results to the background groundwater quality illustrates there may be degradation of the groundwater, but the degradation will be well below appropriate groundwater limits and comply with water quality objectives.

Water Reclamation Policies

25. The *Water Quality Control Plan for the Tulare Lake Basin, Second Edition - revised January 2004*, (hereinafter Basin Plan) specifically provides that “blending of

wastewater with surface or groundwater to promote beneficial reuse of wastewater in water short areas may be allowed where the Regional Water Board determines such reuse is consistent with other regulatory policies set forth or referenced herein.”

26. The Basin Plan further provides as follows: “The irrigation season in the Tulare Lake Basin area typically extends 9 to 10 months, but monthly water usage varies widely. To maximize reuse, users should provide water storage and regulating reservoirs, or percolation ponds that could be used for groundwater recharge of surplus waters when there is no irrigation demand.”

27. Resolution No. R5-2009-0028 *In support of Regionalization, Reclamation, Recycling and Conservation for Wastewater Treatment Plants* was adopted by the Central Valley Water Board in April 2009 to promote wastewater reuse projects such as the Famoso Groundwater Banking project authorized by this Order.

28. The Water Conservation Act of 2009, Senate Bill (SBX7-7), requires 20 percent reduction in statewide water use by 2020 to be achieved through implementation of Best Management Practices (BMPs) and optimization of water reclamation opportunities in the urban, industrial, and agricultural sectors. The proposed project is consistent with these goals.

Site Specific Conditions

29. The District area is characterized by hot dry summers and cooler, humid winters. The rainy season generally extends from November through March. Average annual precipitation and pan evaporation for the area are 6.5 inches and in excess of 74

inches, respectively. The 100-year, 24-hour maximum precipitation is about 2.9 inches, based on maps obtained from the Kern County Resource Management Agency, Engineering, Survey and Permit Services, Floodplain Management Section.

30. The general area of the Famoso Basins consists of older alluvial soil with a geologic age of Pleistocene. Poso Creek has cut down through this older soil and deposited a relatively narrow and thin area of recent alluvium. The natural soil profile at the spreading basins is comprised of a thin (2 to 6 feet) layer of silty sand with trace clay underlain by interbedded and laterally discontinuous layers of clean sand, silty sand, sandy silt, and clayey sand. Previous excavations within Poso Creek revealed a 5 to 6 foot deep scour zone within the bottom of the Poso Creek channel. This scour zone consists of clean sand. The spreading basin berms were created with engineered fill generated from shallow cuts in the upper silty sand horizon. Prior to constructing the berms, the surface soil (silty sand) was excavated to remove disturbed near-surface soil and remnant desiccation cracks. The exposed excavation surface was scarified and compacted. This site preparation for the berms resulted in engineered fill extending at least two feet below original grade for the berms along Poso Creek.
31. The Discharger's Kern Front Facility is not covered by a National Pollutant Discharge Elimination System general industrial storm water permit because storm water runoff from the Kern Front Facility is retained onsite.
32. The total land use area within the District is about 45,000 acres. Non-agricultural lands comprise about 11 percent of the total area. There is also 12.8 percent that is not farmed. Of the remaining 76.2 percent, 99 percent is planted in permanent crops of citrus, almonds, pistachios, apples, peaches, plums and vineyards irrigated

by surface application or drip systems. The remaining one percent of irrigated crops includes alfalfa, potatoes, corn, grains, vegetables, and melons. The primary crops grown within five miles of the Famoso Basins include grapes, citrus, deciduous fruits and nuts according to the land use maps prepared by California Department of Water Resources (DWR) and District records.

District Basin-Wide Groundwater Considerations

33. Basin Plan water quality objectives to protect the beneficial uses of groundwater include numeric 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 groundwater's 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.
34. State Water Board Resolution No. 68-16 (hereafter Resolution 68-16) requires the Central Valley 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 Central Valley Water Board's policies (e.g., quality that

exceeds water quality objectives). Resolution 68-16 requires that the discharge meet best practicable treatment or control (BPTC).

35. The California Legislature enacted A.B. 3030 during the 1992 session, subsequently codified in Water Code section 10750, *et seq.* Water Code section 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.”

36. Water Code section 60224 empowers the District to take any action needed for protection and preservation of groundwater supplies within the District including:

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

37. The District adopted a Groundwater Management Plan (Plan) on 21 July 1994 to establish a policy of efficient water use, conservation, and management. The District adopted an Amended Groundwater Management Plan in July 2007 in accordance with the requirements of SB 1938, Chapter 603. The California

Legislature enacted S. B. 1938 during the 2002 session, subsequently codified in Water Code section 10753, *et seq* and section 10795.4. Action elements in the Plan include:

- Acquire and import available, supplemental surface water for crop irrigation and groundwater recharge;
- The District filed Application 26454, 15 July 1980, to appropriate Poso Creek flow, and the State Water Resources Control Board issued Permit 21032 on 11 May 2000;
- Facilitate conjunctive use operations by the importation and recharge use of supplemental water;
- Construct and operate District wells; and
- Monitor well construction and abandonment as administered by Kern County.

38. Monitoring elements of the Plan include:

- Semi-annual monitoring of groundwater levels of wells within the District;
- Semi-annual preparation of maps of equal elevation of water in wells;
- Monitoring groundwater quality annually and preparing maps of conductivity, chloride, and boron concentrations; and
- Operating and maintaining the Poso Creek gauging station above State Highway 65.

39. As part of its Management Plan, the District endeavors to provide water to its farmers that meets or exceeds the following water quality goals:

Constituent

Units¹

Value

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Electrical Conductivity @ 25°C	umhos/cm	650
Boron	mg/L	0.6
Chloride	mg/L	100
Sodium	mg/L	160

1. umhos/cm = micromhos per centimeter; mg/L = milligrams per liter.

40. In March 2007, the Discharger submitted a report entitled *Cawelo Water District, Valley Waste Disposal Company, Chevron, Proposed Modification of Waste Discharge, Technical Study Update for the California Regional Water Quality Control Board* (hereafter Salinity Study) in support of proposed production water flow and EC increases from Valley Water and proposed production water flow increases from Chevron to District Reservoir B. The Salinity Study presents the results of a salt balance model that evaluates the potential impacts to groundwater underlying the District resulting from the currently authorized produced water flow rates and EC concentrations from all sources to the District, including discharges to Reservoir B from Chevron and Valley Water. The Salinity Study concludes that at projected quality and maximum flow rates from Chevron and Valley Water of 33.5 mgd and 7.4 mgd, respectively, the EC of underlying groundwater could increase by 5.98 umhos/cm per year when balanced by contracted and projected freshwater sources. The Salinity Study states that salts in produced water from Chevron and Valley Water will be blended and balanced with imported fresh water from the Kern River and the State Water Project and managed by the District to meet its irrigation needs and comply with Basin Plan requirements.

41. The Discharger submitted a groundwater monitoring report on 1 February 2005 in conformance with the Plan described in [Finding No. 37](#). The 1 February report states that the average EC of groundwater in the District decreased from 711 umhos/cm to 662 umhos/cm between 1999 and 2004. As determined by the

District, the five year rolling average EC of groundwater in the District as of 2011 was 637 umhos/cm.

42. Groundwater depth, flow, and mixing vary depending on factors such as irrigation demand, precipitation, surface water applied, groundwater flow into and out of the area, and the groundwater extraction zone. The Salinity Study's analysis of the effect of the discharge on groundwater looks at averages over the entire District. The actual impact can vary considerably both vertically and spatially. The impacts will be less noticeable in upgradient (eastern areas) where there is an influx of good quality groundwater.
43. To sustain existing irrigated agriculture, the District supplements the landowner's use of groundwater with imported surface water and the treated oil field produced water from Valley Water and other sources as described herein. Through its authority and Plan, the District proposes to manage the project within its boundaries to meet Basin Plan objectives. The Basin Plan allows blending of wastewater with surface and groundwater to promote reuse of wastewater in water short areas provided it is otherwise consistent with water quality policies. The Poso Creek Subarea and District are water-short areas and the District can ensure consistency with water quality policies by proper management.
44. Irrigation wells within the District extend to at least 900 feet below ground surface (bgs), typically draw water from perforated zones in an unconfined aquifer that extends from 450 feet bgs to more than 1200 feet bgs. The base of the aquifer is about 1500 feet bgs. Domestic wells within the District are typically shallower, seldom penetrating greater than 100 feet below the water table.

Famoso Basins Groundwater Considerations

45. As described in [Finding 7](#), the proposed project includes non-irrigation season discharge of blended oil field produced water by Valley Water at currently authorized flow rates to the Famoso Basins for purposes of groundwater recharge.
46. Previous orders have not required groundwater monitoring in the vicinity of the Famoso Basins, but the District collected data (depth to groundwater, analytical results) from nearby irrigation and supply wells to establish current groundwater conditions beneath the Famoso Basins.
47. Based on data from these wells in the vicinity of the Famoso Basins, depth to groundwater was determined to be on the order of 350 feet bgs with a direction of flow to the west/southwest. This determination is consistent with available data from the Kern County Water Agency and DWR which indicate the regional groundwater level (January, 2010) at a depth of about 350 feet bgs and a west-southwest flow direction south of Poso Creek.
48. Ten of the existing wells in the vicinity of the Famoso Basins were sampled in February 2011 to characterize the background groundwater quality beneath the basins. As described in detail in the June 2011 Analysis Report, seven of the ten wells sampled were determined to be appropriate for characterizing background groundwater quality in the area. The following table presents background groundwater quality characterization based on the Analysis Report.

	<u>Chloride,</u> <u>mg/L²</u>	<u>Boron,</u> <u>mg/L²</u>	<u>EC¹,</u> <u>umhos/cm³</u>	<u>Sodium,</u> <u>mg/L²</u>	<u>Arsenic,</u> <u>ug/l⁴</u>
Background Groundwater Quality for 7 wells⁽⁵⁾	87.7	0.14	618	55.7	3.4

1. EC = Electrical conductivity
2. mg/L = milligrams per liter
3. umhos/cm = micromhos per centimeter
4. ug/L = micrograms per liter
5. 7 wells: 6Q, 7A4, 7B2, 7H2, 8Q1, 8Q2, 17D

49. All of the constituents present in the blended produced water are at concentrations below any maximum contaminant levels (MCLs) (primary and secondary) with the exception of arsenic. As demonstrated in the soil adsorption/arsenic removal report presented in the Antidegradation Analysis Report, the arsenic contained in Reservoir B water will be completely adsorbed as water infiltrates through the unsaturated soils underlying the Famoso Basins and there will be no increase in arsenic concentrations in the underlying groundwater.

Basin Plan, Beneficial Uses, and Water Quality Objectives

50. The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. The beneficial use of water in District Reservoir B and the District distribution system by design is agricultural supply (AGR). The Basin Plan designates the beneficial uses of groundwater as municipal and domestic

supply (MUN), agricultural supply (AGR), industrial process supply (PRO), and industrial service supply (IND).

51. Water in the Tulare Lake Basin is in short supply, requiring importation of surface water from other parts of the State. The Basin Plan encourages use of recycled water on irrigated crops wherever feasible and indicates that evaporation of recyclable wastewater is not an acceptable permanent disposal method where the opportunity exists to replace existing uses or proposed use of fresh water with recycled water.
52. The Basin Plan includes a water quality objective for chemical constituents that, at a minimum, require waters designated as MUN to meet the State drinking water MCLs specified in Title 22. The Basin Plan recognizes that the Central Valley Water Board may apply limits more stringent than MCLs to ensure that waters do not contain chemical constituents in concentrations that adversely affect beneficial uses.
53. The Basin Plan contains the following salt management requirements that are applicable to the groundwater within the District:
 - a. The Basin Plan policy for disposal of oil field wastewater includes effluent limits for EC, chloride, and boron of 1,000 umhos/cm, 200 mg/L, and 1.0 mg/L respectively. These effluent limits reflect best practicable treatment or control (BPTC) for oil field discharges with respect to salinity.
 - b. In 1982, the Central Valley Water Board amended the Basin Plan to allow discharges of oil field wastewater to exceed the above limits to facilitate use for

irrigation and other beneficial uses where the exception would not cause an exceedance of a water quality objective. The Basin Plan, therefore, provides some flexibility to allow oil field wastewater exceeding Basin Plan salinity limits to be used for agricultural use in water short areas, provided the discharger first successfully demonstrates to the Central Valley Water Board that the increases will not cause exceedances of water quality objectives.

- c. The Basin Plan includes effluent salinity limits for discharges to the Poso Creek Subarea for EC, chloride, and boron of 1,000 umhos/cm, 200 mg/L, and 1.0 mg/L respectively.
- d. The Basin Plan includes water quality objectives for the incremental increase in groundwater EC for specific Hydrographic Units. To this end, the Basin Plan states that the maximum average annual increase in salinity as measured by EC shall not exceed 6 umhos/cm in the Poso Hydrographic Unit with the average annual increase in EC determined from the monitoring data by calculation of a cumulative average annual increase over a five year period. As the District covers a large portion of the Poso Hydrographic Unit, Order R5-2007-0066 implemented the water quality objective as a groundwater receiving water limit. This Order carries over the same limit.

54. The Basin Plan establishes narrative water quality objectives for Chemical Constituents, Taste and Odors, and Toxicity. The Toxicity objective, in summary, requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with designated beneficial uses. Quantifying a narrative water quality

objective requires a site-specific evaluation of those constituents that have the potential to impact water quality and beneficial uses.

55. The Basin Plan states that when compliance with a narrative objective is required to protect specific beneficial uses, the Central Valley Water Board will, on a case-by-case basis, adopt numerical limitations in order to implement the narrative objective.

56. In the absence of specific numerical water quality limits, the Basin Plan methodology is to consider any relevant published criteria. General salt tolerance guidelines, such as Water Quality for Agriculture by Ayers and Westcot and similar references, indicate that yield reductions in nearly all crops are not evident when irrigating with water having an EC less than 700 umhos/cm. There is, however, an eight- to ten-fold range in salt tolerance for agricultural crops. It is possible to achieve full yield potential for some crops with waters having EC up to 3,000 umhos/cm if the proper leaching fraction is provided to maintain soil salinity within the tolerance of the crop. The list of crops in [Finding 32](#) is not intended as a definitive inventory of crops that are or could be grown in the area affected by the discharge, but is representative.

57. The rationale for specific effluent limits within this Order follow:

- a. **Oil and Grease:** Order R5-2007-0066 contained an oil and grease limit for Valley Water discharges to Reservoir B of 35 mg/L based on 40 Code of Federal Regulations part 435.50, *Oil and Grease Extraction Point Source Category, Agricultural and Wildlife Water Use Subcategory*. While the discharges to land subject herein are no longer subject to federal

requirements, the Basin Plan requires the Discharger to comply with, or justify a departure from, effluent limitations set forth in 40 CFR 400 et seq. if discharge is to land. The Discharger has not provided such a justification, but rather has shown that the Kern Front Facility is capable of consistently meeting the oil and grease limit of 35 mg/L. Thus the limit is carried over from Order R5-2007-0066.

- b. **Conductivity @ 25°C (EC):** WDRs Order No. R5-2007-0066 limits EC of the discharge to an annual average of 1,030 umhos/cm. The 2007 Salinity Study ([Finding 40](#)) shows that when Valley Water is discharging 7.4 mgd and Chevron is discharging 33.5 mgd of produced water with EC at levels equal to the 10-year historical median values, the EC of underlying groundwater may increase as much as 5.98 umhos/cm per year, which complies with the Basin Plan. This Order authorizes a maximum daily flow rate of 7.4 mgd for Valley Water, and allows for an increase to 14.8 mgd, once the Discharger has demonstrated compliance with Provision F. 13 of this Order. As the Salinity Study uses a long-term median value EC of 1,030 umhos/cm and a flow rate of 7.4 mgd from Valley Water for its calculations, a reduction in allowable EC to accommodate the newly authorized 14.8 mgd flow increment will be required to maintain the 6 umhos/cm salinity increase limit required by the Basin Plan. Accordingly, this Order contains a final EC limit of 515 umhos/cm. The Order also provides interim step values for EC to be used for intermediate flow increases. Groundwater quality changes will exhibit the average effect of the managed discharge; therefore, it is reasonable and appropriate to control the long-term effect with an annual average effluent EC limit. To be effective, the District must manage produced water from Valley Water and Chevron to ensure

compliance with the water quality objective for incremental increase within the District. In addition to the above limits on Discharge 001, this Order also carries over the Basin Plan effluent limit of 1,000 umhos/cm (annual average) EC limit/specification for Discharge 002.

- c. **Boron:** Order No. R5-2007-0066 contains annual average limitations for boron of 1.5 mg/L and daily maximum limitations of 1.6 mg/L, respectively, at Discharge 001. This Order contains boron limitations for Discharge 001 of 1.3 mg/L (annual average) at the maximum proposed flow of 14.8 mgd in order to ensure that the Basin Plan boron limit of 1.0 mg/L that is applied to discharges from Reservoir B (Discharge 002) is not exceeded during the non-irrigation season when surface water blending sources are less reliable. Similar to EC, this Order also provides interim step values for boron to be used for intermediate flow increases to ensure that the Basin Plan boron limit of 1.0 mg/L is not exceeded. At a flow rate of 7.4 mgd, the effluent limit for Boron is 1.5 mg/L at Discharge 001. The 1.0 mg/L (monthly average) boron limit/specification for Discharge 002 are consistent with Basin Plan limitations for discharges to land within the Poso Creek Subarea and oil field discharges to surface waters within the Tulare Lake Basin ([Finding Nos. 53 and 54](#)).
- d. **Chloride:** Order No. R5-2007-0066 contains daily maximum discharge specifications for chloride of 200 mg/L. This Order contains a discharge specification for Discharge 001 of 200 mg/L (annual average). This limit is consistent with the Basin Plan. This Order also carries over from Order No. R5-2007-0066 the Basin Plan limit of 200 mg/L (annual average) chloride limit for Discharge 002.

- e. **Sodium:** This Order contains effluent limits for Discharge 001 and 002 of 202 mg/l (annual average) and 135 mg/l (annual average), respectively. These limitations are consistent with the groundwater limitations developed in the Analysis Report and Addendum to comply with the Basin Plan narrative requirement for protection of the AGR beneficial use.
- f. **Arsenic:** The Discharger completed an arsenic soil-adsorption removal study using soil samples collected from the Famoso Basins and submitted study results in the Antidegradation Analysis Report. The results demonstrate that the unsaturated soils underlying the Famoso Basins have sufficient capacity to adsorb all arsenic from recharge containing a concentration as high as 120 ug/L for at least a 100-year period. Discharges from Reservoir B will not contain arsenic concentrations approaching 120 ug/L. The results demonstrate that there will be no change in the arsenic concentration in underlying groundwater associated project discharges. Therefore, this Order does not contain arsenic limits.

ANTIDEGRADATION

58. State Water Board Resolution No. 68-16 (*"Policy with Respect to Maintaining High Quality Waters of the State"*) (hereafter Resolution 68-16) prohibits degradation of groundwater unless it has been shown that:

- a. 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;
- b. The degradation will not unreasonably affect present and anticipated future beneficial uses;
- c. The Discharger employs best practicable treatment or control (BPTC) to minimize degradation; and
- d. The degradation is consistent with the maximum benefit to the people of the State.

59. When setting effluent limits in Order R5-2007-0066 for flow, EC, chloride, and boron into Reservoir B, and effluent limits for EC, chloride, and boron for discharges from Reservoir B, the Central Valley Water Board considered the Salinity Study, applicable Basin Plan effluent limits, and the factors listed in [Finding 58](#) above, and concluded that groundwater degradation that might occur from the discharges was consistent with the Antidegradation Policy. This Order's discharge limits from Valley Water to Reservoir B and from Reservoir B to the Distribution Canal are consistent with those carried over from Order R5-2007-0066, and therefore, the Board does not need to reconsider Antidegradation with respect to those previously-considered limits.

60. As described in [Findings 22 and 23](#), the District conducted an antidegradation analysis for proposed non-irrigation season discharges to the Famoso Basins. The analysis establishes background water quality upgradient of the Basins and presents

groundwater limitations for the crops grown in the area that could be affected by the proposed discharges. It also models potential changes in groundwater quality that may occur from the proposed discharges and proposes a groundwater monitoring well network to monitor for the potential changes.

61. The Famoso Basins antidegradation analysis model indicates that the proposed discharges may degrade underlying groundwater with EC, chloride, boron, and sodium, but that any degradation that does occur will not exceed proposed groundwater limits and will not cause an exceedance of applicable water quality objectives.

Treatment and Control Practices

62. The Kern Front Facility and District management of Reservoir B and its irrigation system provide treatment or control of the discharge that incorporates:
- a. Primary and secondary surge tanks for initial oil/water separation;
 - b. Wemco flotation clarifiers and heat treatment to separate emulsified oil droplets from the water for additional product recovery;
 - c. Reclaimed water for steam injection;
 - d. Separation Ponds for gravity separation of oil and water;
 - e. Wemco use for final treatment of the produced water prior to delivery to Reservoir B;

- f. Blending produced water with available surface water supplies and groundwater to achieve specified discharge limits for beneficial reuse through crop irrigation and groundwater recharge;
- g. Management of produced water to maximize reuse;
- h. Diversion of Poso Creek flood flows to the Famoso Basins whenever available to further improve percolation water quality; and
- i. Monitoring of Discharges to and from Reservoir B and discharges to the Famoso Basins, the overall groundwater quality of the District, and groundwater quality near the Famoso Basins, to ensure compliance with effluent groundwater limits prescribed herein.

Antidegradation Conclusions

63. The effluent and groundwater limitations established by this Order will ensure that any degradation that does occur 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 treatment and control practices described in [Finding 62](#) represent BPTC.

64. Authorization of the discharges as proposed will:

- a. Enable the continued conjunctive reuse of oilfield produced water combined with surface and groundwater supplies to provide for irrigation in a water short area.

This conjunctive reuse reduces the reliance on both surface water and groundwater supplies.

- b. Provide ongoing benefits associated with oil production, the jobs it creates, and the resulting economic stimulation to the surrounding communities and associated industries.
 - c. Enable continued benefits provided by irrigated agriculture within the District.
 - d. Provide groundwater recharge in an area of otherwise declining water levels, thereby decreasing energy costs for deep well pumping and prolonging the life of wells completed at shallow depths.
 - e. Conserve additional energy by allowing reuse of oil field produced water that would otherwise be disposed of through injection at a higher energy cost.
 - f. Enable continued development of domestic energy production in the Kern Front Oil Field.
65. Given the information in [Finding 63](#) and the benefits described in [Finding 64](#), authorization of the discharge as regulated herein is to the maximum benefit of the people of the State and consistent with the Antidegradation Policy.

TITLE 27 REQUIREMENTS

66. Discharges of oil field produced water from Valley Water to Reservoir B, and from Reservoir B to the District are 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 Central Valley 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 1, as a hazardous waste.

67. The oil and grease removed from produced water at the Kern Front Facility is a designated waste as defined in Title 27 and subject to the full containment specifications therein. However, the oil and grease is contained in a seamless above ground stainless steel tank equipped with a secondary containment area of more than 100 times the volume of the tank 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.

CEQA

68. In accordance with the California Environmental Quality Act (CEQA)(Public Resources Code section 21000, et seq.), the District approved a Negative Declaration in April

2007 for the increase in flows proposed at that time. The Central Valley Water Board reviewed and commented on the Negative Declaration and found that the project as approved by the District and permitted by Order R5-2007-0066 would not have a significant effect on the environment.

The Discharger adopted a Negative Declaration (ND) in 2011 in accordance with the CEQA for discharges to the Famoso Basins. Central Valley Water Board staff reviewed the ND and concurred that it addressed issues with regards to potential impacts to water quality.

69. Additionally, this Order includes requirements to protect water quality, including:

- a. Effluent Limits for Discharge 001 and 002, which establish numerical effluent limitations that are reflective of best practicable treatment for this discharge.
- b. Discharge Specification C.3, which stipulates waste constituents cannot be released or discharged in a concentration or mass that causes violation of this Order's groundwater limitations.

General Findings

70. Based on the threat to water quality and complexity of the discharge, the discharge to and from Reservoir B is determined to be classified as 2-B. Section 2200 of title 23, CCR, defines these categories to include any of the following:

- a. Category 2 threat to water quality: "Those discharges of waste that could impair the designated beneficial uses of the receiving water, cause short term

violations of water quality objectives, cause secondary drinking water standards to be violated, or cause a nuisance.”

- b. Category B complexity: “Any discharger not included in Category A that has physical, chemical, or biological treatment systems (except for septic systems with subsurface disposal), or any Class 2 or Class 3 waste management units.”

71. Pursuant to Water Code section 13263(g), discharge is a privilege, not a right, and adoption of this Order does not create a vested right to continue the discharge.

72. The Central Valley Water Board will review this Order periodically and will revise requirements when necessary.

73. Water Code section 13267(b) states that:

“In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge, waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.”

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KERN FRONT OIL FIELD
KERN COUNTY

74. The technical reports required by this Order and the attached Monitoring and Reporting Program R5-2012-XXXX are necessary to assure compliance with these WDRs. The Discharger owns and operates the facility that discharges the waste subject to this Order.

75. DWR sets standards for the construction and destruction of groundwater wells, as described in the *California Well Standards Bulletin 74-90 (June 1991)* and *Water Well Standards: State of California Bulletin 94-81 (December 1981)*. These standards and any more stringent standards adopted by the State or county pursuant to Water Code section 13801, apply to all monitoring wells.

Public Notice

76. All of the above and the supplemental information and details in the attached Information Sheet, which is incorporated herein, were considered in establishing the following conditions of discharge.

77. The Discharger and interested agencies and persons have been notified of the intent to prescribe WDRs for this discharge, and they have been provided an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

78. All comments pertaining to the discharge were heard and considered in a public meeting.

IT IS HEREBY ORDERED that, Waste Discharge Requirements Order R5-2007-0066 (NPDES No. CA0081311) and Time Schedule Order R5-2011-0901 are hereby rescinded, except for enforcement purposes, and that, pursuant to Water Code sections 13263 and 13267, Valley Water, Cawelo Water District, and their agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the Water Code and regulations adopted thereunder, shall comply with the following:

A. Discharge Prohibitions

1. Discharge of waste other than treated oil field produced water at the location and in the manner described in the Findings and authorized herein is prohibited.
2. The bypass or overflow of wastes to surface waters is prohibited.
3. Neither the discharge nor its treatment shall create a nuisance or pollution as defined in Water Code section 13050.
4. Discharge of waste classified as 'hazardous', as defined in Section 2521(a) of Title 23, California Code of Regulations (CCR), Section 2510 et seq., or of waste classifiable as 'designated', as defined in Water Code section 13173, is prohibited.

B. Effluent Limitations

1. The discharge of treated oil field produced water from Valley Water to Reservoir B (Discharge 001) shall not exceed the following for the constituents listed. For EC and boron, a second table shows the maximum concentration allowed as the discharge to Reservoir B increases to the maximum authorized flow volume.

<u>Constituent</u>	<u>Units</u> ¹	<u>Daily Maximum</u>	<u>Annual</u>
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Flow	mad	14.8 ²	
Boron	ma/L		1.3 ²
Chloride	ma/L		200
EC ³	umhos/cm		515 ²
Oil and Grease	ma/L	35	
Sodium	mg/L		202

1. mgd = million gallons per day; mg/L = milligrams per liter; umhos/cm = micromhos per centimeter
2. The values shown are the final limit at 14.8 mgd and the final EC limit. In the table below, interim step values are shown for intermediate flow increases
3. EC = Electrical Conductivity

DISCHARGE 001 - Variable Flow/EC¹/Boron Limits

<u>Phase</u>		<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>	
<u>Flow Scale, Daily</u>						
<u>Maximum</u> ²	<u>mgd</u>	< 7.4	7.4 - 9.3	9.3 - 11.1	11.1 - 13.0	13.0 - 14.8
<u>EC Limit, Annual</u>						
<u>Average</u>	<u>umhos/cm</u>	1,030	824	687	589	515
<u>Boron Limit, Annual</u>						
<u>Average</u>	<u>mg/l</u>	1.5	1.45	1.4	1.35	1.3

1. EC = Electrical Conductivity
2. The daily maximum flow shall not exceed: 7.4 mgd until the requirements of Provision E. 13.a. are satisfied, 9.3 mgd until the Requirements of Provision E.13.b. are satisfied, 11.1 mgd until the requirements of Provision E.13.c. are satisfied, 13.0 mgd until the requirements of Provision E.13.d. are satisfied. ,
2. The annual total dissolved solids loading to the District contributed by Valley Water discharges shall not exceed 6,636 tons per year. This limit shall be evaluated on a quarterly basis using available flow and EC data and appropriate conversions.

3. The discharge of treated, blended oil field produced water from District Reservoir B to the Distribution Canal (Discharge 002) shall not exceed the following for the constituents listed:

<u>Constituent</u>	<u>Units</u> ¹	<u>Annual Average</u>
Boron	mg/L	1.0
Chloride	mg/L	200
EC ²	umhos/cm	1,000
Sodium	mg/L	135

1. mg/L = milligrams per liter; umhos/cm = micromhos per centimeter; and

2. EC = Electrical conductivity.

C. Discharge Specifications

1. Wastewater treatment and use of blended, reclaimed, oil field produced water for groundwater recharge shall not cause pollution or a nuisance as defined by Water Code section 13050.
2. The Discharger shall operate all systems and equipment to optimize treatment of wastewater and the quality of the discharge.
3. No waste constituent shall be released or discharged, or placed where it will be released or discharged, in a concentration or in a mass that causes violation of groundwater limitations.
4. All conveyance, treatment, storage, and disposal units shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

5. Objectionable odors shall not be perceivable beyond the limits of Reservoir B and the Famoso Basins property at an intensity that creates or threatens to create nuisance conditions.
6. Recharge basins shall have sufficient capacity to accommodate allowable wastewater flow and design seasonal precipitation and ancillary inflow and infiltration during the winter. Design seasonal precipitation shall be based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns.
7. On or about **1 November** of each year, the available recharge basin capacity shall at least equal the volume necessary to comply with Discharge Specification C.6.
8. Reservoir B and the Famoso Basins shall be managed to prevent breeding of mosquitoes. In particular,
 - a. An erosion control plan should assure that coves and irregularities are not created around the perimeter of the water surface.
 - b. Weeds shall be minimized through control of water depth, harvesting, and herbicides.
 - c. Dead algae, vegetation and other debris shall not accumulate on the water surface.
 - d. Vegetation management operations in areas in which nesting birds have been observed shall be carried out either before or after, but not during, the 1 April to 30 June bird nesting season.

D. Groundwater Limitations

1. The discharge, in combination with other sources, shall not cause groundwater underlying the District to contain waste constituents in concentrations that adversely affect beneficial uses. In no case shall the discharge, in combination with other sources, cause average EC in groundwater on a District-wide basis to increase by more than six (6) umhos/cm per year. The average annual increase in EC will be determined from monitoring data by calculation of a cumulative average and annual increase over a 5-year period.
2. The discharge shall not cause groundwater in the area potentially affected by discharges to the Famoso Basins to contain waste constituents in concentrations greater than the following:

	Arsenic	Boron	Chloride	Sodium	Electrical Conductivity
<u>Units¹</u>	<u>ug/L</u>	<u>mg/L</u>	<u>mg/L</u>	<u>mg/L</u>	<u>umhos/cm</u>
<u>Limit</u>	10	0.75	175	115	1,000

1. ug/L = micrograms per liter; mg/L = milligrams per liter; and umhos/cm = micromhos per centimeter.

E. Provisions

1. The Discharger shall comply with the Standard Provisions and Reporting Requirements for Waste Discharge Requirements, dated 1 March 1991 (Standard Provisions), which are a part of this Order.
2. The Discharger shall comply with Monitoring and Reporting Program (MRP) R5-2012-XXXX, which is part of this Order, and any revisions thereto as adopted by the Central Valley Water Board or approved by the Executive Officer.

3. The Discharger shall keep at the District office and Kern Front Treatment Facility, copies of this Order including its MRP, Information Sheet, attachments, and Standard Provisions, for reference by operating personnel. Key operating personnel shall be familiar with its contents.
4. Valley Water and the District must at all times properly operate and maintain their respective facilities and systems of treatment and control (and related appurtenances) that are installed or used to achieve compliance with the conditions of this Order. Proper operation and maintenance also include adequate laboratory controls and appropriate quality assurance procedures. This Provision requires the operation of back-up or auxiliary facilities or similar systems that are installed only when the operation is necessary to achieve compliance with the conditions of the Order.
5. All technical reports and work plans required herein that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of a person registered to practice in California pursuant to California Business and Professions Code Sections 6735, 7835, and 7835.1. As required by these laws, completed technical reports and work plans must bear the signature(s) and seal(s) of the registered professional(s) in a manner such that all work can be clearly attributed to the professional responsible for the work. All reports required herein are required pursuant to California Water Code Section 13267.
6. The Discharger must comply with all conditions of this Order, including timely submittal of technical and monitoring reports as directed by the Executive Officer. Accordingly, the Discharger shall submit to the Central Valley Water Board on or

before each report due date the specified document or, if an action is specified, a written report detailing evidence of compliance with the date and task. If noncompliance is being reported, the reasons for such noncompliance shall be stated, plus an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Central Valley Water Board by letter when it returns to compliance with the time schedule. Violations may result in enforcement action, including Central Valley Water Board or court orders requiring corrective action or imposing civil monetary liability, or in revision or rescission of this Order.

7. In the event of any change in control or ownership of land or waste treatment and storage facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to the Central Valley Water Board.
8. To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the state of incorporation if a corporation, the address and telephone number of the persons responsible for contact with the Central Valley Water Board and a statement. The statement shall comply with the signatory paragraph of Standard Provision B.3 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. If approved by the Executive Officer, the transfer request will be submitted to the Central Valley Water Board for its consideration of transferring the ownership of this Order at one of its regularly scheduled meetings.

9. The Discharger shall submit the technical reports and work plans required by this Order for Central Valley Water Board staff consideration and incorporate comments they may have in a timely manner, as appropriate. The Discharger shall proceed with all work required by the following provisions by the due dates specified.
10. The Discharger shall maintain and operate all ponds sufficient to protect the integrity of containment levees and prevent overtopping or overflows. Unless a California civil engineer certifies (based on design, construction, and conditions of operation and maintenance) that less freeboard is adequate, the operating freeboard in any pond shall never be less than two feet (measured vertically). As a means of management and to discern compliance with this Provision, the Discharger shall install and maintain in the two lowest elevation ponds in the system, permanent markers with calibration that indicates the water level at design capacity and enables determination of available operational freeboard.
11. By **(90 Days following adoption of Order)**, the Discharger shall submit a technical report describing a proposed methodology, including statistical analyses, for determining intrawell groundwater quality goals to quantify degradation caused by discharges of oilfield production water to the Famoso Basins. The proposed methodology is subject to the approval of the Executive Officer.
12. By **(40 months following adoption of Order)**, the Discharger shall submit a Groundwater Quality Assessment Report that presents a summary of all monitoring data (including data collected prior to the adoption of this Order), determines the actual groundwater quality at the specified wells described below and verifies the Discharger's Antidegradation Analysis. The determination of actual groundwater quality shall be made using the methods approved by the

Executive Officer, and shall be based on data from at least 12 consecutive quarterly monitoring events. For each monitoring constituent, the report shall compare the measured concentration in each compliance monitoring well with the proposed intrawell goals to determine the need to reopen the Order to revise the Antidegradation Analysis Report. The groundwater monitoring wells that currently comprise the monitoring well network are presented in the accompanying Monitoring and Reporting Program R5-2012-XXXX.

13. Valley Water shall not increase its maximum daily discharge flow until it meets the requirements described below and receives written authorization of the requested increase from the Executive Officer.

Phase	Requirements
a.	<p>90 days prior to increasing its daily maximum discharge flow to Reservoir B to more than 7.4 mgd, Valley Water must submit a written certification in the form of technical report demonstrating that it has installed enough WEMCO capacity to consistently meet the oil and grease limit in Effluent Limitation B.1., and that it has installed additional treatment capacity or otherwise implemented measures to reliably meet the annual average effluent EC and Boron limits of 824 umhos/cm and 1.45 mg/L, respectively. The certification must be consistent with the requirements of Provision F.5 above. Following Executive Officer written concurrence with the certification, Valley Water may increase its discharge flow to 9.3 mgd.</p>
b.	<p>90 days prior to increasing its daily maximum discharge flow to Reservoir B to more than 9.3 mgd, Valley Water must submit a written certification in the form of technical report demonstrating that it has installed enough WEMCO treatment capacity to consistently meet the oil and grease limit in Effluent Limitation B.1., and that it has installed additional treatment capacity or otherwise implemented measures to reliably meet the annual average effluent EC and Boron limits of 687 umhos/cm and 1.4 mg/L, respectively. The certification must be consistent</p>

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 KERN FRONT OIL FIELD
 KERN COUNTY

	with the requirements of Provision F.5 above. Following Executive Officer written concurrence with the certification, Valley Water may increase its discharge flow to 11.1 mgd.
c.	90 days prior to increasing its daily maximum discharge flow to Reservoir B to more than 11.1 mgd, Valley Water must submit a written certification in the form of technical report demonstrating that it has installed enough WEMCO capacity to consistently meet the oil and grease limit in Effluent Limitation B.1., and that it has installed additional treatment capacity or otherwise implemented measures to reliably meet the annual average effluent EC and Boron limits of 589 umhos/cm and 1.35 mg/L, respectively. The certification must be consistent with the requirements of Provision F.5 above. Following Executive Officer written concurrence with the certification, Valley Water may increase its discharge flow to 13.0 mgd.
d.	90 days prior to increasing its daily maximum discharge flow to Reservoir B to more than 13.0 mgd, Valley Water must submit a written certification in the form of technical report demonstrating that it has installed enough WEMCO capacity to consistently meet the oil and grease limit in Effluent Limitation B.1., and that it has installed additional treatment capacity or otherwise implemented measures to reliably meet the annual average effluent EC and Boron limits of 515 umhos/cm and 1.3 mg/L, respectively. The certification must be consistent with the requirements of Provision F.5 above. Following Executive Officer written concurrence with the certification, Valley Water may increase its discharge flow to 14.8 mgd.

14. If the Central Valley Water Board determines that waste constituents in the discharge have reasonable potential to cause or contribute to an exceedance of an objective for groundwater, this Order may be reopened for consideration of addition or revision of appropriate numerical effluent or groundwater limitations for the problem constituents.

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PRODUCED WATER RECLAMATION PROJECT
KERN FRONT NO. 2 TREATMENT FACILITY
KERN FRONT OIL FIELD
KERN COUNTY

If, in the opinion of the Executive Officer, the Discharger fails to comply with the provisions of this Order, the Executive Officer may refer this matter to the Attorney General for judicial enforcement, may issue a complaint for administrative civil liability, or may take other enforcement actions. Failure to comply with this Order may result in the assessment of Administrative Civil Liability of up to \$10,000 per violation, per day, depending on the violation, pursuant to the Water Code, including sections 13268, 13350 and 13385. The Central Valley Water Board reserves its right to take any enforcement actions authorized by law.

Any person aggrieved by this action may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at:

http://www.waterboards.ca.gov/public_notices/petitions/water_quality

or will be provided upon request.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region on _____ 2012.

WASTE DISCHARGE REQUIREMENTS ORDER R5-2012-XXXX -46-
VALLEY WATER MANAGEMENT COMPANY AND CAWELO WATER DISTRICT
PRODUCED WATER RECLAMATION PROJECT
KERN FRONT NO. 2 TREATMENT FACILITY
KERN FRONT OIL FIELD
KERN COUNTY

PAMELA C. CREEDON, Executive Officer

Order Attachments:

- A Site Location Map
- B Famoso Groundwater Banking Project Map
- C Kern Front Facility Flow Schematic
- D Monitoring Well Map

Monitoring and Reporting Program No. R5-2012-XXXX

Information Sheet

Standard Provisions (1 March 1991) (separate attachment to the Discharger only)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM R5-2012-XXXX
FOR
VALLEY WATER MANAGEMENT COMPANY AND CAWELO WATER DISTRICT
PRODUCED WATER RECLAMATION PROJECT
KERN FRONT NO. 2 TREATMENT FACILITY
KERN FRONT OIL FIELD
KERN COUNTY

This Monitoring and Reporting Program (MRP) is required pursuant to Water Code section 13267.

The Discharger shall not implement any changes to this MRP unless and until the Central Valley Water Board adopts, or the Executive Officer issues, a revised MRP. Changes to sample location shall be established with concurrence of Central Valley Water Board staff, and a description of the revised stations shall be submitted for approval by the Executive Officer.

All samples shall be representative of the volume and nature of the discharge or matrix of material sampled. All analyses shall be performed in accordance with *Standard Provisions and Reporting Requirements for Waste Discharge Requirements*, dated 1 March 1991 (Standard Provisions).

Field test instruments (such as pH) may be used provided that the operator is trained in the proper use of the instrument and each instrument is serviced and/or calibrated at the recommended frequency by the manufacturer or in accordance with manufacturer instructions.

Analytical procedures shall comply with the methods and holding times specified in the following: *Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater* (EPA); *Test Methods for Evaluating Solid Waste* (EPA); *Methods for Chemical Analysis of Water and Wastes* (EPA); *Methods for Determination of Inorganic Substances in Environmental Samples* (EPA); *Standard Methods for the Examination of Water and Wastewater* (APHA/AWWA/WEF); and *Soil, Plant and Water Reference Methods for the*

Western Region (WREP 125). Approved editions shall be those that are approved for use by the United States Environmental Protection Agency or the California Department of Public Health's Environmental Laboratory Accreditation Program. The Discharger may propose alternative methods for approval by the Executive Officer.

If monitoring consistently shows no significant variation in magnitude of a constituent concentration or parameter after a statistically significant number of sampling events, the Discharger may request this MRP be revised to reduce monitoring frequency. The proposal must include adequate technical justification for reduction in monitoring frequency.

A glossary of terms used within this MRP is included on [page 7](#) and a list of the constituents required for the monitoring of Priority Pollutants is included in Table 1, which is on [page 8](#).

EFFLUENT MONITORING

Effluent samples shall be representative of the volume and nature of the discharges. Time of collection of the samples shall be recorded.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed below, after which the frequencies of analysis given in the schedule shall apply for the duration of each such intermittent discharge.

DISCHARGE 001

Effluent samples shall be collected downstream from the treatment system and prior to discharge to Reservoir B. Effluent monitoring for Discharge 001 shall include at least the following:

<u>Frequency</u>	<u>Constituent/Parameter</u>	<u>Units</u>	<u>Sample Type</u>
Continuous	Flow	mgd	Metered
Continuous	Electrical Conductivity	umhos/cm	Metered
Monthly	Arsenic	ug/L	Grab
Monthly	Boron	mg/L	Grab
Monthly	Chloride	mg/L	Grab
Monthly	Oil and Grease	mg/L	Grab
Monthly	Total Suspended Solids	mg/L	Grab
Monthly	pH	pH Units	Grab
Quarterly	General Minerals	mg/L	Grab
Every 5 Years	Priority Pollutants (see Table 1)	Varies	Varies

DISCHARGE 002

Effluent samples shall be collected immediately downstream of the Reservoir B outfall structure. Effluent monitoring for Discharge 002 shall include at least the following:

<u>Frequency</u>	<u>Constituent/Parameter</u>	<u>Units</u>	<u>Sample Type</u>
Monthly	Flow	ac-ft/mo	Calculated
Monthly	Electrical Conductivity	umhos/cm	Grab
Monthly	Arsenic	ug/L	Grab
Monthly	Boron	mg/L	Grab
Monthly	Chloride	mg/L	Grab
Monthly	Total Suspended Solids	mg/L	Grab

GROUNDWATER MONITORING

The Discharger shall monitor six groundwater monitoring wells, shown in the following table, generally downgradient of the Famoso Basins. After measuring water levels and prior to collecting samples, each monitoring well shall be adequately purged to remove water that has been standing within the well screen and casing that may not be chemically representative of formation water. Depending on the hydraulic conductivity of the geologic setting, the volume removed during purging is typically from 3 to 5 volumes of the standing water within the well casing and screen, or additionally the filter pack pore volume.

The following wells, the locations of which are shown on [Attachment D](#), shall be used in the required assessment.

<u>Well I.D. No</u> ^{1.}	<u>MDB&M</u>	<u>Approximate Distance</u> <u>Township and Range, from the Famoso Basins,</u> <u>miles</u>
17D	T27S R26E	0.25 miles south
7F	T27S R26E	0.5 miles west
6P1	T27S R26E	0.5 miles west northwest
18E	T27S R26E	1 mile west southwest
18N2	T27S R26E	1.3 miles southwest
12R	T27S R25E	1.1 miles west

The Discharger shall monitor the above wells for the following:

<u>Frequency</u> ¹	<u>Constituent/Parameter</u>	<u>Units</u>	<u>Sample Type</u>
Quarterly	Depth to groundwater	Feet	Measured
Quarterly	Groundwater Elevation	Feet	Computed
Quarterly	pH	pH Units	Grab

<u>Frequency</u> ¹	<u>Constituent/Parameter</u>	<u>Units</u>	<u>Sample Type</u>
Quarterly	EC	umhos/cm	Grab
Quarterly	Arsenic	ug/L	Grab
Quarterly	Boron	mg/L	Grab
Quarterly	Chloride	mg/L	Grab
Quarterly	Sodium	mg/L	Grab

1. After at least 36 months of monitoring, the Discharger may request a reduced monitoring frequency. The proposal must include adequate technical justification for reduction in monitoring frequency and a demonstration that the District has accumulated enough data to calibrate its Famoso Basin Groundwater Model.

For the monitoring of groundwater salinity changes within the Cawelo Water District (Finding 53.d), monitoring of District wells shall be conducted annually. The District annual average EC will be tabulated and reported in a yearly report summarizing the data and the methodology used to determine the reported average. The report shall be submitted to the Central Valley Water Board by 1 February of each year.

REPORTING

All monitoring results shall be reported in **Quarterly Monitoring Reports** which are due by the first day of the second month after the calendar quarter. Therefore, monitoring reports are due as follows:

- First Quarter Monitoring Report: **1 May**
- Second Quarter Monitoring Report: **1 August**
- Third Quarter Monitoring Report: **1 November**
- Fourth Quarter Monitoring Report: **1 February.**

A transmittal letter shall accompany each monitoring report. The transmittal letter shall discuss any violations that occurred during the reporting period and all actions taken or

planned for correcting violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions or a time schedule for implementing the corrective actions, reference to the previous correspondence is satisfactory. Reports shall be submitted whether or not there is a discharge.

The following information is to be included on all monitoring reports, as well as report transmittal letters:

- Discharger Name
- Facility Name
- Monitoring and Reporting Program Number
- Contact Information (telephone and email)

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner that illustrates clearly, whether the Discharger complies with waste discharge requirements.

In addition to the details specified in Standard Provision C.3, monitoring information shall include the method detection limit (MDL) and the Reporting limit (RL) or practical quantitation limit (PQL). If the regulatory limit for a given constituent is less than the RL (or PQL), then any analytical results for that constituent that are below the RL (or PQL) but above the MDL shall be reported and flagged as estimated.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form. Such increased frequency shall be indicated on the Discharge Monitoring Report Form.

All monitoring reports shall comply with the signatory requirements in Standard Provision B.3. All monitoring reports that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1.

A. All Quarterly Monitoring Reports shall include the following:

Effluent reporting:

1. The results of both effluent discharges (Discharges 001 and 002) as specified on [page 2](#).
2. For each month of the quarter, calculation of the maximum daily flow and the monthly average flow.
3. For each month of the quarter, calculation of the 12-month rolling average EC of the discharge using the EC value for that month averaged with the EC values for the previous 11 months.

Groundwater reporting:

1. The results of groundwater monitoring specified on [page 3](#).
2. For each monitoring well, a table showing constituent concentrations for the last five quarters, up through the current quarter.
3. A groundwater contour map based on groundwater elevations for that quarter. The map shall show the gradient and direction of groundwater flow under/around the facility and/or effluent disposal area(s). The map shall also include the locations of monitoring wells and wastewater storage and discharge areas.

B. Fourth Quarter Monitoring Reports, in addition to the above, by **1 February** of each year, the Discharger shall submit a written report to the Executive Officer containing the following:

Facility information:

1. The names and general responsibilities of all persons employed to operate the produced water treatment systems.
2. The names and telephone numbers of persons to contact regarding the Facility for emergency and routine situations.
3. A statement certifying when the flow meters and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.4).
4. A statement certifying whether the current operation and maintenance manual, and contingency plan, reflect the Facility as currently constructed and operated, and the dates when these documents were last revised and last reviewed for adequacy.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by: _____

MONITORING AND REPORTING PROGRAM NO. R5-2012-XXXX
VALLEY WATER MANAGEMENT COMPANY AND CAWELO WATER DISTRICT
PRODUCED WATER RECLAMATION PROJECT
KERN FRONT NO. 2 TREATMENT FACILITY
KERN FRONT OIL FIELD
KERN COUNTY

PAMELA C. CREEDON, Executive Officer

(Date)

GLOSSARY

BOD ₅	Five-day biochemical oxygen demand
CBOD	Carbonaceous BOD
DO	Dissolved oxygen
EC	Electrical conductivity at 25° C
FDS	Fixed dissolved solids
NTU	Nephelometric turbidity unit
TKN	Total Kjeldahl nitrogen
TDS	Total dissolved solids
TSS	Total suspended solids
Continuous	The specified parameter shall be measured by a meter continuously.
24-Hour Composite	Unless otherwise specified or approved, samples shall be a flow-proportioned composite consisting of at least eight aliquots.
Daily	Samples shall be collected every day.
Twice Weekly	Samples shall be collected at least twice per week on non-consecutive days.
Weekly	Samples shall be collected at least once per week.
Twice Monthly	Samples shall be collected at least twice per month during non-consecutive weeks.
Monthly	Samples shall be collected at least once per month.
Bimonthly	Samples shall be collected at least once every two months (i.e., six times per year) during non-consecutive months
Quarterly	Samples shall be collected at least once per calendar quarter. Unless otherwise specified or approved, samples shall be collected in January, April, July, and October.
Semiannually	Samples shall be collected at least once every six months (i.e., two times per year). Unless otherwise specified or approved, samples shall be collected in April and October.
Annually	Samples shall be collected at least once per year. Unless otherwise specified or approved, samples shall be collected in October.
mg/L	Milligrams per liter
mL/L	Milliliters [of solids] per liter
ug/L	Micrograms per liter

umhos/cm Micromhos per centimeter
mgd Million gallons per day
MPN/100 mL Most probable number [of organisms] per 100 milliliters
General Minerals Analysis for General Minerals shall include at least the following:

Alkalinity	Chloride	Sodium
Bicarbonate	Hardness	Sulfate
Calcium	Magnesium	TDS
Carbonate	Potassium	

General Minerals analyses shall be accompanied by documentation of cation/anion balance.

Table 1. Priority Pollutant Scan

<u><i>Inorganics</i></u> ¹	<u><i>Organics</i></u>		
Antimony	Acrolein	3-Methyl-4-Chlorophenol	Hexachlorobenzene
Arsenic	Acrylonitrile	Pentachlorophenol	Hexachlorobutadiene
Beryllium	Benzene	Phenol	Hexachlorocyclopentadiene
Cadmium	Bromoform	2,4,6-Trichlorophenol	Hexachloroethane
Chromium (III)	Carbon tetrachloride	Acenaphthene	Indeno(1,2,3-c,d)pyrene
Chromium (VI)	Chlorobenzene	Acenaphthylene	Isophorone
Copper	Chlorodibromomethane	Anthracene	Naphthalene
Lead	Chloroethane	Benzidine	Nitrobenzene
Mercury	2-Chloroethylvinyl Ether	Benzo(a)Anthracene	N-Nitrosodimethylamine
Nickel	Chloroform	Benzo(a)pyrene	N-Nitrosodi-n-Propylamine
Selenium	Dichlorobromomethane	Benzo(b)fluoranthene	N-Nitrosodiphenylamine
Silver	1,1-Dichloroethane	Benzo(g,h,i)perylene	Phenanthrene
Thallium	1,2-Dichloroethane	Benzo(k)fluoranthene	Pyrene
Zinc	1,1-Dichloroethylene	Bis(2-chloroethoxy) methane	1,2,4-Trichlorobenzene
Cyanide	1,2-Dichloropropane	Bis(2-chloroethyl) ether	
Asbestos	1,3-Dichloropropylene	Bis(2-chloroisopropyl) ether	<u><i>Pesticides</i></u>
	Ethylbenzene	Bis(2-Ethylhexyl)phthalate	Aldrin
	Methyl Bromide	4-Bromophenyl phenyl ether	alpha-BHC
<u><i>Dioxin Congeners</i></u>	Methyl Chloride	Butylbenzyl Phthalate	beta-BHC
2,3,7,8-TCDD	Methylene Chloride	2-Chloronaphthalene	gamma-BHC (Lindane)
1,2,3,7,8-PentaCDD	Methylene Chloride	4-Chlorophenyl Phenyl Ether	delta-BHC
1,2,3,4,7,8-HexaCDD	1,1,2,2-Tetrachloroethane	Chrysene	Chlordane
1,2,3,6,7,8-HexaCDD	Tetrachloroethylene (PCE)	Dibenzo(a,h)Anthracene	4,4'-DDT
1,2,3,7,8,9-HexaCDD	Toluene	1,2-Dichlorobenzene	4,4'-DDE
1,2,3,4,6,7,8-HeptaCDD	1,2-Trans-Dichloroethylene	1,3-Dichlorobenzene	4,4'-DDD
OctaCDD	1,1,1-Trichloroethane	1,4-Dichlorobenzene	Diieldrin
2,3,7,8-TetraCDF	1,1,2-Trichloroethane	3,3'-Dichlorobenzidine	alpha-Endosulfan
1,2,3,7,8-PentaCDF	Trichloroethylene (TCE)	Diethyl phthalate	beta-Endosulfan

2,3,4,7,8-PentaCDF	Vinyl chloride	Dimethyl phthalate	Endosulfan Sulfate
1,2,3,4,7,8-HexaCDF	2-Chlorophenol	Di-n-Butyl Phthalate	Endrin
1,2,3,6,7,8-HexaCDF	2,4-Dichlorophenol	2,4-Dinitrotoluene	Endrin Aldehyde
1,2,3,7,8,9-HexaCDF	2,4-Dimethylphenol	2,6-Dinitrotoluene	Heptachlor
2,3,4,6,7,8-HexaCDF	2-Methyl-4,6-Dinitrophenol	Di-n-Octyl Phthalate	Heptachlor epoxide
1,2,3,4,6,7,8-HeptaCDF	2,4-Dinitrophenol	1,2-Diphenylhydrazine	Polychlorinated biphenyls
1,2,3,4,7,8,9-HeptaCDF	2-Nitrophenol	Fluoranthene	Toxaphene
OctaCDF	4-Nitrophenol	Fluorene	

¹ With the exception of wastewater samples, samples placed in an acid-preserved bottle for metals analysis must first be filtered. If filtering in the field is not feasible, samples shall be collected in unpreserved containers and submitted to the laboratory within 24 hours with a request (on the chain of custody form) to immediately filter then preserve the sample.

² Samples to be analyzed for volatile compounds and phthalate esters shall be grab samples; the remainder shall be 24-hour composite samples.

INFORMATION SHEET

ORDER NO. R5-2012-XXXX

VALLEY WATER MANAGEMENT COMPANY AND CAWELO WATER DISTRICT

PRODUCED WATER RECLAMATION PROJECT

KERN RIVER AREA STATION 36

KERN RIVER OIL FIELD

KERN COUNTY

Background

The Cawelo Water District ([District](#)) covers approximately 45,000 acres and is generally between State Highway 99 and Highway 65 as shown in [Attachment A](#) (Site Location Map). The District was formed for the purpose of obtaining a “supplemental or partial water supply” and delivering it for irrigation of crops within the District. The District uses imported surface water, pumped groundwater, and treated oilfield produced water from Chevron, Valley Water Management Company, and Schaefer Oil to provide and meet irrigation needs of the agricultural lands of the District.

Valley Water Management Company ([Valley Water](#)) (formerly Valley Waste Disposal Company) owns and operates an oil field produced water reclamation facility called the Kern Front No. 2 Treatment Facility ([Kern Front Facility](#)) serving oil field operators in the Kern Front Oil Field. 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 ([Attachment A](#)). Produced water from the oil field is treated at the Kern Front Facility to remove oil and grease and inorganic sediments, and then conveyed via pipeline to the District’s Reservoir B ([Attachment A](#)). Chevron USA, Inc. ([Chevron](#)) also conveys its treated produced water to Reservoir B. At Reservoir B, treated oil field produced water is blended with surface water and redistributed to irrigate farmland within the District. Schaefer Oil discharges to District Reservoir C and is regulated under separate Order.

Historically, during the non-irrigation season, excess blended water from Reservoir B in the District irrigation system was periodically discharged to Poso Creek. Discharges to Poso Creek exceeded arsenic effluent limits and aquatic toxicity tests. The District, Valley Water,

and Chevron propose to eliminate the discharge to Poso Creek and instead discharge the banded oilfield produced wastewater to the Famoso Groundwater Banking Project or Famoso Basins ([Attachment B](#)). Valley Water and the District are hereafter collectively referred to as Discharger. Chevron's contribution to the District is regulated under separate Order.

History and Project Specific Background

Valley Water was formed around 1932 to serve oil companies in management of production wastes. It has been operating in the Kern Front Oil Field since 1955, and has operated in its current configuration with storage and treatment ponds and conveyance to the District since 1980. In 1980, Valley Water constructed a pipeline to District Reservoir B and submitted an RWD in support of an application for an NPDES permit.

The Kern Front Facility is in the western half of Section 27, T28S, R27E, MDB&M. ([Attachment A](#)). Produced water received by Valley Water is treated to remove oil and grease and inorganic sediment. Four ponds, in series, provide initial gravity separation. Floating oil and grease in the ponds is periodically skimmed and removed. Valley Water currently employs two Wemco air flotation units to provide final polishing. 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. [Attachment C](#) provides a flow schematic of the treatment process at the Kern Front Facility.

Valley Water conveys its treated oil field produced water from the Kern Front Facility through a 20-inch, 3.4-mile pipeline to the District's Reservoir B. Reservoir B is an integral part of the District'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 District via the Distribution Canal. The oil field produced water from Chevron and

Valley Water discharged to Reservoir B is blended with water from other surface and groundwater supplies of the District to meet the effluent and receiving water limits. 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. As described above, Reservoir B also receives oil field produced water from Chevron, which serves the Kern River Oil Field.

Valley Water's existing discharge is regulated by Waste Discharge Requirements Order R5-2007-0066 (NPDES Permit No. CA0081311), which authorized a discharge of up to 7.4 mgd of treated oil field produced water into Reservoir B.

This Order recognizes that the blended oil field produced wastewater discharges from the District, Valley Water, and Chevron to Poso Creek will now be discharged to the Famoso Basins instead. The Famoso Basins consist of seven basins comprising some 374 acres. Operational capacity is approximately 834 acre-feet with two feet of freeboard. The Basins flank both sides of Poso Creek, just upstream of Highway 99.

REGULATORY CONSIDERATIONS

Basin Plan

The *Water Quality Control Plan for the Tulare Lake Basin*, Second Edition, revised January 2004 (Basin Plan), designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. The beneficial use of water in the District Reservoir B and the District distribution system by design is agricultural supply (AGR). The Basin Plan designates the following beneficial uses for the underlying groundwater: municipal and domestic supply (MUN), AGR, industrial process supply (PRO), and industrial service supply (IND).

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 varied widely. Mt. Poso and Round Mountain generated produced water with chlorides of 500 to 1,100 mg/L. Discharges from the Poso Creek Oil Field generated produced water with chloride concentrations of 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 the District 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 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 umhos/cm, 200 mg/L and 1.0 mg/L, respectively. The Central Valley Water Board’s implementation of Resolution 71-122 effectively stopped uncontained discharge of oil field produced water with unacceptable high salt concentrations in an area it called the Poso Creek Subarea.

Follow-up sampling by the District showed the impact of the high salt oil field discharges persisted in 1980. A 1980 map prepared by the District, which depicts groundwater chloride concentrations in the District, shows a degraded area along Lerdo Highway with chloride exceeding 400 mg/L.

The Basin Plan notes the entire basin is essentially closed, and salts discharged within the basin accumulate. 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 six (6) umhos/cm per year for the Poso Groundwater Hydrographic Unit (Hydrologic Area Nos. 558.70, 558.80, and 558.90). The existing and proposed discharge occurs in the North Kern Hydrologic area (558.80) and the Kern Uplands Hydrologic Area (558.90).

The Basin Plan also specifies salinity limits for oil field discharges of 1,000 umhos/cm for EC, 200 mg/L for chloride, and 1.0 mg/L for boron, which are generally applied as annual averages. In 1982, the Central Valley Water Board adopted Resolution No. 82-136, amending the Basin Plan to allow discharges of oil field produced water to exceed Basin Plan effluent limits to facilitate use for irrigation and other beneficial uses where the exception would not cause an exceedance of a water quality objective. The Basin Plan, therefore, provides some flexibility to allow oil field wastewater exceeding Basin Plan salinity limits to be used for agricultural use in water short areas, 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.

When adopting into the Basin Plan the EC, chloride, and boron limits of 1000 umhos/cm, 200 mg/L, and 1.0 mg/L, respectively, for discharges to the Poso Groundwater Hydrographic Unit and for discharges oil field wastewater to land, the Board considered the degradation that would occur and found it to be consistent with State Water Resources Control Board Resolution 68-16, otherwise known as the State's Antidegradation Policy. The limits reflect Best Practicable Treatment or Control for these constituents.

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, California Code of Regulations. The Basin Plan requires the application of the most stringent objective necessary to ensure that groundwater does 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.

The Basin Plan allows blending of wastewater with surface and groundwater to promote reuse of wastewater in water short areas provided it is otherwise consistent with water quality policies.

Regarding discharges to surface waters, the Basin Plan states, "Discharges to surface waters will not be considered a permanent solution when the potential exists for wastewater reclamation."

The Basin Plan incorporates the State's Antidegradation Policy. The Antidegradation Policy requires the Regional Water Board in regulating discharges 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 (BPTC) 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.

Other Requirements/Policies

On 1 June 1994, the US Environmental Protection Agency, US Bureau of Reclamation, State Water Board, Department of Water Resources, Department of Public Health, 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. Central Valley Water Board plans and policies support the efficient use of the State's limited water supplies provided the beneficial uses of water are maintained and water quality objectives are met.

Resolution No. R5-2009-0028 *In support of Regionalization, Reclamation, Recycling and Conservation for Wastewater Treatment Plants* was adopted by the Central Valley Water Board in April 2009 to promote wastewater reclamation projects such as the Famoso Groundwater Banking project.

The Water Conservation Act of 2009, Senate Bill (S.B. X7-7), requires 20 percent reduction in statewide water use by 2020 to be achieved through implementation of Best Management Practices (BMPs) and optimization of water reclamation opportunities in the urban, industrial, and agricultural sectors. The proposed project is consistent with these goals.

The California Legislature enacted Assembly Bill 3030 during the 1992 session, subsequently codified in Water Code section 10750, *et seq.* Water Code section 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 section 60224 empowers the District to take any action needed for protection and preservation of groundwater supplies within the District including;

1. The prevention of contaminants from entering the District groundwater supplies
2. The removal of contaminants from groundwater supplies of the District;
3. The location and characterizing of contaminants which may enter the groundwater supplies of the District,
4. The identification of parties responsible for contamination of groundwater; and
5. The performance of engineering studies.

The District adopted a *Ground Water Management Plan* (Plan) on 21 July 1994 that establishes a policy of efficient water use, conservation, and management. The District adopted an Amended Groundwater Management Plan in July 2007 in accordance with the requirements of S.B. 1938, Chapter 603. The California Legislature enacted S.B. 1938 during the 2002 session, subsequently codified in Water Code section 10753, *et seq* and section 10795.4. Action elements in the Plan include the following:

- Acquire and import available, supplemental surface water for crop irrigation and groundwater recharge.
- The District filed Application 26454, 15 July 1980, to appropriate Poso Creek flow, and the State Water Resources Control Board issued Permit 21032 on 11 May 2000.
- Facilitate conjunctive use operations by the importation and recharge use of supplemental water.
- Construct and operate the District 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 District.

- Semi-annual preparation of maps of equal elevation of water in wells.
- Monitor groundwater quality annually 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, the District supplements its existing limited surface water supplies and over drafted groundwater with the reclamation of treated produced water as described herein. Through its Plan, the District proposes to manage water used within its boundaries in a manner that meets Basin Plan objectives. As mentioned above, the Basin Plan allows blending of wastewater with surface and groundwater to promote reuse. The Poso Creek Subarea and the District are water short areas, and the District can ensure consistency with water quality policies by proper groundwater management.

GROUNDWATER CONDITIONS

District

Kern County Water Agency maps for 2008 indicated that depth to groundwater within the District ranges from about 300 feet below ground surface (bgs) to 500 feet bgs. In Spring 2008, groundwater elevations ranged from about 150 feet above mean sea level (MSL) to less than 100 feet above MSL. Although affected by pumping, groundwater gradient is generally to the west.

As described above, groundwater quality in District has been degraded with electrical conductivity and chloride in several areas from past discharges of oil field production water discharges to drainages and unlined sumps.

The District submitted a groundwater monitoring report in February 2005 that evaluated the general quality of groundwater throughout the District. Between 1999 and 2004, the average

EC of groundwater in the District decreased from 711.3 umhos/cm to 662.2 umhos/cm, which indicates improved groundwater quality. As determined by the District, the five year rolling average EC of groundwater in the District as of 2011 was 637 umhos/cm

Famoso Basins

In February 2011, groundwater monitoring data for the Famoso Basins was obtained from nearby irrigation and supply wells. Depth to water data indicated the depth to groundwater in the vicinity of the Famoso Basins is about 350 feet bgs with a direction of flow to the west/southwest. This correlates with Kern County and Department of Water resources data for the area.

The Discharger collected samples in February 2011 from seven wells upgradient of the Famoso Basins to assess background groundwater quality. The following table presents background groundwater quality characterization based on the February 2011 analytical results.

Famoso Basin Background Groundwater Quality

	Chloride, <u>mg/L</u>	Boron, <u>mg/L</u>	Conductivity (EC), <u>umhos/cm</u>	Sodium, <u>mg/L</u>	Arsenic, <u>ug/L</u>
Background <u>Groundwater</u> <u>Quality</u>	87.7	0.14	618	55.7	3.4

**HISTORIC EFFLUENT AND GROUNDWATER LIMITS
 AND DISCHARGE QUALITY**

In March 2007, the Discharger submitted a report entitled *Cawelo Water District, Valley Waste Disposal Company, Chevron, Proposed Modification of Waste Discharge, Technical Study Update for the California Regional Water Quality Control Board (hereafter Salinity Study)*. Based on the Salinity Study and other technical information provided by the District, WDRs Order No. R5-2007-0066 authorized the following effluent limits:

Discharge 001 - Valley Water into Reservoir B

<u>Constituents</u>	<u>Units</u>	<u>Daily</u> <u>Maximum</u>	<u>Monthly</u> <u>Average</u>	<u>Annual</u> <u>Average</u>
Flow	mgd	7.4	---	---
Electrical Conductivity	umhos/cm	---	---	1,030
Chloride	mg/L	200		---
Boron	mg/L	1.6	1.5	---
Oil and Grease	mg/L	35	---	---

Discharge 002 - Reservoir B outfall into the Distribution Canal

<u>Constituents</u>	<u>Units</u>	<u>Annual</u> <u>Average</u>
Electrical Conductivity	umhos/cm	1,000
Chloride	mg/L	200
Boron	mg/L	1.0

Discharge 003 -Distribution Canal outfall into Poso Creek

<u>Constituents</u>	<u>Units</u>	<u>Daily</u> <u>Maximum</u>	<u>Annual</u> <u>Average</u>
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Constituents	Units	Daily Maximum	Annual Average
Electrical Conductivity	umhos/cm	1,000	--
Chloride	mg/L	200	--
Boron	mg/L	1.0	--
Arsenic	ug/L	10	--
Oil and Grease	mg/L	Non-Detect	--

Boron limits from Valley Water to Reservoir B in Order R5-2007-0066 were permitted as an exception to the Basin Plan limits in accordance with the Basin Plan's policy on discharges from oil fields.

Groundwater limitations in Order R5-2007-0066 stated:

"The discharge, in combination with other sources, shall not cause groundwater underlying the [District] to contain waste constituents in concentrations that adversely affect beneficial uses. In no case shall the discharge, in combination with other sources, cause underlying groundwater to increase in EC by more than six (6) umhos/cm per year over the permit term."

From January 2010 to December 2010, Valley Water's discharges to Reservoir B had an average EC of 789 umhos/cm and average arsenic, boron, chloride and sodium concentrations of 79.3 ug/L, 1.08 mg/L, 86.8 mg/L, and 148.6 mg/L, respectively.

Surface water deliveries to Reservoir B from Lerdo Pumping Station B from January through December 2010 had an average EC of 127 umhos/cm and average arsenic, boron, chloride and sodium concentrations of 4.2 ug/L, 0.12 mg/L, 12 mg/L, and 12 mg/L, respectively.

Blended water discharged from Reservoir B during the irrigation period from April through September had an average EC of 313 umhos/cm and average boron, chloride and sodium concentrations of 0.30 mg/L, 42 mg/L, and 57 mg/L, respectively.

Blended water discharged from Reservoir B during the non-irrigation period from October through March had an average EC of 610 umhos/cm and average boron, chloride and sodium concentrations of 0.67 mg/L, 93 mg/L, and 115 mg/L, respectively.

DISCHARGE PROHIBITIONS, EFFLUENT LIMITATIONS, DISCHARGE SPECIFICATIONS, AND PROVISIONS

The proposed Order would prohibit discharge of wastes other than the treated oil field produced water and would prohibit the bypass or overflow of wastes to surface waters.

Effluent Limits

Rationale for the Effluent Limitations in this Order follow:

1. **Oil and Grease:** Historic discharges to Poso Creek subjected Valley Water's discharges to the limits in 40 CFR 435.50, Oil and Grease Extraction Point Source Category, Agricultural and Wildlife Water Use Subcategory. 40 CFR 435.52 specifies that a daily maximum oil and grease effluent limit of 35 mg/L is best practicable control technology currently available (BPT). In Order R5-2007-0066, the Board determined, based on Best Professional Judgment (BPJ), that daily maximum effluent limitations for oil and grease as specified in 40 C.F.R. 435.52 were necessary to protect water quality. The Basin Plan requires the Discharger to comply with, or justify a departure from, effluent limitations set forth in 40 CFR 400 et seq. if discharge is to land. The Discharger has not provided

such a justification, but rather has shown that the Kern Front Facility is capable of consistently meeting the oil and grease limit of 35 mg/L. Thus the limit can be considered Best Practicable Treatment or Control, and is carried over from Order R5-2007-0066.

2. **Flow and EC:** Order No. R5-2007-0066 limits EC of the discharge to an annual average of 1,030 umhos/cm with a maximum flow rate of 7.4 mgd. This Order allows an increase in flow from 7.4 to 14.8 mgd. To maintain the salt balance of the Salinity Study described above, this Order provides interim step values for EC to be used for intermediate flow increases. At 7.4 mg/L, the EC limit of Valley Water's discharge will remain at 1,030 umhos/cm. At a flow of 14.8 mgd, the EC of the discharge must decrease to no more than 515 umhos/cm. This Order carries over from Order R5-2007-0066 the Basin Plan limit of 1000 umhos/cm for discharges from Reservoir B (Discharge 002).
3. **Boron:** Order No. R5-2007-0066 contains monthly average limitations for boron of 1.5 mg/L and daily maximum limitations of 1.6 mg/L for Discharge 001. Based on the analysis described below, this Order contains a boron limitation for Discharge 001 of 1.3 mg/L as an annual average at the maximum flow rate of 14.8 mgd to ensure that the boron limitation of 1.0 mg/L required by the Basin Plan for discharges to land is not exceeded in the discharge from Reservoir B to the Famoso Basins during winter periods when surface water blending sources are not always reliable. The Order also provides interim step values for boron to be used for intermediate flow increases as shown in Variable Flow/EC/Boron Limits table presented on page 11. At the lower flow rate of 7.4 mgd, the effluent limit for Boron is 1.5 mg/L at Discharge 001 and the boron concentration decreases as the flow rate increases towards 14.8 mgd. The 1.0 mg/L annual average boron limit for Discharge 002 is carried over from Order No. R5-2007-

0066 and is consistent with Basin Plan limitations for discharges to land within the Poso Creek Subarea and oil field discharges to unlined sumps within the Tulare Lake Basin.

4. **Chloride:** Order No. R5-2007-0066 contains daily maximum discharge specifications for chloride of 200 mg/L. This Order carries over the 200 mg/L limit as an annual average for Discharge 001. This limit is consistent with the Basin Plan. This Order also carries over the 200 mg/L annual average chloride limit for Discharge 002, which is also consistent with the Basin Plan limitations for discharges to land within the Poso Creek Subarea. Both limits for discharges to and from Reservoir B are consistent with the Basin Plan limits for discharges in the Poso Subarea and Oil Field Discharges.
5. **Sodium:** This Order contains discharge specifications for Discharge 001 and 002 of 202 mg/l (annual average) and 135 mg/l (annual average), respectively. These limitations are based on the modeling performed in the analysis described below and are necessary to ensure that discharges to the Famoso Basins do not cause exceedances of the groundwater limitations of this Order.
6. **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 at the Famoso Basins must consider the designated beneficial use of municipal supply. Background concentration in groundwater underlying the Famoso Basins is reported to be 3.4 ug/L.

The Discharger completed an arsenic soil-adsorption removal study using soil samples collected from the Famoso Basins and submitted study results in the Antidegradation Analysis Report. These study results demonstrate that the unsaturated soils underlying the Famoso Basins have sufficient adsorption capacity to adsorb all arsenic from the proposed recharge water containing a concentration of 120 ug/L for at least a 100-year

period. These results thus demonstrate that there will be no impact to arsenic concentration in underlying groundwater associated with recharge of produced water at the Famoso Basins. Monitoring data and the analysis as described below indicate that worst case Reservoir B arsenic concentrations will not exceed about 90 ug/L and are expected to be much lower. Therefore, there is no reasonable potential for arsenic to cause groundwater to exceed a water quality objective. This Order does not include effluent limits for arsenic, but does include arsenic monitoring.

The effluent limits described above are presented below in tabular form:

Discharge 001 - From Valley Water to Reservoir B

<u>Constituent</u>	<u>Units</u>	<u>Daily Maximum</u>	<u>Annual Average</u>
Flow	mgd	See below	--
Boron	mg/L		See below
Chloride	mg/L		200
EC	umhos/cm		See below
Oil and Grease	mg/L	35	
Sodium	mg/L		202

Discharge 001 - Variable Flow/EC/Boron Limits

Flow Scale, Daily Maximum	mgd	<u>< 7.4</u>	<u>7.4 - 9.3</u>	<u>9.3 - 11.1</u>	<u>11.1 - 13.0</u>	<u>13.0 - 14.8</u>
EC ¹ Limit, Annual Average	umhos/cm	1,030	824	687	589	515
Boron Limit,	mg/l	1.5	1.45	1.4	1.35	1.3

Annual Average

1. EC = Electrical Conductivity

Discharge 002 - From Reservoir B to Distribution Canal

<u>Constituent</u>	<u>Units</u>	<u>Annual Average</u>
Boron	mg/L	1.0
Chloride	mg/L	200
EC	umhos/cm	1000
Sodium	mg/L	135

Groundwater Limits

This Order prescribes groundwater limitations that implement water quality objectives for groundwater from the Basin Plan. The limits proscribe the discharge, in combination with other sources, from causing groundwater underlying the District to contain waste constituents in concentrations that adversely affect beneficial uses. As the District occupies a large portion of the Poso Hydrographic Unit, this Order applies the Basin Plan incremental EC limit that states in no case shall the discharge, in combination with other sources, cause average EC in groundwater on an average basin-wide basis to increase by more than six (6) umhos/cm per year over a five year period.

Based on the Famoso Analysis, this Order also proscribes the discharge from causing groundwater to contain waste constituents in concentrations greater than the following in the area affected by discharges to the Basins:

<u>Constituent</u>	<u>Units</u>	<u>Level</u>
EC	umhos/cm	1,000
Arsenic	ug/L	10
Boron	mg/L	0.75

Chloride	mg/L	175
Sodium	mg/L	115

Given the District's ability and obligation to manage the quality of groundwater within its management area, the limitations will ensure the protection of groundwater quality for the crops that can reasonably be grown within the District.

Monitoring Requirements

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

The proposed Order includes effluent and groundwater monitoring. The monitoring requires the District to report on the overall quality of groundwater managed by the District. It also requires the District to monitor specific wells near the Famoso Basins to validate the District's modeling effort and to ensure the protection of groundwater being recharged by the Famoso Basins.

Provisions

Provisions 11 and 12 require technical reports and analyses to monitor groundwater to provide the information needed to validate the model used to characterize potential changes

in groundwater beneath the Famoso Basins and to confirm the results of the Antidegradation Analysis.

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.

ANTIDEGRADATION

District-wide Considerations

The Salinity Study was submitted to support proposed production water flow and electrical conductivity (EC) increases from Valley Water and proposed production water flow increases from Chevron to District Reservoir B. The Salinity Study presents the results of a salt balance model that evaluates the potential impacts to groundwater underlying the District resulting from the currently authorized produced water flow rates and EC/TDS concentrations from Valley Water and Chevron to Reservoir B and then the Discharge from Reservoir B out to the District for agricultural irrigation. The model also included surface water inputs and groundwater underflow entering the District from the East.

	<u>Flow Rate</u>		<u>Annual Average Salt Concentration</u>		<u>Salt Loading</u>
	<u>(mgd)</u>	<u>(acft/year)</u>	<u>EC (umhos/cm)</u>	<u>TDS (mg/L)</u>	<u>(tons/year)</u>
Valley Water	7.4	8,304	1,030	588	6,636
Chevron	33.5	37,593	940	486	24,809

Schaefer	2.15	2,424	955	558	1,838
Surface water		64,185	190	107	9,298
Subsurface		22,000	200	115	3,447
<hr/>					
	Total Inflow:	134,506		Total Salts:	46,028

With respect to EC, the Salinity Study concludes that at the above projected quality and maximum flow rates from Chevron and Valley Water of 33.5 mgd and 7.4 mgd, respectively, the EC of underlying groundwater could increase by 5.98 umhos/cm/year when blended and balanced by contracted and projected freshwater sources. This is just less than the Basin Plan requirement that the annual basin-wide average degradation rate cannot be greater than 6.0 umhos/cm/year for the Tule River and Poso Hydrographic Units.

The Salinity Study states that salts in produced water from Valley Water and Chevron will be blended and balanced with imported fresh water from the Kern River and the State Water Project and managed by the District to meet its irrigation needs and comply with the Basin Plan requirement. Implicit in the Salinity Study results is that the District can to some degree manage its system by reducing the volume of the oil field produced water 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.

The Central Valley Water Board considered the Salinity Study and the effluent limits of Order R5-2007-0066, as described above, and concluded that groundwater degradation that might occur from the discharges was consistent with the State Antidegradation Policy. This Order's discharge limits from Valley Water to Reservoir B and from Reservoir B to the Distribution Canal are largely carried over from those in Order R5-2007-0066, and therefore, the Board does not need to reconsider Antidegradation with respect to those previously considered limits. This Order does not authorize discharges to Poso Creek.

Famoso Basin Considerations

The replacement of the non-irrigation season discharge to Poso Creek with the proposed non-irrigation season discharge to the Famoso Basins will result in discharges of blended oil field produced water over a smaller, nonlinear area to groundwater. Given this, Valley Water and the District submitted on 7 July 2011, an antidegradation analysis titled *Cawelo Water District Famoso Basins Antidegradation Analysis* (Analysis). The original intent was to examine whether arsenic concentrations in the Valley Water and District discharges to the Famoso Basins would cause exceedances of the State Maximum Contaminant Level for arsenic of 10 ug/L. The Analysis was expanded to consider impacts from other constituents of concern including EC, chloride, and boron.

The Famoso Analysis includes a groundwater model that examines potential impacts from discharges to the Basins over a 30 year period. The Analysis was updated in a 26 October 2011 *Antidegradation Analysis Addendum* (Addendum). The combination of the two is referred to hereafter as Famoso Analysis.

As described above, background groundwater quality in the area influenced by the proposed discharges to the Famoso Basins is:

	Chloride, <u>mg/L</u>	Boron, <u>mg/L</u>	EC, <u>umhos/cm</u>	Sodium, <u>mg/L</u>	Arsenic, <u>ug/L</u>
Background Groundwater Quality	87.7	0.14	618	55.7	3.4

The Famoso Analysis examines the water available to the District for blending, crops grown in the District, and soils in the area surrounding the Famoso Basins and proposes the following groundwater limitations to implement the Basin Plan’s narrative water quality objectives for Chemical Constituents and Toxicity:

	Chloride <u>mg/L</u>	Boron <u>mg/L</u>	EC <u>umhos/cm</u>	Sodium <u>mg/L</u>
Groundwater Limits	175	0.75	1,000	115

The model indicates the discharge to the Basins, as controlled by the effluent limits section described below and managed by the District, will result in water quality over the entire groundwater column that will be between background concentrations and the groundwater limits described above.

Arsenic is not included in the table above or in previously described effluent limits proposed for the discharges because site specific studies conducted in association with the Famoso Analysis indicate that arsenic discharged a concentrations much higher than those expected would not migrate to groundwater during the 30 year life of the project. The projected recharge concentrations and the proposed groundwater quality limits are listed in the following table:

	Chloride <u>mg/L</u>	Boron <u>mg/L</u>	EC <u>umhos/cm</u>	Sodium <u>mg/L</u>
30-year Maximum¹	123	0.75	718	102
30-year Average¹	104	0.62	624	87
10-year Average¹	104	0.55	621	86
Groundwater Limits	175	0.75	1,000	115

1. Based on a data set of annual calculations.

The model projects the following groundwater concentrations in existing agricultural wells downgradient of the Famoso Basins.

	Chloride	Boron	EC	Sodium	Arsenic
	<u>mg/L</u>	<u>mg/L</u>	<u>umhos/cm</u>	<u>mg/L</u>	<u>ug/L</u>
<u>Well Quality</u>	113	0.64	679	92	3.4

Comparing these results to the background groundwater quality illustrates there will be degradation of the groundwater, but the degradation will not cause violations of groundwater limits or applicable water quality objectives.

To monitor the quality of downgradient groundwater, Valley Water and the District are proposing to monitor wells generally downgradient of the Famoso Basins on a quarterly basis to ensure groundwater limits are met. The wells are shown on Order Attachment D.

There is sufficient reason to accommodate limited groundwater degradation associated with the proposed project, provided the conditions of the Basin Plan are met. The District must manage the blended discharges so they will not substantially affect water quality and violate water quality objectives. A discharge for reclamation in a water short area is considered of maximum benefit to the people of the State as long as water quality objectives are achieved. The discharge as conditioned in the proposed Order is consistent State Water Board Resolution 68-16.

Title 27

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 Central Valley 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 1, as a hazardous waste.

The oil and grease removed from produced water at the Kern Front Facility is a designated waste as defined in Title 27 and subject to the full containment specifications therein. However, the above ground steel tank that contains the oil and grease are fully enclosed, 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.

CEQA

In accordance with the California Environmental Quality Act (CEQA)(Public Resources Code Section 21000, et seq.), the District approved a Negative Declaration in April 2007 for the increase in flows proposed at that time. As documented in Order R5-2007-0066, Central Valley Water Board reviewed and commented on the Negative Declaration and found that the project as approved by the District and permitted by Order R5-2007-0066 would not have a significant effect on the environment.

INFORMATION SHEET, ORDER NO. R5-2012-XXXX
VALLEY WATER MANAGEMENT COMPANY AND CAWELO WATER DISTRICT
PRODUCED WATER RECLAMATION PROJECT
KERN FRONT NO. 2 TREATMENT FACILITY
KERN FRONT OIL FIELD
KERN COUNTY

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The Discharger adopted a subsequent Negative Declaration in 2011 in accordance with the CEQA for the proposed pipeline and discharges associated with the discharges to the Famoso Basins. Central Valley Water Board staff reviewed the Negative Declaration and concurred that it addressed issues with regards to potential impacts to water quality.