CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER R5-2019-0043

WASTE DISCHARGE REQUIREMENTS
FOR

HATHAWAY, LLC; KERN-TULARE WATER DISTRICT; AND
JASMIN RANCHOS MUTUAL WATER COMPANY

PRODUCED WASTEWATER RECLAMATION PROJECT
JASMIN TREATMENT FACILITY
JASMIN OIL FIELD
KERN COUNTY

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

1. Hathaway, LLC (Hathaway) is an oil and natural gas exploration and production company that owns and operates a petroleum treatment facility on the Quinn Lease in the Jasmin Oil Field (Jasmin Treatment Facility). The facility is in Section 15, Township 25 South, Range 27 East, Mount Diablo Base and Meridian (MDB&M); Assessor's Parcel Number (APN) 051-101-41, as shown on Attachment A, which is attached hereto and made part of this Order by reference.

2. Kern-Tulare Water District (Kern-Tulare) is a water district that was formed in 1974 and spans the eastern San Joaquin Valley in Kern and Tulare Counties. Kern-Tulare has a district size of approximately 19,000 acres, which is planted with citrus, grapes, and pistachios. The water distribution network for Kern-Tulare consists of two isolated networks. Oil field produced wastewater (produced wastewater) is blended with irrigation water in the southern distribution network, supplying irrigation water to approximately 3,700 acres of cropland in Kern County.

3. Jasmin Ranchos Mutual Water Company (Jasmin Water Company) is a water management company that operates within the service territory of Kern-Tulare. Jasmin Water Company owns and operates the Jasmin Ranchos Mutual Water Company Reservoir and distributes produced wastewater to approximately 400 acres of citrus. The Jasmin Ranchos Mutual Water Company Reservoir has a storage capacity of two acre-feet and is in Section 15, Township 25 South, Range 27 East, MDB&M; APN 051-101-19, as shown on Attachment A.

4. This Order regulates the discharge of produced wastewater from the Jasmin Treatment Facility to cropland for irrigation, including crops for human consumption. Produced wastewater will be reused to irrigate approximately 3,700 acres of cropland. Crops irrigated with produced wastewater include, but are not limited to, citrus, grapes, and pistachios.

5. Hathaway, Kern-Tulare, and Jasmin Water Company (hereafter jointly referred to as Dischargers) are jointly responsible for compliance with this Order.

Background and Current Practices

6. Kern-Tulare submitted a Report of Waste Discharge to the Central Valley Regional Water Quality Control Board (Central Valley Water Board) for consideration of new individual waste discharge requirements for the reuse of produced wastewater for irrigation. On 20 November 2018, Kern-Tulare submitted an addendum report that includes a final Environmental Impact Report and

Antidegradation Analysis for the proposed project. Under Waste Discharge Requirements Order No. 98-205, Hathaway, Kern-Tulare, and Jasmin Water Company were regulated for the reuse of produced wastewater for irrigation. Kern-Tulare prepared the final Environmental Impact Report and Antidegradation Analysis for the Guzman Reservoir, which is designed and will be constructed to provide additional storage capacity of produced wastewater for Kern-Tulare.

7. Kern-Tulare completed the final engineering design of the Guzman Reservoir and submitted the plans to the Division of Safety of Dams (DSOD) for review. Upon approval from DSOD, Kern-Tulare will begin the construction of the Guzman Reservoir. Approval by DSOD is anticipated in 2019; construction is anticipated to be completed within six months of approval. Findings in this Order describe the complete project, which includes the construction and use of the Guzman Reservoir.

8. Hathaway recovers crude oil from the Cantleberry and Quinn Leases in the Jasmin Oil Field. Production fluid (mixture of crude oil and wastewater) from the petroleum wells are transferred to the Jasmin Treatment Facility. Attachment B, which is attached hereto and made a part of this Order by reference, provides a flow schematic of the treatment processes. Treatment starts with gravity separation of oil and water using a wash tank, after which separated water is sent to one of two Wemco units. The Wemco unit uses mechanical agitation to induce the formation of small bubbles to capture oil that is then skimmed off and returned to the wash tank. Water from the Wemco Units is discharged to Pond Nos. 1 and 2, in series, for skimming. Produced wastewater is pumped from Pond No. 2 uphill to netted Pond Nos. 3 and 4, in series. Using gravity, produced wastewater flows, in series, through Pond Nos. 5, 6, and 7 where it is temporarily stored prior to being discharged to Kern-Tulare and Jasmin Water Company. Pond Nos. 1 through 7 are unlined and Pond Nos. 1, 2, and 3 are netted to preclude the entry of wildlife.

9. Kern-Tulare owns and operates the Big Four and Guzman Reservoirs. Produced wastewater from the Jasmin Treatment Facility will be pumped to the Guzman Reservoir for storage. The Guzman Reservoir has a storage capacity of 590 acre-feet and is in Sections 21 and 22, Township 25 South, Range 27 East, MDB&M; APN 051-110-75, as shown on Attachment A. Produced wastewater from the Guzman Reservoir is transferred to the Big Four Reservoir for blending with groundwater and surface water supplies. The Big Four Reservoir has a storage capacity of 340 acre-feet and is in Sections 17 and 20, Township 25 South, Range 27 East, MDB&M; APN 051-110-59, as shown on Attachment A. Blended produced wastewater from the Big Four Reservoir is pumped to the Jasmin Ranchos Mutual Water Company Reservoir and cropland for irrigation.

10. Hathaway, Kern-Tulare, and Jasmin Water Company entered into an agreement (Agreement) for the sale and transfer of produced wastewater from Hathaway to Kern-Tulare and Jasmin Water Company. The agreement is effective as of 1 July 2016 and consists of a 20-year term. A copy of the agreement was submitted to the Central Valley Water Board.

11. On 21 March 2019, Kern-Tulare submitted a new Antidegradation Analysis that proposes to increase the project flowrate from 2,640 acre-feet per year (ac-ft/yr.) to 3,320 ac-ft/yr. The information in the Antidegradation Analysis has been considered in this Order.

12. The Report of Waste Discharge and addendum thereto do not include an adequate technical demonstration that the Jasmin Treatment Facility can maintain the treatment efficiency at the

proposed flowrate of 3,320 ac-ft/yr. As a result, the initial maximum annual flowrate allowed by this Order, as described in Effluent Limitations B.1, is 2,640 ac-ft/yr. In accordance with Provision E.5, the maximum annual flowrate allowed by this Order may be increased upon Executive Officer review and approval of a technical report that demonstrates the treatment capacity of the Jasmin Treatment Facility is 3,320 ac-ft/yr.

Proposed Discharge

13. Hathaway will discharge up to 3,320 ac-ft/yr. (approximately 20.5 million barrels per year) of produced wastewater, upon satisfying Provision E.5, to Kern-Tulare and Jasmin Water Company for irrigation.

14. Produced wastewater from the Jasmin Treatment Facility is pumped to the Jasmin Ranchos Mutual Water Company Reservoir and the Guzman Reservoir as shown on Attachment C, which is attached hereto and made part of this Order by reference. The Agreement, described in Finding 10, outlines the volume and priority for produced wastewater discharged to Kern-Tulare and the Jasmin Water Company.

15. Kern-Tulare is comprised of four service areas, as shown on Attachment D, which is attached hereto and made part of this Order by reference. These service areas are regulated under this Order for the reuse of produced wastewater for irrigation. The four service areas are irrigated with drip or micro-spray irrigation systems for increased water efficiency. Table 1 identifies the crop acreage for each of the service areas.

Table 1: Crop Acreage Per Service Area

Service Area	Acreage per Crop[1]				
	Citrus	Grapes	Pistachios	Fallow	Total
Jasmin Water Company Service Area	399	0	0	0	399
Cameo Service Area	1,783	0	507	117	2,407
Section 17 Service Area	40	0	877	0	917
Hathaway Service Area	0	0	17	0	17
Total Acreage	2,222	0	1,401	117	3,740

1. Crop acreage values are based on Kern-Tulare's 2018 Crop Survey Report.

16. The Dischargers collected samples of produced wastewater from Pond No. 7 at the Jasmin Treatment Facility for analysis. These samples were collected and analyzed according to Revised Monitoring and Reporting Requirements Order No. 98-205. Detectable analytical results for the first, second, and third quarter of 2018 are summarized in Table 2 below.

Table 2: Produced Wastewater Quality at the Jasmin Treatment Facility

Constituent	Unit	Analytical Results [1]			Maximum Contaminant Levels (MCLs) [2]	
		Q1 2018	Q2 2018	Q3 2018	Primary [3]	Secondary[4]
Boron	mg/L [5]	0.84	0.63	0.64	- [6]	-
Calcium	mg/L	9	8.6	8.2	-	-
Chloride	mg/L	60	67	59	-	250
Electrical Conductivity	umhos/cm [7]	611	674	680	-	900
Magnesium	mg/L	0.2	0.086	0.032	-	-
Potassium	mg/L	2.4	1.3	1.6	-	-

Constituent	Unit	Analytical Results [1]			Maximum Contaminant Levels (MCLs) [2]	
		Q1 2018	Q2 2018	Q3 2018	Primary [3]	Secondary [4]
Sodium	mg/L	140	140	130	-	-
Sulfate	mg/L	65	71	47	-	250
Total Dissolved Solids	mg/L	460	460	540	-	500
Total Suspended Solids	mg/L	<2.5 [8]	2.7	2.5	-	-
1,2,4-Trimethylbenzene	ug/L [9]	1.3	0.89	1.1	-	-
1,3,5-Trimethylbenzene	ug/L	<0.25	0.22	0.25	-	-
Benzene	ug/L	<0.25	<0.083	<0.083	1	-
Ethylbenzene	ug/L	<0.25	<0.098	<0.098	300	-
Naphthalene	ug/L	<0.25	<0.36	<0.36	-	-
n-Propylbenzene	ug/L	<0.25	<0.11	0.14	-	-
o-Xylene	ug/L	-	0.22	0.27	-	-
p- & m-Xylenes	ug/L	-	<0.28	0.29	-	-
Toluene	ug/L	0.55	0.11	0.36	150	-
Total Xylenes	ug/L	0.52	0.43	0.55	1,750	-
Oil and Grease	mg/L	5.1	5.4	4.6	-	-
Total Petroleum Hydrocarbons	mg/L	-	<0.79	1.9	-	-
Hexavalent Chromium	mg/L	<0.005	<0.0007	0.000076	0.05 [10]	-
Total Mercury	mg/L	<0.0001	<0.000029	0.00005	-	-
Total Recoverable Antimony	mg/L	<0.001	<0.00011	<0.00011	0.006	-
Total Recoverable Arsenic	mg/L	<0.0015	<0.0007	<0.0007	0.01	-
Total Recoverable Barium	mg/L	0.0051	0.0048	0.0043	1	-
Total Recoverable Chromium (III)	mg/L	<0.0015	0.00086	0.00057	0.05 [10]	-
Total Recoverable Cobalt	mg/L	<0.0005	<0.0001	<0.0001	-	-
Total Recoverable Copper	mg/L	0.003	0.0033	0.00052	1.3	1
Total Recoverable Iron	mg/L	<0.025	<0.03	<0.03	-	0.3
Total Recoverable Lead	mg/L	<0.0005	0.00054	<0.0001	0.015	-
Total Recoverable Lithium	mg/L	<0.02	0.017	0.019	-	-
Total Recoverable Manganese	mg/L	<0.002	0.0044	0.0029	-	0.05
Total Recoverable Molybdenum	mg/L	<0.0005	0.00032	0.00035	-	-
Total Recoverable Nickel	mg/L	<0.001	0.00051	0.00046	0.1	-
Total Recoverable Selenium	mg/L	<0.0007	<0.00019	0.00087	0.05	-
Total Recoverable Strontium	mg/L	0.082	0.081	0.091	-	-
Total Recoverable Vanadium	mg/L	<0.003	<0.00078	<0.00078	-	-
Total Recoverable Zinc	mg/L	<0.0025	0.02	0.0018	-	5

1. Water quality results compiled in Table 2 are from quarterly monitoring reports required under Revised Monitoring and Reporting Program Order No. 98-205.
2. Maximum contaminant levels (MCLs) are published by the State Water Resources Control Board, Division of Drinking Water.
3. Standard based on chronic, non-acute, or acute human health effects.

4. Guidelines established to manage water for aesthetic considerations, such as taste, color, and odor. These are not considered to present a risk to human health.
5. mg/L = milligrams per liter.
6. "-" = there is no MCL for this constituent.
7. µmhos/cm = micromhos per centimeter.
8. "<" = less than the minimum detection limit.
9. µg/L = micrograms per liter.
10. The MCL of 0.05 mg/L is for total chromium.

The analytical results summarized in Table 2 indicate the quality of the treated produced wastewater is adequate for agriculture reuse. Most constituents are non-detect, with detection limits below the most stringent drinking water standards or at the lowest level achievable by the laboratory. Two constituents, 1,2-Dibromo-3-chloropropane and 1,2-Dibromethane, yielded non-detect results with the method detection limit (MDL) greater than the maximum contaminant levels (MCLs) for drinking water. According to the Discharger, this was the lowest detection limit achievable by the laboratory. The complete list of analytical results is available in Attachment 1 of the Information Sheet.

17. The analytical results summarized in Table 2 show detections for some constituents, including organic compounds; however, the detections are below the MCL where they exist. As discussed in more detail in the Food Safety Expert Panel section of the Information Sheet, the Central Valley Water Board has enlisted the services of a panel of experts (Food Safety Expert Panel) to guide an investigation regarding whether the use of produced wastewater for irrigation poses a threat to food safety. To date, the Food Safety Expert Panel has not identified a significant threat to food safety from the reuse of produced wastewater for irrigation.

18. The primary source of surface water used by Kern-Tulare for blending is from the Friant-Kern Canal. The quality of this water source is summarized in Table 3 below. The ranges shown represent wet year climate conditions and dry year climate conditions.

Table 3: Friant-Kern Canal Water Quality

Constituents	Units	Results [1] (Wet)	Results [2] (Dry)
Electrical Conductivity	µmhos/cm [3]	30	270
Boron	mg/L [4]	0.02	0.02
Chloride	mg/L	4.1	18
Sodium	mg/L	3.0	34
Total Dissolved Solids	mg/L	23	200

1. Water sample collected from the Friant-Kern Canal on 15 July 2009.
2. Water sample collected from the Friant-Kern Canal on 13 August 2014.
3. µmhos/cm = micromhos per centimeter.
4. mg/L = milligrams per liter.

19. Kern-Tulare does not own irrigation wells to off-set the potential increased water demands within its service territory. To resolve this issue, Kern-Tulare is partnered with landowners that have privately-owned deep groundwater wells near the Big Four Reservoir. There are four privately-owned wells that pump groundwater into the Big Four Reservoir for blending with produced wastewater. All remaining deep groundwater wells within Kern-Tulare's service territory are used to supplement individual's water supplies via the discharge of groundwater to privately-owned agricultural reservoirs (normally with a storage capacity of less than one

acre-foot). Table 4 summarizes the quality of two deep groundwater wells within Kern-Tulare's service territory.

Table 4: Irrigation Well Water Quality

Constituents	Units	Well 20C1 Results [1]	Well 28G2 Results [2]
Electrical Conductivity	µmhos/cm [3]	760	570
Boron	mg/L [4]	0.19	0.32
Chloride	mg/L	63	63
Sodium	mg/L	88	100
Total Dissolved Solids	mg/L	460	360

1. Groundwater sample from Well 20C1 collected on 5 August 2015.
2. Groundwater sample from Well 28G2 collected on 5 August 2015.
3. µmhos/cm = micromhos per centimeter.
4. mg/L = milligrams per liter.

Well 20C1 represents groundwater quality that is pumped to the Big Four Reservoir to be blended with produced wastewater. Well 28G2 represents water quality that is pumped to privately owned agricultural reservoirs as a supplemental water supply.

20. The Agreement, as discussed in Finding 10, states that Hathaway's petroleum wells in the Jasmin Oil Field have not undergone well stimulation, as defined by California Code of Regulations (CCR), title 14, section 1761. The Agreement also states that produced wastewater obtained from petroleum wells that have undergone well stimulation shall not be transferred to Kern-Tulare or Jasmin Water Company to be reused for irrigation.

Water Reclamation Policies

21. The *Water Quality Control Plan for the Tulare Lake Basin, Third Edition – revised May 2018,* (hereinafter Basin Plan) states 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."

22. The Basin Plan states further, "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."

23. 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

24. According to Federal Emergency Management Agency (FEMA) map numbers 06029C0250E and 06029C0775E, the Jasmin Treatment Facility, Big Four Reservoir, Guzman Reservoir, and Jasmin Ranchos Mutual Water Company Reservoir are outside of the 100-year return frequency flood zones. According to FEMA Map Number 06029C0250E, limited portions of the proposed irrigated acreage in the north are within a 100-year return flood event zone.

25. According to Custom Soil Resource Reports for portions of Kern County published by the United States Department of Agriculture, Natural Resources Conservation Service, the majority of the soils in the Jasmin Water Company service area are mapped as Chanac-Pleito complex, with smaller amounts of Chanac clay loam. Soils in the Cameo service area are largely mapped as Chanac clay loam and Chanac-Pleito complex. The majority of the soils in the Section 17 service area are also Chanac clay loam, with smaller amounts of Exeter sandy loam and Delano sandy loam soils.

26. The Chanac clay loam is described as a well-drained soil originating from fan remnants, with moderately high capacity to transmit water. The Chanac-Pleito complex includes the Chanac clay loam, with larger amounts of sand and less clay; it is also well drained with a moderately high capacity to transmit water. The Exeter and Delano sandy loams are also described as well-drained, but the Exeter soil has a more limited capacity to transmit water. Depending upon slope and irrigation, these soils may be considered as important farmlands.

27. The project area is characterized by hot dry summers and cooler, humid winters. The rainy season generally extends from November through March. Average annual precipitation is 7.1 inches and annual evapotranspiration is 55.7 inches (California Irrigation Management Information System (CIMIS) Delano Station #182).

Basin Plan, Beneficial Uses, and Water Quality Objectives

28. The Basin Plan designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Water Board.

29. The intended use of the water discharged to Kern-Tulare and Jasmin Water Company is agricultural supply. Surface water flows in the area are to the South Valley Floor hydrologic unit, Valley Floor Waters. The surface water beneficial uses of Valley Floor Waters, as stated in the Basin Plan for Hydrologic Area No. 558, are agricultural supply (AGR); industrial service supply (IND); industrial process supply (PRO); water contact recreation (REC-1); non-contact water recreation (REC-2); warm freshwater habitat (WARM); wildlife habitat (WILD); rare, threatened, or endangered species (RARE); and groundwater recharge (GWR).

30. The project is in the Kern County Basin hydrologic unit, Poso groundwater hydrographic unit with regards to groundwater. The Basin Plan designates the beneficial uses of groundwater in the Kern County Basin Detailed Analysis Unit (DAU) 257 as municipal and domestic supply (MUN), agricultural supply (AGR), industrial supply (IND), and water contact recreation (REC-1).

31. 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 MCLs in Title 22 of the 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.

32. 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 electrical conductivity (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.

33. According to *Water Quality for Agriculture* by Ayers and Westcot, boron is an essential element for plant growth that has the potential to become toxic at elevated concentrations. The yield for specific crops is not impacted until the toxicity threshold is reached resulting in a variety of symptoms displayed on the trunk, limbs, leaves, and/or fruit. *Water Quality for Agriculture* has a relative boron tolerance threshold category for a variety of crops that ranges from “Very Sensitive” (<0.5 mg/l) to “Very Tolerant” (6-15 mg/l). Crops related to this project that are discussed in *Water Quality for Agriculture* are displayed in Table 5 below.

Table 5. Crop Sensitivity for Boron

Crop(s)	Boron Tolerance Category	Boron Range (mg/l)
Lemons	Very Sensitive	< 0.5
Oranges and Grapes	Sensitive	0.5 – 0.75

34. The Basin Plan contains the following management requirements regarding oil field wastewater that are applicable to the groundwater within Kern-Tulare:

    a. The Basin Plan policy for disposal of oil field wastewater in unlined sumps overlying groundwater with existing or probable future beneficial uses includes effluent limits for EC, chloride, and boron of 1,000 µmhos/cm, 200 mg/L, and 1.0 mg/L respectively.

    b. In 1982, the Central Valley Water Board amended the Basin Plan to allow discharges of produced 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 produced wastewater exceeding Basin Plan salinity limits to be reused for agricultural use in water short areas, provided the dischargers first successfully demonstrate to the Central Valley Water Board that the increases will not cause exceedances of water quality objectives.

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

    a. **Oil and Grease**: An effluent limit of 35 mg/L for Oil and Grease is established in 40 CFR Part 435.50, Oil and Grease Extraction Point Source Category, Agricultural and Wildlife Water Use Subcategory. While the discharges to land described herein are not subject to federal requirements, the Basin Plan requires the Dischargers to comply with, or justify a departure from, effluent limitations set forth in 40 CFR 400 et seq., if the discharge is to land. The Dischargers have not provided such a justification, but rather have shown that the Jasmin Treatment Facility is capable of meeting the oil and grease limit of 35 mg/L. Thus, the limit is applied for this Order.

    b. **Electrical Conductivity**: This Order applies the Basin Plan effluent limit for produced wastewater of 1,000 µmhos/cm as an annual average for the discharge to the Guzman Reservoir and Pond No. 7 at the Jasmin Treatment Facility.

    c. **Boron**: This Order applies the Basin Plan effluent limit of 1.0 mg/L for produced wastewater as an annual average for the discharge to the Guzman Reservoir and Pond No. 7 at the Jasmin Treatment Facility.

    d. **Chloride:** This Order applies the Basin Plan effluent limit of 200 mg/L for produced wastewater as an annual average for the discharge to the Guzman Reservoir and Pond No. 7 at the Jasmin Treatment Facility.

Groundwater Considerations

36. The California Legislature enacted Assembly Bill 3030 during the 1992 session, subsequently codified in Water Code section 10750, *et seq*. Water Code section 10753 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."

37. Water Code section 60224 empowers Kern-Tulare to take any action needed for protection and preservation of underlying groundwater supplies including:

    a. The prevention of contaminants from entering groundwater supplies;

    b. The removal of contaminants from groundwater supplies;

    c. The locating and characterizing of contaminants which may enter the groundwater supplies;

    d. The identification of parties responsible for contamination of groundwater; and

    e. The performance of engineering studies.

38. Kern-Tulare adopted an updated Groundwater Management Plan (Plan) in 2012 with the following objectives:

    a. Maintain or improve groundwater levels within the service territory;

b. Control degradation of groundwater quality; and

c. Limit land subsidence to the greatest extent possible.

39. Monitoring elements of the Groundwater Management Plan include:

a. Semi-annual or semi-monthly monitoring of groundwater levels in wells within the service territory;

b. Evaluation of available water quality data to assess areas of concern if necessary;

c. Evaluation of available subsidence data to address areas of concern if necessary; and

d. Preparation of monitoring reports once every 5 years to present the results of the monitoring program.

40. Kern-Tulare adopted an Agricultural Water Management Plan (AWMP) in 2016 in accordance with the requirements of the Water Conservation Bill of 2009 (SBX7-7, Water Code §10820). The AWMP presents Kern-Tulare's existing and planned activities and programs designed to improve water use efficiency.

41. To sustain existing irrigated agriculture, Kern-Tulare supplements the landowner's use of surface water and groundwater with the produced wastewater from Hathaway. Through its authority, Kern-Tulare 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 areas with water shortages provided it is otherwise consistent with water quality policies.

Site-Specific Groundwater Considerations

42. The project area is located within the Kern County Groundwater Subbasin (5-022.14) per the Department of Water Resources' Bulletin 118. The aquifer system in Kern-Tulare's area consists of unconfined conditions in the upper few hundred feet, and confined conditions at greater depths, depending on the local extent of the confining layers.

43. The project area is located on the east side of the San Joaquin Valley, in the western part of the Sierra Nevada foothills. The geologic formations underlying Kern-Tulare dip generally to the west and the uppermost strata thicken to the west. Sediments that comprise the shallow to intermediate depth water-bearing deposits in the sub-basin are primarily continental deposits of Tertiary and Quaternary age derived from erosion of the Sierra Nevada. From youngest to oldest, these deposits include younger alluvium and flood deposits, older alluvium and stream deposits, the Kern River Formation in the eastern part of the sub-basin (and its subbasin equivalent, the Tulare Formation, further to the west), marine sediments of the San Joaquin and Etchegoin Formations, the Santa Margarita Formation, and the Olcese Formation.

44. The unconsolidated continental deposits are of Pleistone and Holocene age. In the eastern and southern subbasin margins, the unit is composed of up to 150 feet of interstratified beds of clay, silt, sand, and gravel. These deposits are difficult to distinguish from underlying fine-grained older alluvium, and the total thickness of these unconsolidated deposits may be as much as 1,000 feet. In Kern-Tulare, there are limited water wells installed in the continental deposits, as higher yields

can be found in wells installed in the deeper formations. Groundwater in the continental deposits is considered to be first-encountered and the unsaturated zone is typically 400 to 500 feet below ground surface.

45. The Tulare and Kern River Formations are both Plio-Pleistocene in age and represent a facies change from west to east across the sub-basin. The Tulare Formation (western sub-basin) consists of interbedded, oxidized to reduced sands, gypsiferous clays, and gravels derived predominantly from Coast Range sources. The Kern River Formation (eastern sub-basin) consists of poorly sorted, lenticular deposits of clay, silt, sand, and gravel derived from the Sierra Nevada. Both units are moderately to highly permeable and can yield moderate to large quantities of water to wells.

46. The Santa Margarita and Olcese Formations are Miocene in age and have a marine depositional setting in the western portion of the subbasin and a continental depositional setting in the eastern part of the subbasin. The Santa Margarita Formation consists of interbedded highly permeable alluvial sand and silty sand deposits ranging in thickness from 150 to 200 feet. The Olcese Formation has a sand layer up to 450 feet thick. These formations contain confined aquifers in the project area, and many of the irrigation wells in Kern-Tulare are installed in these formations.

47. The depth to groundwater is highly variable due to nearby groundwater recharge areas and groundwater extraction areas. Based on 2017 groundwater well data available on the Department of Water Resources website, depth to groundwater across the proposed project varies from approximately 430 to 680 feet below the ground surface (bgs). Groundwater elevation in this area ranges from approximately 70 to 100 feet above mean sea level. The gradient flow direction of the area is generally east to west.

48. The Antidegradation Analysis identifies three shallow groundwater wells that are considered to be representative of first-encountered groundwater. Well 6-B is approximately three miles southwest of the Guzman Reservoir and is screened at 600 to 800 feet below ground surface (bgs). Well 15D1 is approximately 1.5 miles northeast of the Big Four Reservoir and is screened between 480 and 680 feet bgs. Well 19F1 is 1.5 miles southwest of the Big Four Reservoir and is screened starting at 464 feet bgs (well survey and well screen interval are not available). Table 6 summarizes the quality of shallow groundwater for Wells 6-B, 15D1, and 19F1.

Table 6: Shallow Groundwater Quality

Constituents	Units	Well 6-B	Well 15D1		Well 19F1
		8/5/2015	2/22/2018	2/26/2019	5/29/2014
Electrical Conductivity	µmhos/cm [1]	830	521	517	696
Boron	mg/L [2]	0.75	0.043	<0.10	0.2
Chloride	mg/L	130	42	29	43
Sodium	mg/L	160	46	43	81
TDS	mg/L	500	380	390	400

1. µmhos/cm = micromhos per centimeter.
2. mg/L = milligrams per liter.

Produced wastewater from the Jasmin Treatment Facility appears to be at or below the quality of shallow groundwater near the project area.

49. As required under Revised Monitoring and Reporting Program Order No. 98-205, Kern-Tulare submitted a Monitoring Well Installation and Sampling Plan (MWISP) to the Central Valley Water Board. As described in this plan, Kern-Tulare proposes to monitor groundwater elevations at four wells that are installed in the continental deposits. The groundwater elevation contour map included in the MWISP shows shallow groundwater generally moving from the east to west within the project area. The MWISP is under review and is subject to approval by the Executive Officer.

50. The Antidegradation Analysis identifies two deep groundwater wells that are privately-owned and within Kern-Tulare's service territory. Well 20C1 and Well 28G2 are deep water wells that are used for blending water in the Big Four Reservoir or as a supplemental water supply for specific service areas. Water samples for Well 20C1 and Well 28G2 were collected on 5 August 2015. Table 7 summarizes the quality of deep groundwater near the project area.

Table 7: Deep Groundwater Quality

Constituents	Units	Well 20C1 [1]	Well 28G2 [2]
Electrical Conductivity	µmhos/cm [3]	760	570
Boron	mg/L [4]	0.19	0.32
Chloride	mg/L	63	63
Sodium	mg/L	88	100
Total Dissolved Solids	mg/L	460	360

1. Well 20C1 has a depth of 2,000 feet and is representative of groundwater supplied to the Big Four Reservoir and the Section 17 service area.
2. Well 28G2 has a depth of 2,030 feet and is representative of groundwater supplied to the Cameo and Jasmin Ranchos Mutual Water Company service area.
3. umhos/cm = micromhos per centimeter.
4. mg/L = milligrams per liter.

Antidegradation Analysis

51. State Water Board Resolution No. 68-16 (hereafter Resolution 68-16) requires the Central Valley Water Board, in regulating the discharge of waste, to maintain high quality waters of the State until it is demonstrated that any change in quality will be consistent with the maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality lower than that described in the Central Valley Water Board's policies (e.g., quality that exceeds water quality objectives).

52. Resolution 68-16 (*Policy with Respect to Maintaining High Quality Waters of the State*) (Anti-Degradation Policy) generally prohibits the Central Valley Water Board from authorizing activities that will result in the degradation of high-quality waters unless it has been shown that:

    a. The degradation will 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 dischargers will employ 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.

53. For the purposes of determining whether the discharges regulated under this Order have the potential to degrade groundwater, the blended produced wastewater that will be discharged to land has been compared to groundwater in Kern-Tulare. The Antidegradation Analysis includes groundwater limitations that were developed based on the discharge, groundwater quality, and potential degradation that may occur. The water quality assessment reviewed arsenic, EC, boron, chloride, and sodium, which are known to be present in produced wastewater. Groundwater limitations required under this Order have been determined to be appropriate based on Central Valley Water Board staff.

54. The Antidegradation Analysis quantified the amount and quality of water moving through the unsaturated zone due to infiltration from the reservoirs and irrigated cropland. Long-term water quality of infiltration from the reservoirs and irrigated cropland was estimated by averaging the results of 3 wet climate years, 6 average climate years, and 3 dry climate years. The maximum concentration of produced wastewater for the first through third quarter of 2018 was also considered. Table 8 summarizes the water quality results for: blended produced wastewater percolating from the project, produced wastewater, shallow groundwater, and effluent limitations specified in the Basin Plan. Levels of EC, chloride, and sodium in percolating water from the reservoirs and irrigated cropland are less than groundwater quality in the project area. The Antidegradation Analysis indicates boron in water percolating from the reservoirs will increase slightly but will continue to be below that necessary to maintain AGR beneficial uses of groundwater.

Table 8: Proposed Project Water Quality

	EC (µmhos/cm [1])	Boron (mg/L [2])	Chloride (mg/L)	Sodium (mg/L)	Percolate and Seepage Flow (Ac-ft [3])
Blended Produced Wastewater percolating from Reservoirs	435	0.42	39	83	318
Blended Produced Wastewater percolating from Cropland	361	0.35	34	68	1,158
Produced Wastewater [4]	680	0.84	67	140	
Basin Plan Effluent Limits	1,000	1.0	200	-	-
Shallow Groundwater Quality in the Project Area [5]	641	0.27	61	83	-

1 umhos/cm = micromhos per centimeter.
2 mg/L = milligrams per liter.
3 Ac-ft = Acre-feet per year.
4 Maximum value of produced wastewater based on the first through quarter monitoring data for 2018.
5 Average water quality of shallow groundwater based on Wells 6-B, 15D1, and 19F1.

55. The Dischargers implemented the following treatment and control measures to minimize the potential for the discharge to degrade groundwater:

a. Treatment of produced wastewater to minimize oil and grease before blending and use for irrigation.

b. Blending of produced wastewater supplies so that the blended concentrations are protective of designated beneficial uses of the underlying aquifers.

c. Use of irrigation water management practices that optimize the balance between a) leaching to manage root zone salinity and b) minimizing percolation during the summer months in favor of winter percolation with lower concentrations.

The Board finds that these treatment and control practices represent BPTC of the wastes that may threaten to degrade waters of the state.

56. The discharge, as regulated by this Order, will provide the following benefits:

a. An additional irrigation water supply that will offset or augment surface water and groundwater resources.

b. A 'drought proof' water supply. This has additional benefits for crop production planning.

c. A water reuse program that provides the oil industry with a reliable and environmentally beneficial way to manage produced wastewater while providing a significant benefit for agriculture that would not be available if the produced wastewater was discharged to injection wells for disposal.

d. An additional water supply to support the agricultural economy of the Central Valley region.

57. As described in Finding 54, the project is not likely to result in significant degradation of groundwater with respect to EC, chloride, sodium, and boron. The Groundwater Limitations in this Order do authorize some degradation of groundwater with respect to EC, chloride, sodium, boron, and arsenic, however, the degradation, should it occur, will not cause groundwater to exceed the quality necessary to maintain its designated beneficial uses of MUN, AGR, IND, and REC-1.

58. This Order complies with Resolution 68-16 because it ensures that any degradation that may occur as a result of the discharge regulated by this Order will not result in water quality lower than that prescribed in state and regional policies, that the degradation will not unreasonably affect present and anticipated future beneficial uses, that the Dischargers will employ BPTC to minimize degradation, and that the degradation is consistent with the maximum benefit to the people of the state due to the significant benefits provided by the activities regulated by this Order as described in Finding No. 56.

Other Regulatory Considerations

59. Based on the threat to water quality and complexity of the discharge, the facility is determined to be classified as 2-B. California Code of Regulations, title 23, section 2200, 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."

60. Title 27 of the California Code of Regulations (hereafter Title 27) contains regulatory requirements for the treatment, storage, processing, and disposal of solid waste. However,

Title 27 exempts certain activities from its provisions. Title 27, section 20090 states, in relevant part:

> (b) Wastewater - Discharges of wastewater to land, including but not limited to evaporation ponds, percolation ponds, or subsurface leach fields if the following conditions are met:
>
> (1) the applicable RWQCB has issued WDRs, reclamation requirements, or waived such issuance;
>
> (2) the discharge is in compliance with the applicable water quality control plan; and
>
> (3) the wastewater does not need to be managed according to Chapter 11, Division 4.5, Title 22 of this code as a hazardous waste.

The discharge of produced wastewater from the Jasmin Treatment Facility to Kern-Tulare and Jasmin Water Company are exempt from the requirements of Title 27 because the Board is issuing these waste discharge requirements, because the discharge as regulated by this Order will comply with the Basin Plan, and because the wastes subject to regulation under this Order do not need to be managed as hazardous wastes.

61. Water Code section 13267(b) states, in relevant part, that:

> In conducting an investigation … 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 … 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.

The technical reports required by this Order and the attached Monitoring and Reporting Program R5-2019-0043 are necessary to assure compliance with these WDRs. The Dischargers own and operate the facilities that discharge the waste subject to this Order.

62. The California Department of Water Resources (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 74-81 (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.

63. 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.

CEQA

64. In accordance with the requirements of the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.), Kern-Tulare prepared an Environmental Impact Report (EIR) for the use of produced wastewater for irrigation and groundwater recharge. The EIR was circulated for public review and comment from 23 May 2016 through 6 July 2016 (State Clearinghouse No. 2015021024). The Central Valley Water Board, acting as a responsible agency, was consulted during the development of these documents. Kern-Tulare certified the EIR, adopted a Mitigation Monitoring and Reporting Program (MMRP), and approved the produced wastewater project. Kern-Tulare filed a Notice of Determination (NOD) for the EIR with the Kern County Clerk and Governor's Office of Planning and Research (OPR) on 12 August 2016. The Central Valley Water Board as the responsible agency pursuant to CEQA (Public Resources Code, section 21069) and in making its determinations and findings, must presume that the Kern-Tulare EIR comports with the requirements of CEQA and is valid. (Public Resources Code, section 21167.3.) The Regional Board has determined that the Project, when implemented in accordance with the MMRP and the conditions in this Order, will not result in any significant adverse water resource impacts.

65. The federal Bureau of Reclamation provided the public with an opportunity to comment on a Draft Finding of No Significant Impact (FONSI) and Draft Environmental Assessment (EA) for the Oilfield Water Reuse Project in January and February 2017. The final FONSI (FONSI-15-006) and EA (EA-15-006) were posted in March 2017.

CV-SALTS Reopener

66. The Central Valley Water Board adopted Basin Plan amendments incorporating new programs for addressing ongoing salt and nitrate accumulation in the Central Valley at its 31 May 2018 Board Meeting. These programs, once effective, could change how the Central Valley Water Board permits discharges of salt and nitrate. For nitrate, dischargers that are unable to comply with stringent nitrate requirements will be required to take on alternate compliance approaches that involve providing replacement drinking water to persons whose drinking water is affected by nitrate. Dischargers could comply with the new nitrate program either individually or collectively with other dischargers. For salinity, dischargers that are unable to comply with stringent salinity requirements would instead need to meet performance-based requirements and participate in a basin-wide effort to develop a long-term salinity strategy for the Central Valley. This Order may be amended or modified to incorporate any newly-applicable requirements.

67. The stakeholder-led Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) initiative has been coordinating efforts to implement new salt and nitrate management strategies. The Board expects dischargers that may be affected by new salt and nitrate management policies to coordinate with the CV-SALTS initiative.

Food Safety Expert Panel

68. The Central Valley Water Board established a panel of experts (Food Safety Expert Panel) in the field of toxicology, biology, and agriculture to review the reuse of produced wastewater for irrigation. The Food Safety Expert Panel is to provide the Board with recommendations regarding

potential impacts that may be associated with the reuse of produced wastewater for irrigation. On 13 June 2017, Hathaway, Kern-Tulare, and Jasmin Water Company signed the *Memorandum of Understanding Between the Central Valley Regional Water Quality Control Board and the Permit Holders Governing the Solicitation, Management, and Review of Academic, Technical and/or Scientific Studies Related to the Irrigation of Food Crops with Oil Field Produced Water* (MOU). This MOU outlines the process by which the Permit Holders will fund and the Central Valley Water Board will oversee, manage, and review academic, technical, and/or scientific studies conducted by a third-party consultant related to the irrigation of food crops with produced wastewater. These studies will be used to inform the work of the Food Safety Expert Panel and the Central Valley Water Board. If the work being conducted by the Food Safety Expert Panel effort determines there is a significant threat to crop safety and public health associated with the irrigation of crops with produced wastewater, this Order may be reopened and modified to address the threat.

Public Notice

69. 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.

70. Hathaway, Kern-Tulare, Jasmin Water Company, 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.

71. All comments pertaining to the discharge were heard and considered in a public hearing.

IT IS HEREBY ORDERED that pursuant to sections 13263 and 13267 of the Water Code, Hathaway, LLC, Kern-Tulare Water District, Jasmin Ranchos Mutual Water Company, their agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. Discharge Prohibitions

1. The discharge of wastes other than treated produced wastewater at the location and in the manner described in the Findings and authorized herein is prohibited.

2. The bypass or overflow of wastes, including produced wastewater, to surface waters or surface water drainage courses 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 the California Code of Regulations, title 23, section 2510 et seq., is prohibited.

5. The discharge of fluids used in "well stimulation treatment," as defined by CCR, title 14, section 1761 (including hydraulic fracturing, acid fracturing, and acid matrix stimulation), to land is prohibited.

6. The discharge of produced wastewater from wells containing well stimulation treatment fluids, as defined by CCR, title 14, section 1761, is prohibited.

7. Treatment system bypass of untreated or partially treated waste is prohibited, except as allowed in section A.13 of Standard Provisions and Reporting Requirements for Waste Discharge Requirements, dated 1 March 1991.

8. Produced wastewater overflow from the Jasmin Treatment Facility, Big Four Reservoir, Guzman Reservoir, or the Jasmin Ranchos Mutual Water Company Reservoir is prohibited.

B. Effluent Limitations

1. The discharge of treated produced wastewater from Pond No. 7 at the Jasmin Treatment Facility to Kern-Tulare and the Jasmin Water Company (**Discharge 001**) shall not exceed the following:

Constituent	Units	Daily Maximum [1]	Annual Average [2]	Annual Maximum [3]
Flowrate	Ac-ft/yr [4]	-	-	3,320 [5]
Electrical Conductivity	µmhos/cm [6]	-	1,000	
Boron	mg/L [7]	-	1.0	
Chloride	mg/L	-	200	
Oil & Grease	mg/L	35	-	

1. The **Daily Maximum** is the greatest discharge rate or concentration permitted for one day.
2. The **Annual Average** is the arithmetic mean of measurements made during a calendar year.
3. The **Annual Maximum** is the maximum discharge rate permitted for the calendar year.
4. Ac-ft/yr = Acre-feet per year.
5. The value shown is the final annual maximum flowrate at 3,320 ac-ft/yr. The annual maximum flowrate shall not exceed 2,640 ac-ft/yr. until Provision E.5 is satisfied.
6. µmhos/cm = micromhos per centimeter.
7. mg/L = milligrams per liter.

2. The discharge of blended produced wastewater from the Jasmin Ranchos Mutual Water Company Reservoir (**Discharge 002**) to cropland for irrigation shall not exceed the following:

Constituent	Units	Annual Average [1]
Electrical Conductivity	µmhos/cm [2]	1,000
Boron	mg/L [3]	1.0
Chloride	mg/L	200
Sodium	mg/L	175

1. The **Annual Average** is the arithmetic mean of measurements made during a calendar year.
2. µmhos/cm = micromhos per centimeter.
3. mg/L = milligrams per liter.

3. The discharge of blended produced wastewater from the Guzman Reservoir (**Discharge 003**) to the Big Four Reservoir shall not exceed the following:

Constituent	Units	Annual Average [1]
Electrical Conductivity	µmhos/cm [2]	1,000
Boron	mg/L [3]	1.0
Chloride	mg/L	200
Sodium	mg/L	175

1. The **Annual Average** is the arithmetic mean of measurements made during a calendar year.
2. µmhos/cm = micromhos per centimeter.
3. mg/L = milligrams per liter.

4. The discharge of blended produced wastewater, surface water, and groundwater from the Big Four Reservoir (**Discharge 004**) to cropland for irrigation shall not exceed the following:

Constituent	Units	Annual Average [1]
Electrical Conductivity	µmhos/cm [2]	1,000
Boron	mg/L [3]	1.0
Chloride	mg/L	200
Sodium	mg/L	175

1. The **Annual Average** is the arithmetic mean of measurements made during a calendar year.
2. µmhos/cm = micromhos per centimeter.
3. mg/L = milligrams per liter.

C. Discharge Specifications

1. The Dischargers shall operate all systems and equipment to optimize treatment of wastewater and the quality of the discharge.

2. 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 (see Section D.2).

3. Produced wastewater shall not be discharged to a canal used to transport municipal and domestic water sources (Friant-Kern Canal and/or others).

4. The discharge of the produced wastewater shall not create objectionable odors at the Jasmin Treatment Facility, Jasmin Ranchos Mutual water Company Reservoir, Guzman Reservoir, and Big Four Reservoir that are perceivable beyond the limits of the reservoirs at an intensity that creates or threatens to create nuisance conditions.

5. The reservoirs encompassed by this Order 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.

6. The reservoirs encompassed by this Order shall be managed to prevent breeding of mosquitos. 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 be allowed to 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.

7. Newly constructed or rehabilitated berms or levees (excluding internal berms that separate ponds or control the flow of water within a surface impoundment) shall be designed and constructed under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1.

8. The Jasmin Ranchos Mutual Water Company Reservoir, Guzman Reservoir, Big Four Reservoir, and the ponds at the Jasmin Treatment Facility shall be free of visible oil or oil accumulation, or effectively netted to preclude the entry of wildlife.

D. Groundwater Limitations

1. The discharge of produced wastewater, in combination with other sources, shall not cause groundwater underlying Kern-Tulare 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 basin-wide basis to increase by more than six (6) µmhos/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.

2. The discharge of produced wastewater shall not cause groundwater to exceed primary MCLs established under Title 22.

3. The discharge of produced wastewater shall not cause groundwater in the area potentially affected by the discharge to contain waste constituents in concentrations greater than the following:

Constituent	Units	Limitation
Electrical Conductivity	µmhos/cm [1]	1,000
Arsenic	µg/L [2]	10
Boron	mg/L [3]	0.75
Chloride	mg/L	175
Sodium	mg/L	115

1. µmhos/cm = micromhos per centimeter.
2. µg/L = micrograms per liter.
3. mg/L = milligrams per liter.

E. Provisions

1. The Dischargers 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 Dischargers shall comply with Monitoring and Reporting Program (MRP) R5-2019-0043, 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 Dischargers shall comply with the following:

    a. The Dischargers shall be fully engaged in the Food Safety Project as envisioned in the MOU as signed in June 2017 and shall provide to the Manager and Administrator in a timely manner information that they may request to ensure the timely completion of the crop sampling under Task 3, including but not limited to, the following:

        i. The Dischargers shall, on an annual basis by 1 January, submit a list of all crops that are irrigated with produced wastewater within its service area. The list shall include a description of the anticipated time of harvest for each crop.

        ii. The Dischargers shall provide notification to the Manager and Administrator at least two weeks prior to harvest of any and all crops that are or have been irrigated with water that could contain produced wastewater. The notification shall include the type of crop and anticipated harvest date. The Dischargers shall work with the Administrator and the crop owners to obtain access and ensure that representative samples of the crops can be obtained by the third-party sampler under Central Valley Water Board oversight.

    b. As directed by the Manager, the Dischargers shall participate as directed in Tasks 1, 2, and 3, as agreed upon in the MOU including timely responses to inquiries by the Administrator and Manager.

    c. If one of the Dischargers listed in Finding No. 5 does not comply with any part of the above provision, then the Manager at his discretion, may bring to the Central Valley Water Board for consideration an Order prohibiting the use of produced wastewater for irrigation for that Discharger.

4. The Dischargers shall keep at the Kern-Tulare office, the Jasmin Water Company office, and the Jasmin 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.

5. To increase the maximum annual flowrate of produced wastewater to Kern-Tulare and Jasmin Water Company (Discharge 001), the Dischargers shall submit a technical report that demonstrates the Jasmin Treatment Facility is adequately designed and constructed to treat produced wastewater at the increased flow volume and to the quality described in the findings of this Order. The technical report is subject to Executive Officer approval. Following written

approval by the Executive Officer, the maximum annual flowrate for Discharge 001 may be increased to 3,320 ac-ft/yr.

6. The Dischargers 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.

7. 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.

8. The Dischargers shall comply with all conditions of this Order, including timely submittal of technical and monitoring reports. On or before each report due date, the Dischargers shall submit the specified document to the Central Valley Water Board or, if appropriate, a written report detailing compliance or noncompliance with the specific schedule date and task. If noncompliance is being reported, then the Dischargers shall state the reasons for such noncompliance and provide an estimate of the date when the Dischargers will be in compliance. The Dischargers shall notify the Central Valley Water Board in writing 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.

9. In the event of any change in control or ownership of land or waste treatment and storage facilities presently owned or controlled by the Dischargers, the Dischargers 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.

10. The Dischargers shall comply with Standard Provisions, General Reporting Requirements A.4, which requires the submittal of a new Report of Waste Discharge to the Central Valley Water Board **at least 140 days** before making any material change to the discharge. Material changes include, but not limited to increasing the volume of produced wastewater, irrigation of lands not identified in Finding 2 of this Order, and incorporating new sources of produced wastewater not identified in Finding 8 of this Order.

11. 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.

12. The Dischargers 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 Dischargers shall proceed with all work required by the following provisions by the due dates specified.

13. **Within 30 days of signing a new agreement** for the transfer and reuse of produced wastewater from Hathaway to Kern-Tulare and Jasmin Water Company, the Dischargers shall submit a copy of the agreement to the Central Valley Water Board.

14. The Dischargers shall use the best practicable cost-effective control technique(s) including proper operation and maintenance, to comply with this Order.

15. As described in the Standard Provisions, the Dischargers shall report promptly to the Central Valley Water Board any material change or proposed change in the character, location, or volume of the discharge.

If, in the opinion of the Executive Officer, the Dischargers fail 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 of the Central Valley Water Board 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

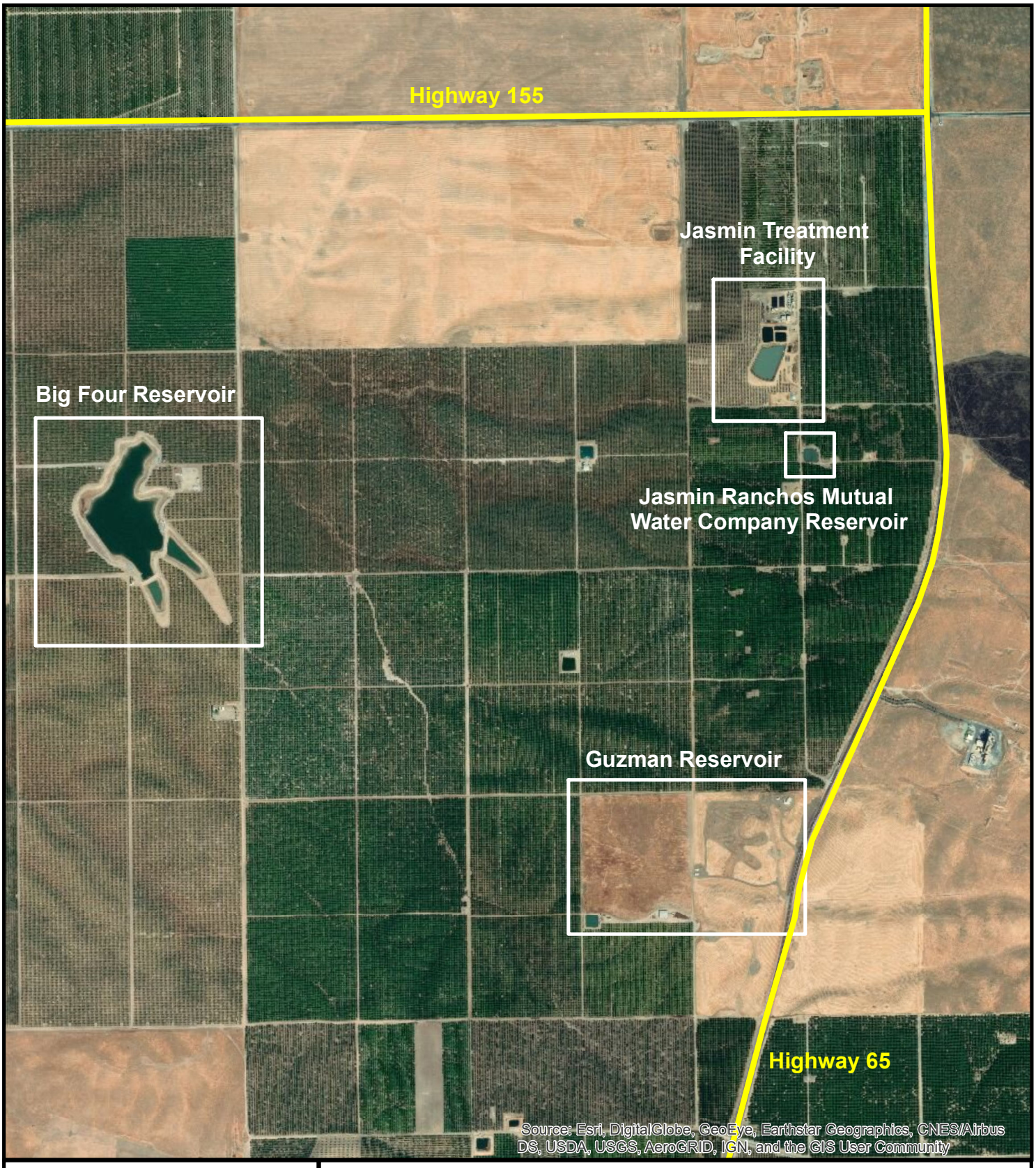
or will be provided upon request.

I, PATRICK PULUPA, Executive Officer, do hereby certify that the foregoing is a full true, and correct copy of an Order adopted by the California Regional Water Quality Control Board on, 6 June 2019.

PATRICK PULUPA, Executive Officer

Order Attachments
- Attachment A. – Site Map
- Attachment B. – Treatment Process Flow Diagram
- Attachment C. – Network Flow Diagram
- Attachment D. – Irrigated Cropland

Monitoring and Reporting Program R5-2019-0043
Information Sheet Order R5-2019-0043
Standard Provisions (1 March 1991)



N

0 0.125 0.25 0.5 Miles

SITE MAP

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2019-0043
FOR
HATHAWAY, LLC, KERN-TULARE WATER DISTRICT,
AND JASMIN RANCHOS MUTUAL WATER COMPANY
JASMIN TREATMENT FACILITY
KERN COUNTY

ATTACHMENT A

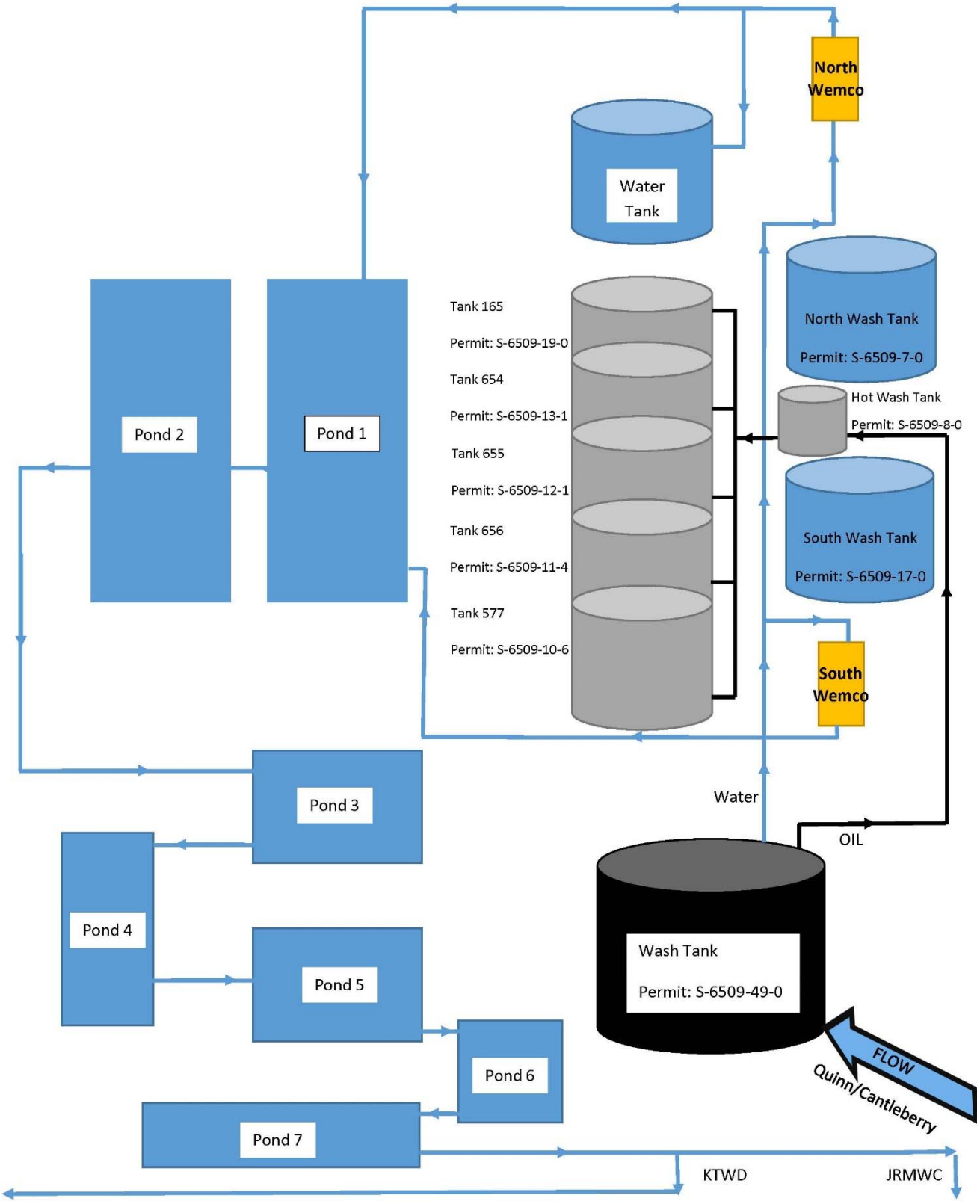


Image Created By:
Kern-Tulare Water District

Not to scale

TREATMENT PROCESS FLOW DIAGRAM
WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2019-0043
FOR
HATHAWAY, LLC, KERN-TULARE WATER DISTRICT,
AND JASMIN RANCHOS MUTUAL WATER COMPANY
JASMIN TREATMENT FACILITY
KERN COUNTY

ATTACHMENT B

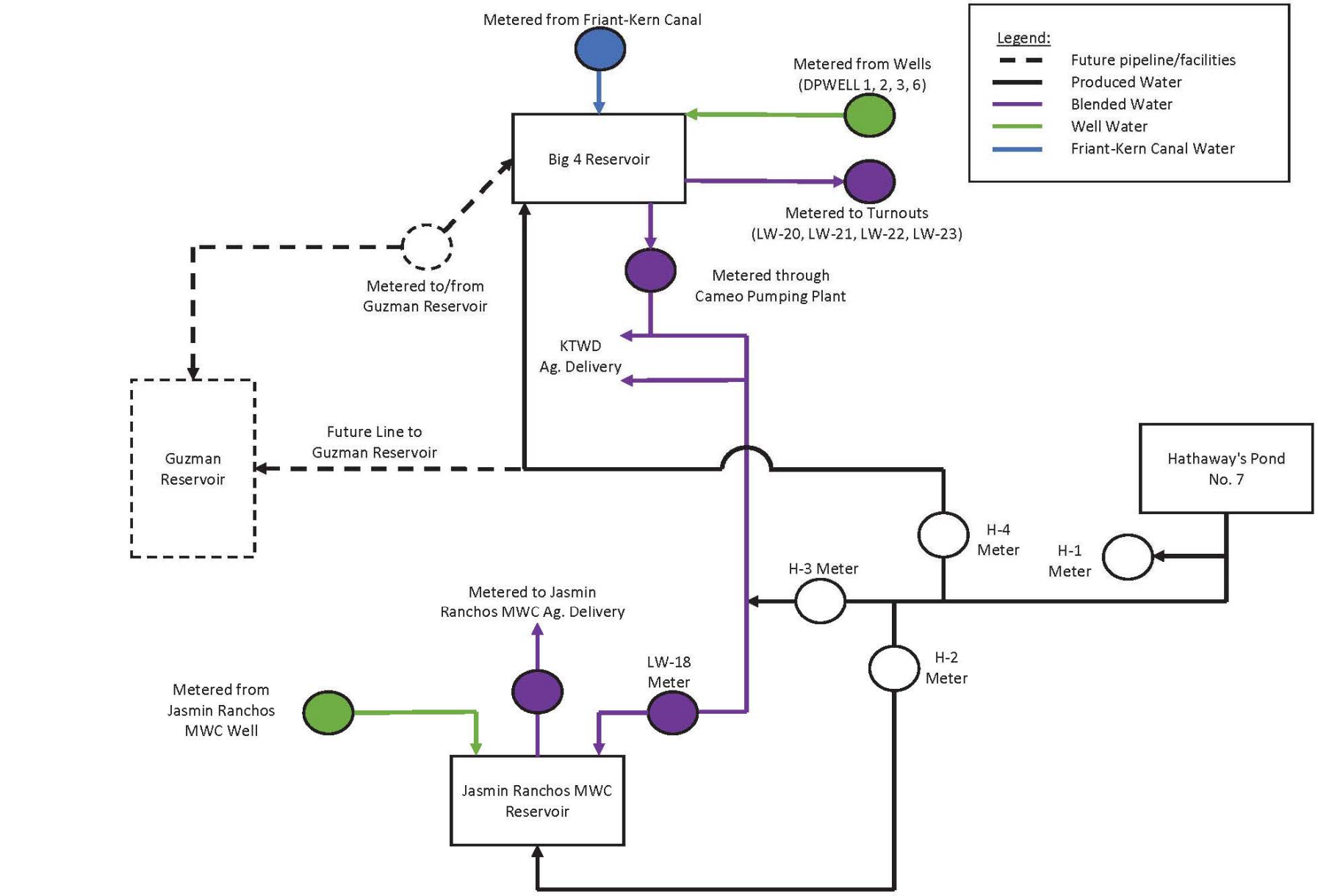
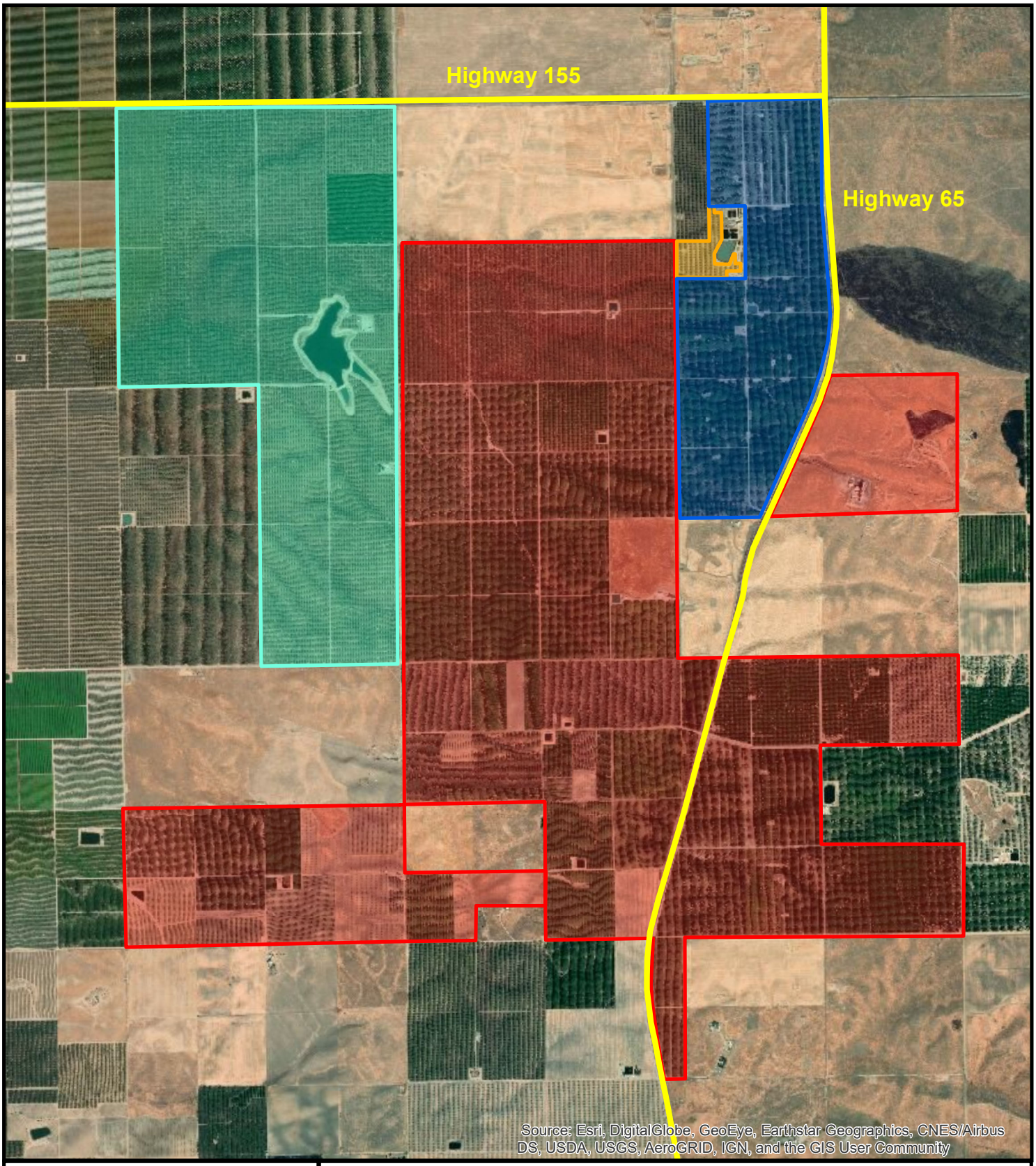


Image Created By:
Kern-Tulare Water District

NETWORK FLOW DIAGRAM
WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2019-0043
FOR
HATHAWAY, LLC, KERN-TULARE WATER DISTRICT,
AND JASMIN RANCHOS MUTUAL WATER COMPANY
JASMIN TREATMENT FACILITY
KERN COUNTY

ATTACHMENT C



Legend

- Cameo Service Area
- JRMWC Service Area
- Section 17 Service Area
- Hathaway Service Area

N

0 0.2 0.4 0.8 Miles

Irrigated Cropland

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2019-0043
FOR
HATHAWAY, LLC, KERN-TULARE WATER DISTRICT,
AND JASMIN RANCHOS MUTUAL WATER COMPANY
JASMIN TREATMENT FACILITY
KERN COUNTY

ATTACHMENT D

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM
ORDER NO. R5-2019-0043

FOR
HATHAWAY, LLC; KERN-TULARE WATER DISTRICT; AND
JASMIN RANCHOS MUTUAL WATER COMPANY

PRODUCED WASTEWATER RECLAMATION PROJECT
JASMIN TREATMENT FACILITY
JASMIN OIL FIELD
KERN COUNTY

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

Hathaway, LLC (Hathaway), Kern-Tulare Water District (Kern-Tulare), and Jasmin Ranchos Mutual Water Company (Jasmin Water Company) (hereafter jointly referred to as Dischargers) 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 a 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.

This MRP includes monitoring, record-keeping, and reporting requirements. Monitoring requirements include groundwater samples, produced wastewater samples, identification of chemicals associated with petroleum exploration and production, and tracking the application of recycled materials (blended produced wastewater); in order to determine if the Dischargers are in compliance with applicable laws, regulations, policies, and Waste Discharge Requirements Order No. R5-2019-0043 (WDRs).

MONITORING

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 applicable provisions of the ***Standard Provisions and Reporting Requirements for Waste Discharge Requirements***, dated 1 March 1991 (Standard Provisions).

Field test instruments (such as a pH meter) 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 State Water Board's Environmental Laboratory Accreditation Program (ELAP). The Dischargers may propose alternative methods for approval by the Executive Officer.

This MRP can be modified if the Dischargers provide sufficient data to support the proposed changes. If monitoring consistently shows no significant variation in magnitude of a constituent concentration or parameter after a statistically significant number of sampling events, the Dischargers may request this

MRP be revised by the Executive Officer to reduce the number of monitoring locations, monitoring frequency, or to change the list of constituents. The proposal must include adequate technical justification for any revision.

This MRP requires the Dischargers to keep and maintain records for five years from the date the monitoring activities occurred and to prepare and submit reports containing the results of monitoring specified below. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the Central Valley Water Board.

A complete list of substances that are tested for and reported on by the testing laboratory shall be provided to the Central Valley Water Board. All peaks must be reported. In addition, both the method detection limit (MDL) and the practical quantitation limit (PQL) shall be reported. Detection limits shall be equal to or more precise than USEPA methodologies. Analysis with an MDL greater than the most stringent drinking water standard that results in non-detect needs to be reanalyzed with the MDL set lower than the drinking water standard, if possible, or at the lowest detection limit achievable by the laboratory. If the regulatory limit for a given constituent is less than the reporting limit (RL) or PQL, then any analytical results for that constituent below the RL (or PQL), but above the method detection limit (MDL), shall be reported and flagged as estimated. All quality assurance/quality control (QA/QC) samples must be run on the same dates as when samples are actually analyzed. Proper chain of custody procedures must be followed and a copy of the completed chain of custody form shall be submitted with the report. All analyses must be performed by an ELAP certified laboratory.

PRODUCED WASTEWATER MONITORING

Produced wastewater samples shall be representative of the volume and nature of the discharges. The Dischargers shall maintain all sampling and analytical results: date, exact place, and time of sampling; dates analyses were performed; analytical techniques used; and results of all analyses.

The Dischargers shall label all pipelines discharging produced wastewater, or other sources of water (e.g., surface water and/or groundwater), to the Jasmin Ranchos Mutual Water Company Reservoir, Guzman Reservoir, and Big Four Reservoir . Identifying labels shall be located within five feet of the pipeline and shall include at least the following: type of water (e.g., produced wastewater, surface water, or groundwater), source of the water (e.g., Well ID, canal, or lease/facility), and the company that supplies the water.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Dischargers 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 – Produced Wastewater (Jasmin Treatment Facility)

The Dischargers shall monitor the volume and quality of produced wastewater treated at the Jasmin Treatment Facility. A representative sample of produced wastewater shall be collected from Pond No. 7, the last pond at the Jasmin Treatment Facility. Produced wastewater monitoring for Discharge 001 shall include at least the following:

Constituent/Parameter	Units	Sample Type	Frequency
Flow to Jasmin Water Company [1]	Ac-ft/day [2]	Metered[3]	Continuous
Flow to Kern-Tulare [1]	Ac-ft/day	Metered	Continuous
Other Flow [1]	Ac-ft/day	Metered	Continuous
Electrical Conductivity	µmhos/cm	Meter	Continuous
Table I – Water Quality Monitoring	Varies	Grab	Quarterly
Table II – Oil Production and Process Chemicals and Additives [4]	Varies	Grab	Quarterly

[1] Individual volumes of produced wastewater shall be monitored and all discharge locations shall be defined in each monitoring report.

[2] Acre feet per day.

[3] Flow may be measured with an appropriate engineered alternative if approved in writing by the Executive Officer.

[4] The Dischargers are responsible for identifying approved analytical methods for all constituents identified in Table II, as appropriate. For constituents that have approved analytical methods, the Dischargers are responsible for the completion of the analyses. For constituents that do not have an approved analytical method, the Dischargers shall cite the source (e.g., name of the consultant or laboratory) and qualifications of the entity that made the determination that an analytical method is not available for specific constituents in Table II. Entities that are reviewing Table II to identify analytical methods shall have adequate knowledge related to laboratory analyses and be qualified to complete this review.

Discharge 002 – Irrigation Water
(Jasmin Ranchos Mutual Water Company Reservoir)

Produced wastewater and blending water are mixed in the Jasmin Ranchos Mutual Water Company Reservoir prior to distribution to cropland for irrigation. A monitoring station shall be established opposite of the inlet at the Jasmin Ranchos Mutual Water Company Reservoir that provides a representative sample of blended produced wastewater used for irrigation. Monitoring of the Jasmin Ranchos Mutual Water Company Reservoir for Discharge 002 shall include at least the following:

Constituent/Parameter	Units	Sample Type	Frequency
Inlet to the JRMWC Reservoir [1]			
Produced Wastewater	Ac-ft/m[2]	Metered[3]	Monthly
Blending Water	Ac-ft/m	Metered	Monthly
Total Volume	Ac-ft/m	Calculated	Monthly
Outlet of the JRMWC Reservoir [4]			
Jasmin Water Company	Ac-ft/m	Metered	Monthly
Other	Ac-ft/m	Metered	Monthly
Blending Ratio [5]	-	Calculated	Monthly
Table I – Water Quality Monitoring	Varies	Grab	Quarterly
Table II – Oil Production and Process Chemicals and Additives [6]	Varies	Grab	Quarterly

[1] Individual volumes shall be monitored and all sources of water defined in each monitoring report (e.g., petroleum production facilities, irrigation well names, or surface water sources).

[2] Acre-feet per month.

[3] Flow may be measured with an appropriate engineered alternative if approved in writing by the Executive Officer.

[4] Individual volumes shall be monitored and all locations where blended produced wastewater is discharged to land shall be defined in each monitoring report.

[5] The blending ratio shall be calculated using the sum of blending water and produced wastewater that are mixed.

[6] The Dischargers are responsible for identifying approved analytical methods for all constituents identified in Table II, as appropriate. For constituents that have approved analytical methods, the Dischargers are responsible for the completion of the analyses. For constituents that do not have an approved analytical method, the Dischargers shall cite the source (e.g., name of the consultant or laboratory) and qualifications of the entity that made the determination that an analytical method is not available for specific constituents in Table II. Entities that are reviewing Table II to identify analytical methods shall have adequate knowledge related to laboratory analyses and be qualified to complete this review.

Discharge 003 – Produced Wastewater Storage (Guzman Reservoir)

The Dischargers shall monitor the volume and quality of produced wastewater discharged to the Guzman Reservoir. The Dischargers shall establish a monitoring station at the Guzman Reservoir that provides a representative sample of produced wastewater discharged to the Big Four Reservoir. Produced wastewater monitoring for Discharge 003 shall include at least the following:

Constituent/Parameter	Units	Sample Type	Frequency
Inlet to the Guzman Reservoir [1]			
Produced Wastewater	Ac-ft/m[2]	Metered [3]	Monthly
Blending Water	Ac-ft/m	Metered	Monthly
Total Volume	Ac-ft/m	Calculated	Monthly
Outlet of the Guzman Reservoir [4]			
Big Four Reservoir	Ac-ft/m	Metered	Monthly
Other	Ac-ft/m	Metered	Monthly
Table I – Water Quality Monitoring	Varies	Grab	Semi-Annual [5]

[1] Individual volumes shall be monitored and all sources of water defined in each monitoring report (e.g., petroleum production facilities, irrigation well names, or surface water sources).

[2] Acre-feet per month.

[3] Flow may be measured with an appropriate engineered alternative if approved in writing by the Executive Officer.

[4] Individual volumes shall be monitored and all locations where blended produced wastewater is discharged to land shall be defined in each monitoring report.

[5] Water samples shall be analyzed two times per year, with at least one sample during January through June and a second sample from July through December.

Discharge 004 – Irrigation Water (Big Four Reservoir)

The Dischargers shall monitor the volume and quality of produced wastewater discharged to the Big Four Reservoir. The Dischargers shall establish a monitoring station at the Big Four Reservoir that provides a representative sample of blended produced wastewater used for irrigation. Monitoring at Discharge 004 shall include at least the following:

Constituent/Parameter	Units	Sample Type	Frequency
Inlet to the Big Four Reservoir[1]			
Produced Wastewater	Ac-ft/m[2]	Metered [3]	Monthly
Blending Water	Ac-ft/m	Metered	Monthly
Total Volume	Ac-ft/m	Calculated	Monthly
Outlet of the Big Four Reservoir [4]			
Kern-Tulare Water District	Ac-ft/m	Metered	Monthly

Constituent/Parameter	Units	Sample Type	Frequency
Jasmin Water Company	Ac-ft/m	Metered	Monthly
Other	Ac-ft/m	Metered	Monthly
Blending Ratio [5]	-	Calculated	Monthly
Table I – Water Quality Monitoring	Varies	Grab	Quarterly
Table II – Oil Production and Process Chemicals and Additives [6]	Varies	Grab	Quarterly

[1] Individual volumes shall be monitored and all sources of water defined in each monitoring report (e.g., petroleum production facilities, irrigation well names, or surface water sources).

[2] Acre-feet per month.

[3] Flow may be measured with an appropriate engineered alternative if approved in writing by the Executive Officer.

[4] Individual volumes shall be monitored and all locations where blended produced wastewater is discharged to land shall be defined in each monitoring report.

[5] The blending ratio shall be calculated using the sum of blending water and produced wastewater that are mixed.

[6] The Dischargers are responsible for identifying approved analytical methods for all constituents identified in Table II, as appropriate. For constituents that have approved analytical methods, the Dischargers are responsible for the completion of the analyses. For constituents that do not have an approved analytical method, the Dischargers shall cite the source (e.g., name of the consultant or laboratory) and qualifications of the entity that made the determination that an analytical method is not available for specific constituents in Table II. Entities that are reviewing Table II to identify analytical methods shall have adequate knowledge related to laboratory analyses and be qualified to complete this review.

IRRIGATION WATER MONITORING

The Dischargers shall monitor the volume of water used for irrigation and the acreage of cropland receiving produced wastewater. Irrigation water monitoring shall include at least the following:

Constituent/Parameter	Units	Sample Type	Frequency
Volume of Produced Wastewater [1]	Ac-ft/m[2]	Calculated	Monthly
Volume of Blending Water [1]	Ac-ft/m	Calculated	Monthly
Blending Ratio [3]	-	Calculated	Monthly
Service Territory [4]	Acres	-	Annually
Area of Cropland Receiving Blended Water [5]	Acres	-	Annually
Crop Types [6]	-	-	Annually

[1] Individual volumes shall be monitored and all sources of water defined in each monitoring report (e.g., oil extraction facilities, irrigation well names, and surface water sources).

[2] Acre-feet per month.

[3] The blending ratio shall be calculated using the sum of blending water and produced wastewater that are mixed .

[4] The service territory shall include the total acreage of the water district or water company.

[5] The acreage of cropland shall include all land that was irrigated with produced wastewater within each water district and water company.

[6] This shall include at least the crop type and acreage for all cropland irrigated with produced wastewater within each water district and water company.

CHEMICAL AND ADDITIVE MONITORING

The Dischargers shall monitor all chemicals and additives used during petroleum exploration, production, and/or treatment that have the potential to be in the produced wastewater used for irrigation. Chemical and additive monitoring shall include at least the following:

Requirement	Frequency
A list of all chemicals and additives used.	Quarterly
Volume and mass of each chemical and additive used in gallons and kilograms.	Quarterly
The mass of each solid chemical and additive used in grams or kilograms (if dissolved into a solution, provide resulting solution concentration or ratio).	Quarterly
A list of the leases and/or facilities where the chemicals and additives are being used.	Quarterly
Safety data sheets for each chemical and additive.	Annually

Monitoring and reporting of chemical additives may be reduced at the discretion of the Assistant Executive Officer.

GROUNDWATER MONITORING

The Dischargers shall monitor groundwater quality at the Jasmin Treatment Facility, Jasmin Ranchos Mutual Water Company Reservoir, Big Four Reservoir, and Guzman Reservoir. After measuring water levels and prior to collecting samples, each groundwater 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 first encountered groundwater. 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. Alternative methods for collecting groundwater samples may be submitted to the Central Valley Water Board for review and approval.

The Dischargers shall monitor groundwater wells for the following:

Constituent/Parameter	Units	Sample Type	Frequency
Depth to groundwater	Feet [1]	Measured	Quarterly
Groundwater elevation	Feet (amsl)[2]	Calculated	Quarterly
Table I – Water Quality Monitoring	Varies	Grab	Quarterly
Table II – Oil Production and Process Chemicals and Additives [3]	Varies	Grab	Quarterly

[1] Recorded to one hundredth of a foot

[2] Feet above mean sea level.

[3] The Dischargers are responsible for identifying approved analytical methods for all constituents identified in Table II, as appropriate. For constituents that have approved analytical methods, the Dischargers are responsible for the completion of the analyses. For constituents that do not have an approved analytical method, the Dischargers shall cite the source (e.g., name of the consultant or laboratory) and qualifications of the entity that made the determination that an analytical method is not available for specific constituents in Table II. Entities that are reviewing Table II to identify analytical methods shall have adequate knowledge related to laboratory analyses and be qualified to complete this review.

Within 30 days of notification that permission to sample a well(s) is revoked or a well(s) is damaged, the Dischargers shall submit for review and approval by Central Valley Water Board staff a report that either: (1) demonstrates that a reduction in the number of monitoring wells will not impair the ability to clearly and accurately assess potential groundwater impacts, or (2) proposes the installation of a new monitoring well(s) to offset the well(s) that is no longer able to be sampled.

GROUNDWATER WELL SURVEY

Within 60 days of the signature date of this MRP, the Dischargers shall conduct a well survey to identify all water supply wells within two (2.0) miles of the Jasmin Treatment Facility, Jasmin Ranchos Mutual Water Company Reservoir, Guzman Reservoir, and Big Four Reservoir. **Within 90 days** of the signature date of this MRP, the Dischargers shall sample the identified domestic water supply wells within one (1.0) mile of the Jasmin Treatment Facility, Jasmin Ranchos Mutual Water Company Reservoir, Guzman Reservoir, and Big Four Reservoir and analyze the samples for the waste constituents listed in Tables I and II of this MRP. Groundwater well survey results, analytical results, and its interpretation shall be reported in an individual report, separate from quarterly monitoring reports. If access to private property is requested and denied, evidence of that denial is required. If this task has been completed, the Dischargers shall submit a letter referencing the report submitted to the Central Valley Water Board with this information.

MONITORING WELL INSTALLATION COMPLETION REPORT

The Dischargers submitted a Monitoring Well Installation and sampling Plan (MWISP) to the Central Valley Water Board, which is currently under review. Upon written approval by the Executive Officer, the Dischargers may implement the proposed plan in the MWISP.

Within **90 days** of the installation of a groundwater monitoring well(s), a Monitoring Well Installation Completion Report (MWICR) shall be submitted. At a minimum, the MWICR shall summarize the field activities as described below.

1. General Information:
    a. Brief overview of field activities including well installation summary (such as number, depths), and description and resolution of difficulties encountered during field program.
    b. Topographic map showing any existing nearby domestic, irrigation, and municipal supply wells and monitoring wells, utilities, surface water bodies, drainage courses and their tributaries/destinations, and other major physical and man-made features.
    c. Site plan showing monitoring well locations, other existing wells, unused and/or abandoned wells, major physical site structures, any waste handling facilities, and on-site surface water features.
    d. Period of field activities and milestone events (e.g., distinguish between dates of well installation, development, and sampling).

2. Monitoring Well Construction:
    a. Number and depths of monitoring wells installed.
    b. Monitoring well identification (i.e., numbers).
    c. Date(s) of drilling and well installation.
    d. Description of monitoring well locations including field-implemented changes (from proposed locations) due to physical obstacles or safety hazards.
    e. Description of drilling and construction, including equipment, methods, and difficulties

encountered (such as hole collapse, lost circulation, need for fishing).

f. Name of drilling company, driller, and logger (site geologist to be identified).
g. As-builts for each monitoring well with the following details:
    i. Well identification.
    ii. Total borehole and well depth.
    iii. Date of installation.
    iv. Boring diameter.
    v. Casing material and diameter (include conductor casing, if appropriate).
    vi. Location and thickness of slotted casing, perforation size.
    vii. Location, thickness, type, and size of filter pack.
    viii. Location and thickness of bentonite seal.
    ix. Location, thickness, and type of annular seal.
    x. Depth of surface seal.
    xi. Type of well cap.
    xii. Type of surface completion.
    xiii. Depth to water (note any rises in water level from initial measurement) and date of measurement.
    xiv. Well protection device (such as below-grade water tight vaults, stovepipe, bollards, etc.).
h. All depth to groundwater measurements during field program.
i. Field notes from drilling and installation activities (e.g., all subcontractor dailies, as appropriate).
j. Construction summary table of pertinent information such as date of installation, well depth, casing diameter, screen interval, bentonite seal interval, and well elevation.
k. Detailed geologic log of subsurface materials encountered.
l. Complete geophysical logs and corresponding interpretations.

3. Monitoring Well Development:
    a. Date(s) and time of development.
    b. Name of developer.
    c. Method of development.
    d. Methods used to identify completion of development.
    e. Development log: volume of water purged and measurements of temperature, pH and electrical conductivity during and after development.
    f. Disposition of development water.
    g. Field notes (such a bailing to dryness, recovery time, number of development cycles).

4. Monitoring Well Survey:
    a. Identify coordinate system or reference points used.
    b. Description of measuring points (i.e. ground surface, top of casing, etc.).
    c. Horizontal and vertical coordinates of well casing with cap removed.
    d. Name, license number, and signature of California licensed professional who conducted survey.
    e. Surveyor's field notes.
    f. Tabulated survey data.

FACILITY MONITORING

Monthly measurements of water levels are required for Pond Nos. 1 through 7 at the Jasmin Treatment Facility, Jasmin Ranchos Mutual Water Company Reservoir, Guzman Reservoir, and Big Four Reservoir. Markers shall be in place with calibrations indicating the water level at design capacity and available operational freeboard. The freeboard shall be monitored **monthly** to the nearest tenth of a foot and results included in the **quarterly** report.

Annually, prior to the anticipated rainy season, but no later than **30 September**, the Dischargers shall conduct an inspection of the facility. The inspection shall assess repair and maintenance needed for: oil booms; drainage control systems; slope failure; any change in site conditions that could impair the integrity of the waste management unit or precipitation and drainage control structures; and shall assess preparedness for winter conditions including, but not limited to, erosion and sedimentation control. The Dischargers shall take photos of any problem areas before and after repairs. Any necessary construction, maintenance, or repairs shall be **completed by 31 October**. Annual facility inspection reporting shall be submitted by **1 February** of the following year.

The Dischargers shall inspect all precipitation, diversion, and drainage facilities for damage **within 7 days** following major storm events (e.g., a storm that causes continual runoff for at least one hour) capable of causing flooding, damage, or significant erosion. The Dischargers shall take photos of any problem areas before and after repairs. Necessary repairs shall be completed within 30 days of the inspection. Damages and repairs shall be reported in the **quarterly** report.

REPORTING REQUIREMENTS

All monitoring results shall be submitted to the Central Valley Water Board, which are due as follows:

Monitoring Report	Due Date
First Quarter Monitoring Report: January – March	**1 May**
Second Quarter Monitoring Report: April – June	**1 August**
Third Quarter Monitoring Report July - September	**1 November**
Fourth Quarter Monitoring Report October – December	**1 February**
Annual 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 Dischargers have 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.**

In reporting monitoring data, the Dischargers shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible for all historical and current data. The data shall be summarized in such a manner that illustrates clearly, whether the Dischargers comply with the WDRs.

If the Dischargers monitor any constituent 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 monitoring reports. Such increased frequency shall be indicated on the monitoring reports.

All monitoring reports shall comply with the signatory requirements in Standard Provision B.3. All monitoring reports that involve planning, investigation, evaluation, 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. Reports submitted to the Central Valley Water Board

The Dischargers shall submit copies of all monitoring reports, work plans, and technical reports to the following:

1. Electronic mail to CentralValleyFresno@waterboards.ca.gov.

2. Over the Internet to the State Water Board Geographic Environmental Information Management System database (GeoTracker) at http://www.waterboards.ca.gov/ust/electronic_submittal/index.shtml.

   A frequently asked question document for GeoTracker can be found at: http://www.waterboards.ca.gov/ust/electronic_submittal/docs/faq.pdf.

   Electronic submittals to GeoTracker shall comply with GeoTracker standards and procedures, as specified on the State Water Board's web site.

The following information is to be included on all monitoring reports and report transmittal letters:

Hathaway, LLC, Kern-Tulare Water District, and Jasmin Ranchos Mutual Water Company
Produced Wastewater Reclamation Project
Jasmin Treatment Facility
Waste Discharge Requirements Order No. R5-2019-0043
GeoTracker Site Global ID: T10000007320
CIWQS Place ID: 233496

B. All Monitoring Reports shall include, at a minimum, the following:

Produced Wastewater Reporting:

1. Tabular summary of current and historical water quality results for Discharges 001, 002, 003, and 004 as specified on MRP pages 2, 3, 4, and 5.
2. For each month of the quarter, a tabular summary of the monthly flow, the total annual flow (for the calendar year), and the historical annual flowrates for Discharges 001, 002, 003, and 004.
3. For each month of the quarter, a tabular summary of the maximum daily flow and average daily flow for Discharge 001.
4. The tabular summary of water quality results shall include the Chemicals Abstracts Service Registry Number (CASRN) for all constituents, as appropriate, required in Tables I and II of this MRP.
5. For each sample of Boron, the Dischargers shall calculate the 12-month rolling average of

the discharge using the current value for that month averaged with the historical values for the previous 11 months.

Irrigation Water Reporting:

1. Irrigation water reporting shall be clearly marked in all monitoring reports.
2. Tabular summary of current and historical results as specified on MRP page 5.

Chemical and Additive Reporting:

1. List of all chemicals and additives that were used during the quarter.
2. Tabular summary of current and historical monthly volume and mass for all chemicals and additives as specified on MRP pages 5 and 6.
3. Summary that identifies if any chemicals and additives were detected in the produced wastewater or in groundwater.
4. List of all leases and facilities where chemicals and additives are being used.

Groundwater Reporting:

1. Tabular summary of current and historical results as specified on MRP pages 6 and 7.
2. A groundwater contour map with the depth to groundwater for that respective reporting period. The contour map shall include groundwater direction for the Jasmin Treatment Facility, Jasmin Ranchos Mutual Water Company Reservoir, Big Four Reservoir and Guzman Reservoir. The map shall also include the locations of monitoring wells, system components, and application areas where blended produced wastewater is used for irrigation.
3. Provide a current isoconcentration map of groundwater data for EC, chloride, and boron concentrations.

Laboratory Reports:

1. Laboratory reports submitted in compliance with this MRP shall be accompanied by an **Excel file** that includes the analytical data found in the laboratory report. Excel files need to be generated by the laboratory, or compiled by the Discharger. At a minimum, the Excel file shall include the constituent name, sample location, sample name, sample date, analysis date, analytical method, result, unit, MDL, RL, CASRN, and dilution factor. Excel files shall either be mailed to the Central Valley Water Board Office on an electronic storage device, or sent via electronic mail to CentralValleyFresno@waterboards.ca.gov. Either method of delivery needs to include, at a minimum, a copy of the transmittal letter.

C. **Annual Monitoring Reports**, in addition to the above, by 1 February of each year, the Dischargers 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 the person who performed the calibration (Standard Provision C.4).
4. A summary of all spills/releases, if any, that occurred during the year, tasks undertaken in response to the spills, and the results of the tasks undertaken.

5. A summary of all leases and facilities that generated produced wastewater that was discharged to Jasmin Ranchos Mutual Water Company Reservoir, Big Four Reservoir, and Guzman Reservoir.
6. A summary (i.e., flow diagram, or description) that clearly illustrates all processes and locations for produced wastewater during extraction, treatment, storage, and disposal.
7. A map of the following:
    - Facility(s) within the oil field,
    - Facility(s)/lease(s) boundaries,
    - Produced wastewater distribution network, and
    - Distribution network for blended produced wastewater.

Produced Wastewater Reporting:

1. Tabular summary of current and historical total annual flow for Produced Wastewater Monitoring as specified on MRP pages 2 through 5.

Irrigation Water Reporting

1. Tabular summary of the current and historical average annual blending ratios.
2. Tabular summary of current and historical crops that were irrigated with blended produced wastewater and the crops respective acreage within the service territory of each water provider.
3. Individual aerial maps for Kern-Tulare Water District, and Jasmin Ranchos Mutual Water Company shall identify the crop(s) grown at each parcel within their respective service territory. Parcels that have changed crop type during the calendar year shall be noted by the submittal of two aerial maps for each Discharger, one aerial map for January and a second aerial map for December.

Chemical and Additive Reporting:

1. Safety Data Sheets for all chemicals and additives that are identified in quarterly monitoring reports for that respective calendar year.
2. Tabular summary of current and historical annual volume and mass for all chemicals and additives.
3. Summary that identifies if any chemicals and additives were detected in the produced wastewater used for irrigation or groundwater.
4. Identify new chemicals/additives that were used during the current calendar year and not in the previous calendar year.
5. Identify chemicals/additives that were used during the current or previous calendar year that will no longer be used by the Discharger.

Requesting Administrative Review by the State Water Board. Any person aggrieved by an action of the Central Valley Water Board that is subject to review as set forth in Water Code section 13320(a), may petition the State Water Board to review the action. Any petition must be made in accordance with Water Code section 13320 and California Code of Regulations, title 23, section 2050 and following. The State Water Board must receive the petition within thirty (30) days of the date the action was taken, except that if the thirtieth day following the date the action was taken falls on a Saturday, Sunday, or state holiday, then the State Water Board must receive the petition by 5:00 p.m. on the next business day. Copies of the laws and regulations applicable to filing petitions may be found on the internet at http://www.waterboards.ca.gov/public_notices/petitions/water_quality/index.shtml or will be provided upon request.

Modifications. Any modification to this Monitoring and Reporting Program shall be in writing and approved by the Assistant Executive Officer, including any extensions. Any written extension request by the Dischargers shall include justification for the delay.

The Dischargers shall implement the above monitoring program in the first month following adoption of this MRP.

I, PATRICK PULUPA, Executive Officer, hereby certify that the foregoing is a full true and correct copy of the Monitoring and Reporting Program adopted by the California Regional Water Quality Control Board on 6 June 2019.

PATRICK PULUPA, Executive Officer

Table I – Water Quality Monitoring

Parameters	Units	US EPA or other Method	Reporting Frequency
Field Parameters			
Temperature	°F[1]	Meter	Quarterly
Electrical Conductivity	µmhos/cm[2]	Meter	Quarterly
pH	pH units	Meter	Quarterly
Monitoring Parameters			
Total Dissolved Solids (TDS)	mg/L[3]	160.1	Quarterly
Total Suspended Solids (TSS) [4]	mg/L	160.2	Quarterly
Total Organic Carbon (TOC)	mg/L	415.3	Quarterly
Electrical Conductivity	µmhos/cm	2510B	Quarterly
Boron, dissolved	mg/L	6010B	Quarterly
Standard Minerals			
Alkalinity as CaCO3	mg/L	310.1	Quarterly
Bicarbonate Alkalinity as CaCO3	mg/L	310.1	Quarterly
Carbonate Alkalinity as CaCO3	mg/L	310.1	Quarterly
Hydroxide Alkalinity as CaCO3	mg/L	310.1	Quarterly
Sulfate, dissolved	mg/L	300.0	Quarterly
Total Kjeldahl Nitrogen	mg/L	351.3	Quarterly
Nitrogen, Total	mg/L	440.0	Quarterly
Nitrate-N, dissolved	mg/L	300.0	Quarterly
Nitrite as N	mg/L	353.2	Quarterly
Ammonia as N	mg/L	350.1	Quarterly
Ammonium as N	mg/L	350.2	Quarterly
Calcium, dissolved	mg/L	6010B	Quarterly
Magnesium, dissolved	mg/L	6010B	Quarterly
Sodium, dissolved	mg/L	6010B	Quarterly
Potassium	mg/L	6010B	Quarterly
Chloride	mg/L	300.0	Quarterly
Semi-Volatile Organic Compounds [5]	µg/L [5]	8270-SIM	Quarterly
Total Petroleum Hydrocarbons (TPH)	µg/L	418.1	Quarterly
Volatile Organic Compounds			
Full Scan (See Table III)	µg/L	8260B	Quarterly
Stable Isotopes			
Oxygen (^{18}O)	o/oo [6]	900.0	Quarterly
Deuterium (Hydrogen 2, ^{2}H, or D)	o/oo	900.0	Quarterly
Radionuclides			
Radium-226	pCi/L [7]	SM[8] 7500-Ra	Quarterly
Radium-228	pCi/L	SM 7500-Ra	Quarterly
Gross Alpha particle (excluding radon and uranium)	pCi/L	SM 7110	Quarterly
Uranium	pCi/L	200.8	Quarterly
Oil and Grease	mg/L	1664A	Quarterly
Constituents of Concern			
Lithium	mg/L	200.7	Quarterly

Table I – Water Quality Monitoring

Parameters	Units	US EPA or other Method	Reporting Frequency
Strontium	mg/L	200.7	Quarterly
Iron	mg/L	200.8	Quarterly
Manganese	mg/L	200.8	Quarterly
Antimony	mg/L	200.8	Quarterly
Arsenic	mg/L	200.8	Quarterly
Barium	mg/L	200.8	Quarterly
Beryllium	mg/L	200.8	Quarterly
Cadmium	mg/L	200.8	Quarterly
Chromium (total)	mg/L	200.8	Quarterly
Chromium (hexavalent)	mg/L	7196A	Quarterly
Cobalt	mg/L	200.8	Quarterly
Copper	mg/L	200.8	Quarterly
Lead	mg/L	200.8	Quarterly
Mercury	mg/L	7470A	Quarterly
Molybdenum	mg/L	200.8	Quarterly
Nickel	mg/L	200.8	Quarterly
Selenium	mg/L	200.8	Quarterly
Silver	mg/L	200.8	Quarterly
Thallium	mg/L	200.8	Quarterly
Vanadium	mg/L	200.8	Quarterly
Zinc	mg/L	200.8	Quarterly
MBAS (Methylene Blue Active Substances)	mg/L	SM 425.1	Quarterly
QAC (Quaternary Ammonium Compounds)	mg/L	As Appropriate	Quarterly

[1] Degrees Fahrenheit.
[2] Micromhos per centimeter.
[3] Milligrams per liter .
[4] TSS is not required for groundwater monitoring.
[5] Micrograms per liter.
[6] Parts per thousand.
[7] Picocuries per liter
[8] Standard Methods

Table II - Oil Production and Process Chemicals and Additives

No.	Constituent	CASRN	No.	Constituent	CASRN
1	1,2,3 Trimethylbenzene	526-73-8	160	Lead	7439-92-1
2	1,2 Benzisothiazol-3(2H)-one	2634-33-5	161	Light Aliphatic Naphtha	64742-89-8
3	1,2,4-Trimethylbenzene	95-63-6	162	Light aromatic naphtha	64742-95-6
4	1,3,5 Trimethylbenzene	108-67-8	163	Lignite	129521-66-0
5	1,4 Dioxane	123-91-1	164	Limestone	1317-65-3
6	1H, 3H-Pyrano (4,3-b)(1)benzopyran-9-carboxylic acid, 4,10-dihydro-3,7,8 trihydroxy-3-methyl-10-oxo	479-66-3	165	Lithium carbonate	554-13-2
7	1-Hexadecene	629-73-2	166	Lithium chlorate	13453-71-9
8	2-Butoxyethanol	111-76-2	167	Lithium chloride	7447-41-8
9	2-Ethylhexanol	104-76-7	168	Lithium hydroxide	1310-65-2
10	2-Methylamino-2-methyl-1-propanol	27646-80-6	169	Lithium hypochlorite	13840-33-0
11	2-Propen-1-aminium, N,N-dimethyl-N-2-propenyl-, chloride, polymer with 2-hydroxypropyl 2-	67990-40-3	170	Magma Fiber	6806-10-0000
12	2-Propenoic acid, 2-methyl-, polymer with methyl 2-methyl-2-propenoate, octadecyl 2-methyl 2 propenoate and 2propenoic acid, sodium salt	145417-45-4	171	Mercury	7439-97-6
13	2-Propenoic acid, polymer with 2-propenamide, sodium salt	25987-30-8	172	Methanol	67-56-1
14	2-Propenoic acid, telomer with 2-methyl-2-(1-oxo-2-propenyl)-1-propanesulfonic acid, sodium salt	130800-24-7	173	Methyl Chloride	74-87-3
15	3-Butyn-2-ol, 2-methyl	115-19-5	174	Methyl ester of sulfonated tannin	N/A
16	Acetaldehyde	75-07-0	175	Methyl oxirane polymer	PE-M2464
17	Acetic Acid	64-19-7	176	Methylchloroisothiazolinone	26172-55-4
18	Acetone	67-64-1	177	Mineral Oil	8012-95-1
19	Acrolein	107-02-8	178	Monoethanolamine	141-43-5
20	Acrolein dimer	100-73-2	179	Mullite	1302-93-8
21	Acrylamide	79-06-1	180	Naphthalene	91-20-3
22	Acrylic Acid	79-10-7	181	Nickel	7440-02-0
23	Alchohols, C14-15, ethoxylated	68951-67-7	182	Nickel sulfate	7786-81-4
24	Alcohol ethoxylate	68439-45-2	183	Non Phenol Ethoxylates	9016-45-9
25	Alcohol ethoxylated, C-10-14	66455-15-0	184	Nonylphenol polyethylene glycol ether	127087-87-0
26	Alcohols, C9-11, ethoxylated	68439-46-3	185	Nutshell	N/A
27	Alkanes, C11-15-iso	90622-58-5	186	Oleic acid	112-80-1
28	Alkanes, C14-16	90622-46-1	187	Orange terpenes	68647-72-3
29	Alkanolamine aldehyde condensate	4719-04-4	188	Organic Acids Ethoxylated Alcohols	104-55-2
30	Alkanolamine phosphate	29868-05-1	189	Organic surfactant	577-11-7
31	Alkoxylated alcohol	69011-36-5	190	Oxyalkylated alkylphenol	68412-54-4
32	Alkyl amine	68439-70-3	191	Oxyalkylated alkylphenolic resin	30704-64-4
33	Alkyl benzenesulfonate	68081-81-2	192	Oxyalkylated alkylphenolic resin	30846-35-6
34	Alkyl benzenesulfonic acid	68584-22-5	193	Oxyalkylated alkylphenolic resin	63428-92-2
35	Alkyl dimethyl benzyl ammonium chloride	8001-54-5	194	Oxyalkylated alkylphenolic resin	68171-44-8
36	Alkylaryl sulfonate	68584-27-0	195	Oxyalkylated polyamine	67939-72-4
37	Alkylaryl sulfonates	68910-32-7	196	Oxyalkylated polyamine	68910-19-0
38	Alkylarylsulfonate amine salt	90218-35-2	197	Paraffinic petroleum distillate	64742-55-8
39	Alkylbenzene mixture	68648-87-3	198	Pentadecane, 3-methylene	56919-55-2
40	Almond Shell	90320-37-9	199	Pentadecane, 5-methylene	115146-98-0
41	Aluminum oxide	1344-28-1	200	Pentadecane, 7-methylene	13043-55-5
42	Aluminum chloride	7446-70-0	201	Pentasodium diethylenetriamine pentaacetate	140-01-2
43	Aluminum chloride hydroxide	12042-91-0	202	Peroxyacetic acid	79-21-0
44	Aluminum stearate	300-92-5	203	Petroleum distillates	64742-53-6
45	Amide surfactant acid salt	N/A	204	Phosphate ester salt	68425-75-2

Table II - Oil Production and Process Chemicals and Additives

No.	Constituent	CASRN	No.	Constituent	CASRN
46	Amides, Non Ionics	68140-01-2	205	Phosphonate salt	P-84-470
47	Amine derivative	61791-24-0	206	Phosphonic Acid	13598-36-2
48	Amine salt	67924-33-8	207	Phosphonium, tetrakis (hydroxymethyl)-, sulfate (2:1), salt	55566-30-8
49	Amine salt	NP-U2856	208	Phosphoric acid	7664-38-2
50	Amine sulfate	64346-44-7	209	Phosphoric acid ester salt	N/A
51	Amine sulfate	926-39-6	210	Piperazine	110-85-0
52	Aminotri (methylenephosphonic acid)	6419-19-8	211	POE (20) Sorbitan Trioleate	9005-70-3
53	Ammonium alkylaryl sulfonates	68910-31-6	212	Polyacrylamide	9003 05 8
54	Ammonium Benzoate	1863-63-4	213	Polyacrylate	9003-79-8
55	Ammonium bisulfate	10192-30-0	214	Polyacrylic acid	9003 01 4
56	Ammonium chloride	12125-02-9	215	Polyamine	64114-46-1
57	Ammonium Fluoride	1341-49-7	216	Polyamine salts	68955-69-1
58	Ammonium sulfate	7783-20-2	217	Polycarboxylate salt	19019-43-3
59	Amorphous silica	7631-86-9	218	PolyDADMAC	26062-79-3
60	Antimony trioxide	1309-64-4	219	Polydimethylsiloxane emulsion	N/A
61	Aromatic amines	N/A	220	Polyethylene	25038-59-9
62	Barite	13462-86-7	221	Polyethylene glycol	25322-68-3
63	Barium	7440-39-3	222	Polyglycol diepoxide	68036-92-0
64	Barium sulfate	7727-43-7	223	Polyglycol diepoxide	68036-95-3
65	Bentonite	1302-78-9	224	Polyglycol ester	PE-M2481
66	Benzene	71-43-2	225	Polyglycol ether	9038-95-3
67	Benzoic Acid	65-85-0	226	Polylactide resin	9051-89-2
68	Benzyl chloride	100-44-7	227	Polymer sodium acrylate	9033-79-8
69	Beryllium	7440-41-7	228	Polyoxyalklene glycol	68123-18-2
70	Branched DDBSA	68411-32-5	229	Polyoxyalkylene	68551-12-2
71	C12-C14 Isoalkanes	68551-19-9	230	Polyoxyalkylene glycol	36484-54-5
72	C12-C14 Isoalkanes	68551-20-2	231	Polyoxyalkylenes	78330-21-9
73	C14-30 Alkyl Derivatives	68855-24-3	232	Polyoxyalkylenes	61790-86-1
74	Cadmium	7440-43-9	233	Polyoxyethylene nonylphenyl ether phosphate	68412-53-3
75	Calcium carbonate	471-34-1	234	Polypropylene glycol	25322-69-4
76	Calcium oxide	1305-78-8	235	Polyquaternary amine	42751-79-1
77	Calcium sulfate	7778-18-9	236	Polyvinyl Alcohol	9002-89-5
78	Carbon	7440-44-0	237	Potassium acetate	127-08-2
79	Carbon Dioxide	124-38-9	238	Potassium bisulfate	7646-93-7
80	Carboxymethyl cellulose	9004-32-4	239	Potassium chloride	7447-40-7
81	Cationic acrylamide copolymer	69418-26-4	240	Potassium hydroxide	1310-58-3
82	Cationic acrylamide monomer	44992-01-0	241	Potassium Oxide	12136-45-7
83	Cationic polymer	54076-97-0	242	Propargl alcohol	107-19-7
84	Cedar Fiber	11132-73-3	243	Propionaldehyde	123-38-6
85	cellophane	9005-81-6	244	Propylene glycol	57-55-6
86	Cellulose	9004-34-6	245	Quartz Crystalline Silica	14808-60-7
87	Chromium	7440-47-3	246	Quaternary ammonium compound	61790-41-8
88	Citric acid	77-92-9	247	Quaternary ammonium compound	68424-85-1
89	Citrus Terpenes	94266-47-4	248	Quaternized condensed alkanolamines	68609-18-7
90	Cocamide DEA	68603-42-9	249	Quinaldine	91-63-4
91	Cocamide DEA	68155-07-7	250	Salt of an organic sulfur compound	P-88-1256
92	Coke, petroleum, calcined	64743-05-1	251	Salt of fatty acid polyamine	68153-60-6
93	Copper	7440-50-8	252	Saponite	1319-41-1
94	Copper sulfate pentahydrate	7758-99-8	253	Severely Hydrotreated Paraffinic	64742-62-7
95	Cotton seed hulls	68308-87-2	254	Silica crystalline tridymite	15468-32-3
96	Crosslinked polyol ester	129828-31-5	255	Silica, crystalline, cristoballite	14464-46-1
97	Cumene	98-82-8	256	Siloxanes and Silicones	63148-62-9
98	Cyclohexanol	108-93-0	257	Smectite	1318-93-0
99	Cyclohexylamine	108-91-8	258	Sodium acetate	127-09-3
100	Cymenes	25155-15-1	259	Sodium Acid Pyrophosphate	7758-16-9
101	DDBSA Salt	N/A	260	Sodium Benzoate	532-32-1

Table II - Oil Production and Process Chemicals and Additives

No.	Constituent	CASRN	No.	Constituent	CASRN
102	Diester of sulfosuccinic acid sodium salt	2673-22-5	261	Sodium bicarbonate	144-55-8
103	Diethanolamine	111-42-2	262	Sodium bisulfite	7631-90-5
104	Dimethyl siloxane	N/A	263	Sodium carbonate	497-19-8
105	Dinonylphenyl polyoxyethylene	9014-93-1	264	Sodium carboxymethylstarch	9063-38-1
106	Diphosphoric acid, sodium salt (1:4)	7722-88-5	265	Sodium Chlorate	7775 09 9
107	Dipropylene glycol methyl ether	34590-94-8	266	Sodium chloride	7647-14-5
108	Disodium ethylenediaminediacetate	38011-25-5	267	Sodium chloride	4647-14-5
109	Diutan gum	125005-87-0	268	Sodium dichloroisocyanurate	2893-78-9
110	d-Limonene	5989-27-5	269	Sodium edetate	64-02-8
111	Dodecane	112-40-3	270	Sodium Erythorbate	6381-77-7
112	Drilling Paper	N/A	271	Sodium glycolate	2836-32-0
113	Ethanol	64-17-5	272	Sodium hydroxide	1310-73-2
114	Ethanolamine thioglycolate	126-97-6	273	Sodium hypochlorite	7681-52-9
115	Ethoxylated amine	61791-26-2	274	Sodium Iodide	7681-82-5
116	Ethoxylated C11 Alcohol	34398-01-1	275	Sodium olefin sulfonate	68439-57-6
117	Ethoxylated octylphenol	N/A	276	Sodium Oxide	1313-59-3
118	Ethyl Acetate	141-78-6	277	Sodium polyacrylate	9003-79-3
119	Ethyl acrylate	140-88-5	278	Sodium polyacrylate	9003 04 7
120	Ethyl Octynol	5877-42-9	279	Sodium sulfate	7757-82-6
121	Ethylbenzene	100-41-4	280	Sodium tetraborate pentahydrate	12179-04-3
122	Ethylene Glycol	107-21-1	281	Sodium Thiosulfate Pentahydrate	10102-17-7
123	Fatty Acid	143-07-7	282	Sodium Thiosulfate Pentahydrate	7772-98-7
124	Fatty acid ester	67762-38-3	283	Sodium Trimetaphosphate	7785-84-4
125	Fatty acid oxyalkylate	70142-34-6	284	Solvent Dewaxed Heavy Paraffinic	64742-65-0
126	Fatty acids, tall-oil, sodium salts	61790-45-2	285	Sorbitan ester	NP-SMO3_U1240
127	Fatty alkylamines	61788-91-8	286	Sorbitan Mono-9-Octadecenoate	9005-65-6
128	Ferrous sulfate	17375-41-6	287	Sorbitan monooleate	1338-43-8
129	Formaldehyde	50-00-0	288	Soybean oil, Me ester	67784-80-9
130	Formamide	75-12-7	289	Stearic acid	57-11-4
131	Formic Acid	64-18-6	290	Steel mill slag	65996-69-2
132	Furfuryl alcohol	98-00-0	291	Stoddard Solvents	8052-41-3
133	Glutaral	111-30-8	292	Sulfur dioxide	7446 09 5
134	Glycerides, tall oil mono-, di, and tri	97722-02-6	293	Sulfuric acid	7664-93-9
135	Glycerine	56-81-5	294	Tall oil fatty acids	61790-12-3
136	Glycine, N,N, 1,2- ethanediylbis (N-(carboxymethyl)-disodium salt	139-33-3	295	Tallow alkylamines	61790-33-8
137	Glycolic acid	79-14-1	296	Tar bases, Quinoline derivatives, benzyl chloride- Quaternized	72480-70-7
138	Glyoxal	107-22-2	297	Terpene hydrocarbon	8002 09 3
139	Graphite	7782-42-5	298	Tetradecane	629-59-4
140	Gypsum	13397-24-5	299	Tetrapropylenebenzene	25265-78-5
141	Heavy aromatic naphtha	64742-94-5	300	Thiourea, polymer with formaldehyde and 1-phenylethanone	68527-49-1
142	Heavy Catalytic Naphtha	64741-68-0	301	Titanium dioxide	13463-67-7
143	Humic acids	1415-93-6	302	Toluene	108-88-3
144	Hydrochloric Acid	7647-01-0	303	Tridecane	629-50-5
145	Hydrofluoric Acid	7664-39-3	304	Triethylene Glycol	112-27-6
146	Hydrogen Peroxide	7722-84-1	305	Trimethyl Benzene	25551-13-7
147	Hydroquinone	123-31-9	306	Triphosphoric acid, sodium salt (1:5)	7758-29-4
148	Hydrotreated light distillate	64742-47-8	307	Trisodium nitrilotriacetic acid	5064-31-3
149	Hydroxyethyl cellulose	9004-62-0	308	Undecane	1120-21-4
150	Hydroxyethylidenediphosphonic Acid	2809-21-4	309	Urea	57-13-6
151	Inorganic sulfer compound	7783-18-8	310	Walnut Shell	84012-43-1
152	Iodine	7553-56-2	311	Water	7732-18-5
153	Ionic surfactants	N/A	312	Wood dust	N/A
154	Isobutanolamine	124-68-5	313	Xanthan Gum	11138-66-2

Table II - Oil Production and Process Chemicals and Additives

No.	Constituent	CASRN	No.	Constituent	CASRN
155	Isopropanol	67-63-0	314	Xenon	7440-63-3
156	Isoquinoline	119-65-3	315	Xenon radionuclide	14932-42-4
157	Kerosene	8008-20-6	316	Xylene	1330-20-7
158	Krypton	7439-90-9	317	Zinc	7440-66-6
159	Krypton 85	13983-27-2	318	Zinc chloride	7646-85-7

Table III – Full Scan for Volatile Organic Compounds (Method 8260B)

Constituent	CASRN	Constituent	CASRN	Constituent	CASRN
Acetone	67-64-1	1,3-Dichlorobenzene	541-73-1	Methylene chloride	75-09-2
Acetonitrile	75-05-8	1,4-Dichlorobenzene	106-46-7	Methyl methacrylate	80-62-6
Acrolein (Propenal)	107-02-8	1,4-Dichlorobenzene-d (IS)		4-Methyl-2-pentanone (MIBK)	108-10-1
Acrylonitrile	107-13-1	cis-1,4-Dichloro-2-butene	1476-11-5	Naphthalene	91-20-3
Allyl alcohol	107-18-6	trans-1,4-Dichloro-2-butene	110-57-6	Nitrobenzene	98-95-3
Allyl chloride	107-05-1	Dichlorodifluoromethane	75-71-8	2-Nitropropane	79-46-9
Benzene	71-43-2	1,1-Dichloroethane	75-34-3	N-Nitroso-di-n-butylamine	924-16-3
Benzyl chloride	100-44-7	1,2-Dichloroethane	107-06-2	Paraldehyde	123-63-7
Bis(2-chloroethyl)sulfide	505-60-2	1,2-Dichloroethane-d (surr)		Pentachloroethane	76-01-7
Bromoacetone	598-31-2	1,1-Dichloroethene	75-35-4	2-Pentanone	107-87-9
Bromochloromethane	74-97-5	trans-1,2-Dichloroethene	156-60-5	2-Picoline	109-06-8
Bromodichloromethane	75-27-4	1,2-Dichloropropane	78-87-5	1-Propanol	71-23-8
4-Bromofluorobenzene (surr)	460-00-4	1,3-Dichloro-2-propanol	96-23-1	2-Propanol	67-63-0
Bromoform	75-25-2	cis-1,3-Dichloropropene	10061-01-5	Propargyl alcohol	107-19-7
Bromomethane	74-83-9	trans-1,3-Dichloropropene	10061-02-6	$-Propiolactone	57-57-8
n-Butanol	71-36-3	1,2,3,4-Diepoxybutane	1464-53-5	Propionitrile (ethyl cyanide)	107-12-0
2-Butanone (MEK)	78-93-3	Diethyl ether	60-29-7	n-Propylamine	107-10-8
t-Butyl alcohol	75-65-0	1,4-Difluorobenzene	540-36-3	Pyridine	110-86-1
Carbon disulfide	75-15-0	1,4-Dioxane	123-91-1	Styrene	100-42-5
Carbon tetrachloride	56-23-5	Epichlorohydrin	106-89-8	1,1,1,2-Tetrachloroethane	630-20-6
Chloral hydrate	302-17-0	Ethanol	64-17-5	1,1,2,2-Tetrachloroethane	79-34-5
Chlorobenzene	108-90-7	Ethyl acetate	141-78-6	Tetrachloroethene	127-18-4
Chlorobenzene-d (IS)		Ethylbenzene	100-41-4	Toluene	108-88-3
Chlorodibromomethane	124-48-1	Ethylene oxide	75-21-8	Toluene-d (surr)	2037-26-5
Chloroethane	75-00-3	Ethyl methacrylate	97-63-2	o-Toluidine	95-53-4
2-Chloroethanol	107-07-3	Fluorobenzene	462-06-6	1,2,4-Trichlorobenzene	120-82-1
2-Chloroethyl vinyl ether	110-75-8	Hexachlorobutadiene	87-68-3	1,1,1-Trichloroethane	71-55-6
Chloroform	67-66-3	Hexachloroethane	67-72-1	1,1,2-Trichloroethane	79-00-5
Chloromethane	74-87-3	2-Hexanone	591-78-6	Trichloroethene	79-01-6
Chloroprene	126-99-8	2-Hydroxypropionitrile	78-97-7	Trichlorofluoromethane	75-69-4
3-Chloropropionitrile	542-76-7	Iodomethane	74-88-4	1,2,3-Trichloropropane	96-18-4
Crotonaldehyde	4170-30-3	Isobutyl alcohol	78-83-1	Vinyl acetate	108-05-4
1,2-Dibromo-3-chloropropane	96-12-8	Isopropylbenzene	98-82-8	Vinyl chloride	75-01-4
1,2-Dibromoethane	106-93-4	Malononitrile	109-77-3	o-Xylene	95-47-6
Dibromomethane	74-95-3	Methacrylonitrile	126-98-7	m-Xylene	108-38-3
1,2-Dichlorobenzene	95-50-1	Methanol	67-56-1	p-Xylene	106-42-3

INFORMATION SHEET

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2019-0043
HATHAWAY, LLC; KERN-TULARE WATER DISTRICT; AND
JASMIN RANCHOS MUTUAL WATER COMPANY
PRODUCED WASTEWATER RECLAMATION PROJECT
JASMIN TREATMENT FACILITY
JASMIN OIL FIELD
KERN COUNTY

Background

Hathaway, LLC (Hathaway) is an oil and natural gas exploration and production company that owns and operates a petroleum treatment facility on the Quinn Lease in the Jasmin Oil Field (Jasmin Treatment Facility). The facility is in Section 15, Township 25 South, Range 27 East, Mount Diablo Base and Meridian (MDB&M); Assessor's Parcel Number (APN) 051-101-41, as shown on Attachment A of Waste Discharge Requirements Order No. R5-2019-0043 (WDRs).

Kern-Tulare Water District (Kern-Tulare) is a water district that was formed in 1974 and spans the eastern San Joaquin Valley in Kern and Tulare Counties. Kern-Tulare has a district size of approximately 19,000 acres, which is planted with citrus, grapes, and pistachios. The water distribution network for Kern-Tulare consists of two isolated networks. Oil field produced wastewater (produced wastewater) is pumped through the southern distribution network in Kern County, providing produced wastewater for irrigation to approximately 3,700 acres of cropland. This cropland is comprised of citrus, grapes, pistachios, and fallow land.

Jasmin Ranchos Mutual Water Company (Jasmin Water Company) is a water management company that operates within the service territory of Kern-Tulare. Jasmin Water Company owns and operates the Jasmin Ranchos Mutual Water Company Reservoir and distributes produced wastewater to approximately 400 acres of citrus. The Jasmin Ranchos Mutual Water Company Reservoir has a storage capacity of two acre-feet and is in Section 15, Township 25 South, Range 27 East, MDB&M; APN 051-101-19, as shown on Attachment A.

Under Waste Discharge Requirements Order No. 98-205, Hathaway, Kern-Tulare, and the Jasmin Water Company are regulated for the reuse of produced wastewater for irrigation. As petroleum operations expanded across the Quinn and Cantleberry Leases, additional produced wastewater was available for irrigation. Kern-Tulare submitted a Report of Waste Discharge to the Central Valley Regional Water Quality Control Board (Central Valley Water Board) for consideration of new individual waste discharge requirements that would include the use of a new storage reservoir to accept the additional flow of produced wastewater from Hathaway. On 20 November 2018, Kern-Tulare submitted an addendum report that includes a final Environmental Impact Report and Antidegradation Analysis for the proposed project.

Kern-Tulare completed the final engineering design of the Guzman Reservoir and submitted the plans to the Division of Safety of Dams (DSOD) for review. Upon approval from DSOD, Kern-Tulare will begin the construction of the Guzman Reservoir. Approval by DSOD is anticipated in 2019; construction is anticipated to be completed within six months of approval.

The WDRs regulate the discharge of produced wastewater from the Jasmin Treatment Facility to cropland for irrigation, including crops for human consumption. Produced wastewater will be reused to irrigate approximately 3,700 acres of cropland. Crops irrigated with produced wastewater include, but are not limited to, citrus, grapes, and pistachios.

Hathaway, Kern-Tulare, and Jasmin Water Company (hereafter jointly referred to as Dischargers) are jointly responsible for compliance with the WDRs. The Findings in the WDRs and items in this Information Sheet describe the project, which includes the completion of the Guzman Reservoir.

On 21 March 2019, Kern-Tulare submitted a new Antidegradation Analysis that proposes to increase the project flowrate from 2,640 acre-feet per year (ac-ft/yr) to 3,320 ac-ft/yr. The findings of the Antidegradation Analysis have been incorporated into the findings of this Order. The Antidegradation Analysis did not include an adequate technical demonstration that the Jasmin Treatment Facility can maintain the treatment efficiency at the proposed flowrate of 3,320 ac-ft/yr. As a result, the maximum annual flowrate allowed by this Order, as described in Effluent Limitations B.1, is 2,640 ac-ft/yr. In accordance with Provision E.5, the maximum annual flowrate allowed by this Order may be increased upon Executive Officer approval.

Proposed Discharge

The proposed discharge is 3,320 acre-feet per year (ac-ft/yr) (approximately 20.5 million barrels per year) of produced wastewater, upon satisfying Provision E.5, to Kern-Tulare and Jasmin Water Company for irrigation. Production fluid (mixture of crude oil and produced wastewater) is extracted from petroleum wells across the Quinn and Cantleberry Leases in the Jasmin Oil Field and pumped to the Jasmin Treatment Facility. The petroleum wells and the Jasmin Treatment Facility are owned and operated by Hathaway.

The treatment process of the Jasmin Treatment Facility is shown in a flow schematic on Attachment B of the WDRs. Treatment starts with gravity separation of oil and water using a wash tank, after which separated water is sent to one of two Wemco units. The Wemco unit uses mechanical agitation to induce the formation of small bubbles to capture oil that is then skimmed off and returned to the wash tank. Water from the Wemco units are discharged to Pond Nos. 1 and 2, in series, for skimming. Produced wastewater is pumped from Pond No. 2 uphill to Pond Nos. 3 and 4, in series. Using gravity, produced wastewater flows, in series, through Pond Nos. 5, 6, and 7 where it is temporarily stored prior to being discharged to Kern-Tulare and Jasmin Water Company. Ponds No. 1 through 7 are unlined and Pond Nos. 1, 2, and 3 are netted to preclude the entry of wildlife.

Produced wastewater from the Jasmin Treatment Facility is pumped to Kern-Tulare and Jasmin Water Company, as shown in Attachment C of the WDRs. Produced wastewater transferred to Kern-Tulare will be pumped to the Guzman Reservoir for storage. The Guzman Reservoir has a storage capacity of 590 acre-feet and is in Sections 21 and 22, Township 25 South, Range 27 East, MDB&M; APN 051-110-75, as shown on Attachment A. Produced wastewater from the Guzman Reservoir is transferred to the Big Four Reservoir for blending with groundwater and surface water supplies. The Big Four Reservoir has a storage capacity of 340 acre-feet and is in Sections 17 and 20, Township 25 South, Range 27 East, MDB&M; APN 051-110-59, as shown on Attachment A. Blended produced wastewater from the Big Four Reservoir is pumped to the Jasmin Ranchos Mutual Water Company Reservoir and cropland for irrigation. The Guzman and Big Four Reservoirs are owned and operated by Kern-Tulare.

Jasmin Water Company owns and operates the Jasmin Ranchos Mutual Water Company Reservoir. The Jasmin Ranchos Mutual Water Company Reservoir receives blended produced wastewater form the Big Four Reservoir and produced wastewater from the Jasmin Treatment Facility.

The project will irrigate approximately 3,700 acres of cropland with produced wastewater. According to the 2018 Crop Survey Report for Kern-Tulare, crop types consist of citrus, grapes, and pistachios. Kern-Tulare consists of four service areas that are irrigated with produced wastewater, as shown on Attachment D of the WDRs. Table 1 identifies the crop acreage for each of the service areas.

Table 1: Crop Acreage Per Service Area

Service Area	Acreage per Crop				
	Citrus	Grapes	Pistachios	Fallow	Total
Jasmin Water Company Service Area	399	0	0	0	399
Cameo Service Area	1,783	0	507	117	2,407
Section 17 Service Area	40	0	877	0	917
Hathaway Service Area	0	0	17	0	17
Total Acreage	2,222	0	1,401	117	3,740

The Dischargers collected water samples from the following: produced wastewater from the Jasmin Treatment Facility (Pond No. 7), blended produced wastewater from the Jasmin Ranchos Mutual Water Company Reservoir (JRMWC Reservoir), and blended produced wastewater from the Big Four Reservoir (Big Four). Samples from these locations were analyzed for volatile organic compounds, polycyclic aromatic hydrocarbons, and metals. Sample results have been summarized by Central Valley Water Board staff and are shown on Attachment 1, which is attached hereto and made a part of this Information Sheet by reference. This analyses were completed in compliance with Revised Monitoring and Reporting Program Order No. 98-205, issued on 30 June 2017.

Analytical results, summarized in Attachment 1, demonstrate the produced wastewater and blended produced wastewater are adequate for agricultural reuse. Most constituents are non-detect, with detection limits below the most stringent drinking water standards or at the lowest detection limit achievable by the laboratory. Exceptions are 1,2-Dibromo-3-chloropropane and 1,2-Dibromethane, which yielded non-detect results with the method detection limit (MDL) slightly greater than the maximum contaminant level (MCL), as shown in Attachment 1. According to the Dischargers, this is the lowest detection limit achievable by the laboratory.

The analyses show detections for several constituents, including some organic compounds; however, the detections are below the MCLs where they exist. As discussed in more detail in the Food Safety Expert Panel section of the Information Sheet, the Central Valley Water Board has enlisted the services of a panel of experts (Food Safety Expert Panel) to investigate whether the use of produced wastewater for irrigation poses a threat to food safety. To date, the Food Safety Expert Panel has not identified a significant threat to food safety from the reuse of produced wastewater for irrigation.

Hathaway, Kern-Tulare, and Jasmin Water Company each signed a 20-year agreement (Agreement) that outlines the polices for the transfer and reuse of produced wastewater from Hathaway to Kern-Tulare and Jasmin Water Company. The Agreement and the WDRs state that produced wastewater from wells that have undergone well stimulation, as defined by California Code of Regulations (CCR), title 14, section 1761, shall not be reused for irrigation.

REGULATORY CONSIDERATIONS

Basin Plan, Beneficial Uses, and Water Quality Objectives

The Basin Plan designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Water Board. The intended use of the water discharged to Kern-Tulare and Jasmin Water Company is agricultural supply. Surface water flows at the proposed cropland are to the South Valley Floor hydrologic unit, Valley Floor Waters. The beneficial uses of Valley Floor Waters, as stated in the Basin Plan for Hydrologic Area No. 558, are agricultural supply (AGR); industrial service supply (IND); industrial process supply (PRO); water contact recreation (REC-1); non-contact water recreation (REC-2); warm freshwater habitat (WARM); wildlife habitat (WILD); rare, threatened, or endangered species (RARE); and groundwater recharge (GWR).

The Basin Plan also specifies salinity limits for oil field discharges of 1,000 umhos/cm for electrical conductivity (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 produced wastewater 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 produced wastewater exceeding Basin Plan salinity limits to be used for agricultural use in water-short areas, provided the Dischargers 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.

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 that groundwater shall not contain chemical constituents in concentrations that adversely affect any beneficial use or that exceed the 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. The Basin Plan incorporates the State's Antidegradation Policy. The State's 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 the maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in the Regional Water Board's policies (e.g., quality that exceeds water quality objectives). The State's Antidegradation Policy 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.

Groundwater Considerations

The depth to groundwater is highly variable due to nearby groundwater recharge areas and groundwater extraction areas. Based on 2017 groundwater well data available on the Department of Water Resources website, depth to groundwater across the proposed project varies from approximately 430 to 680 feet below the ground surface (bgs). Groundwater elevation in this area ranges from approximately 70 to 100 feet above mean sea level. The gradient flow direction of the area is generally east to west.

The Antidegradation Analysis identifies three groundwater wells that are considered to be representative of first-encountered groundwater. Well 6-B is approximately three miles southwest of the Guzman Reservoir and is screened at 600 to 800 ft bgs. Well 15D1 is approximately 1.5 miles northeast of the Big Four Reservoir and is screened between 480 and 680 feet bgs. Well 19F1 is 1.5 miles southwest of the Big Four Reservoir and is screened starting at 464 feet bgs (well survey and well screen interval are not available). Table 2 summarizes the quality of shallow groundwater.

Table 2. Shallow Groundwater Quality

Constituents	Units	Well 6-B	Well 15D1		Well 19F1
		8/5/2015	2/22/2018	2/26/2019	5/29/2014
Electrical Conductivity	µmhos/cm [1]	830	521	517	696
Boron	mg/L [2]	0.75	0.043	<0.10	0.2
Chloride	mg/L	130	42	29	43
Sodium	mg/L	160	46	43	81
TDS	mg/L	500	380	390	400

[1] umhos/cm = micromhos per centimeter.
[2] mg/L = milligrams per liter.

The Antidegradation Analysis identifies two deep groundwater wells that are privately owned and within Kern-Tulare's service territory. Well 20C1 and Well 28G2 are deep water wells that are used for blending water to the Big Four Reservoir or as a supplemental water supply to specific service

areas. Water samples for Well 20C1 and Well 28G2 were collected on 24 May 2014 and 5 August 2015, respectively. Table 3 summarizes the quality of deep groundwater near the project area.

Table 3: Deep Groundwater Quality

Constituents	Units	Well 20C1 [1]	Well 28G2 [2]
Electrical Conductivity	µmhos/cm [3]	760	570
Boron	mg/L [4]	0.19	0.32
Chloride	mg/L	63	63
Sodium	mg/L	88	100
Total Dissolved Solids	mg/L	460	360

1. Well 20C1 has a depth of 2,000 feet and is representative of groundwater supplied to the Section 17 service area.
2. Well 28G2 has a depth of 2,030 feet and is representative of groundwater supplied to the Cameo and Jasmin Ranchos Mutual Water Company service area.
3. umhos/cm = micromhos per centimeter.
4. mg/L = milligrams per liter.

Water quality results for shallow groundwater appear to be at or greater than produced wastewater from the Jasmin Treatment Facility. Water quality from deep groundwater wells appears to be of better quality than shallow groundwater and produced wastewater. As required under Revised Monitoring and Reporting Program Order No. 98-205, Kern-Tulare submitted a Monitoring Well Installation and Sampling Plan (MWISP) to the Water Board. As described in this plan, Kern-Tulare proposes to monitor groundwater elevations at four wells that are installed in the continental deposits. The groundwater elevation contour map included in the MWISP shows shallow groundwater generally moving from the east to west within the project area. The MWISP is under review by Central Valley Water Board staff and is subject to approval by the Executive Officer.

DISCHARGE PROHIBITIONS, EFFLUENT LIMITATIONS, DISCHARGE SPECIFICATIONS, AND PROVISIONS

The WDRs regulate the discharge of produced wastewater to the Jasmin Ranchos Mutual Water Company Reservoir, Guzman Reservoir, Big Four Reservoir, and seven ponds at the Jasmin Treatment Facility, and the reuse of produced wastewater for irrigation.

Discharge Prohibitions

The WDRs include Discharge Prohibitions A.1 through A.8 that identify specific prohibitions for the facilities regarding the reuse of produced wastewater for irrigation. This includes prohibiting the discharge of well stimulation fluids and produced wastewater from wells that have undergone well stimulation, as defined by California Code of Regulations, title 14, section 1761.

Effluent Limits

Rationale for the Effluent Limitations in the WDRs follow:

a. **Oil and Grease:** An effluent limit of 35 mg/L for Oil and Grease is established in 40 CFR Part 435.50, *Oil and Grease Extraction Point Source Category, Agricultural and Wildlife Water Use Subcategory*. While the discharges to land described here are not subject to federal requirements, the Basin Plan requires the Dischargers to comply with, or justify a departure from, effluent limitations set forth in 40 CFR 400 et seq. if discharge is to land. The Dischargers have not provided such a justification, but rather has shown that the Treatment Facility is capable of consistently meeting the oil and grease limit of 35 mg/L. Thus the limit for the discharge (Discharge 001) is applied in the WDRs.

b. **Conductivity (EC):** The WDRs apply the Basin Plan effluent limit for produced wastewater of 1,000 µmhos/cm as an annual average for Discharges 001, 002, 003, and 004.

c. **Boron:** The WDRs apply the Basin Plan effluent limit of 1.0 mg/L for oilfield wastewater as an annual average for Discharges 001, 002, 003, and 004.

d. **Chloride:** The WDRs apply the Basin Plan effluent limit of 200 mg/L for oilfield wastewater as an annual average for Discharges 001, 002, 003, and 004.

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 WDRs include produced wastewater and groundwater monitoring. Produced wastewater monitoring includes the analysis of produced wastewater for specific constituents at specific frequencies. Analysis of produced wastewater will include the analysis of chemicals and additives used during petroleum exploration and production that may be in produced wastewater. Groundwater monitoring requires the installation of a groundwater monitoring well network for the project area capable of determining any potential impacts to first encountered groundwater from the project. Groundwater monitoring will also include the submittal of groundwater contour maps and analysis of groundwater for specific constituents at specific frequencies.

Reopener

The conditions of the discharge in the WDRs 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 WDRs 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 WDRs.

ANTIDEGRADATION

State Water Board Resolution No. 68-16 (hereafter Resolution 68-16) requires the Central Valley Water Board, in regulating the discharge of waste, to maintain high quality waters of the State until it is demonstrated that any change in quality will be consistent with the maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality lower than that described in the Central Valley Water Board's policies (e.g., quality that exceeds water quality objectives).

Resolution No. 68-16 (*Policy with Respect to Maintaining High Quality Waters of the State*) (Anti-Degradation Policy) generally prohibits the Central Valley Water Board from authorizing activities that will result in the degradation of high-quality waters unless it has been shown that:

a. The degradation will not result in water quality lower 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 will employ BPTC to minimize degradation; and

d. The degradation is consistent with the maximum benefit to the people of the state.

The WDRs establishes effluent limitations for the discharges that 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 Antidegradation Analysis quantified the amount and quality of water moving through the unsaturated zone due to infiltration from the reservoirs and irrigated cropland. Long-term water quality of infiltration from the reservoirs and irrigated cropland was estimated by averaging the results of 3 wet climate years, 6 average climate years, and 3 dry climate years for both reservoir seepage and service area percolate. The maximum concentration of produced wastewater for the first through third quarter of 2018 was also considered. These values are compared to underlying groundwater quality and water quality objectives in Table 4. Levels of EC, chloride, and sodium in percolating water and infiltration from the reservoirs and irrigated cropland are less than groundwater quality in the project area. The Analysis indicates boron in water percolating from the reservoirs will increase slightly but will continue to be below that necessary to maintain AGR beneficial uses of groundwater.

Table 4: Proposed Project Water Quality

	EC (µmhos/cm [1])	Boron (mg/L [2])	Chloride (mg/L)	Sodium (mg/L)	Percolate and Seepage Flow Ac-ft [3]
Infiltration of Blended Produced Wastewater from Reservoirs	435	0.42	39	83	318
Infiltration of Blended Produced Wastewater from Cropland	361	0.35	34	68	1,158
Produced Wastewater [4]	680	0.84	67	140	
Water Quality Objectives	1,000	0.75	175	160	-
Shallow Groundwater Quality in the Project Area [5]	641	0.27	61	83	-

1 umhos/cm = micromhos per centimeter.
2 mg/L = milligrams per liter.
3 Ac-ft = Acre-feet per year.
4 Maximum value of produced wastewater based on the first through quarter monitoring data for 2018.
5 Average water quality of shallow groundwater based on Wells 6-B, 15D1, and 19F1.

The quality of produced wastewater does not exceed effluent limits in the Basin Plan or maximum contaminant levels. The Antidegradation Analysis states that water quality at the project will not be significantly degraded and will not impact designated beneficial uses identified in the Basin Plan. The WDRs require the installation of a groundwater monitoring well network to identify any potential impacts to groundwater and to ensure that the findings in the Antidegradation Analysis are accurate. The Groundwater Limitations in this Order do authorize some degradation of groundwater with respect to EC, chloride, sodium, boron, and arsenic, however, the degradation, should it occur, will not cause groundwater to exceed the quality necessary to maintain its designated beneficial uses of MUN, AGR, IND, and REC-1.

The Antidegradation Analysis states that the Dischargers shall implement the following BPTC measures to minimize the potential degradation of water quality:

a. Treatment of produced wastewater to minimize oil and grease before blending and use for irrigation.

b. Blending of produced wastewater supplies so that the blended concentrations are protective of designated beneficial uses of the underlying aquifers.

c. Use of irrigation water management practices that optimize the balance between a) leaching to manage root zone salinity and b) minimizing percolation during the summer months in favor of winter percolation with lower concentrations.

The Board finds that these treatment and control practices represent BPTC of the wastes that may threaten to degrade waters of the state.

The WDRs comply with the Anti-Degradation Policy because they ensure that any degradation that may occur as a result of the discharges regulated by the WDRs will not result in water quality lower than that prescribed in state and regional policies, that the degradation will not unreasonably affect

present and anticipated future beneficial uses, that the Dischargers will employ BPTC to minimize degradation, and that the degradation is consistent with the maximum benefit to the people of the state due to the significant benefits provided by the activities regulated by the WDRs.

CV-SALTS Reopener

The Central Valley Water Board adopted Basin Plan amendments incorporating new programs for addressing ongoing salt and nitrate accumulation in the Central Valley at its 31 May 2018 Board Meeting. These programs, once effective, could change how the Central Valley Water Board permits discharges of salt and nitrate. For nitrate, dischargers that are unable to comply with stringent nitrate requirements will be required to take on alternate compliance approaches that involve providing replacement drinking water to persons whose drinking water is affected by nitrates. Dischargers could comply with the new nitrate program either individually or collectively with other dischargers. For salinity, dischargers that are unable to comply with stringent salinity requirements would instead need to meet performance-based requirements and participate in a basin-wide effort to develop a long-term salinity strategy for the Central Valley. This Order may be amended or modified to incorporate any newly-applicable requirements.

The stakeholder-led Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) initiative has been coordinating efforts to implement new salt and nitrate management strategies. The Board expects dischargers that may be affected by new salt and nitrate management policies to coordinate with the CV-SALTS initiative.

FOOD SAFETY EXPERT PANEL

The Central Valley Water Board established a panel of experts (Food Safety Expert Panel) in the fields of toxicology, biology, and agriculture to review data regarding the reuse of produced wastewater for irrigation. The Food Safety Expert Panel is to provide the Board with recommendations regarding potential impacts that may be associated with the reuse of produced wastewater for irrigation. On 13 June 2017, Hathaway, Kern-Tulare, and Jasmin Water Company signed the *Memorandum of Understanding Between the Central Valley Regional Water Quality Control Board and the Permit Holders Governing the Solicitation, Management, and Review of Academic, Technical and/or Scientific Studies Related to the Irrigation of Food Crops with Oil Field Produced Water* (MOU). This MOU outlines the process by which the Permit Holders will fund and the Central Valley Water Board will oversee, manage, and review academic, technical, and/or scientific studies conducted by a third-party consultant related to the irrigation of food crops with produced wastewater. These studies will be used to inform the work of the Food Safety Expert Panel and the Central Valley Water Board. If the work being conducted by the Food Safety Expert Panel effort determines there is a significant threat to crop safety and public health associated with the irrigation of crops with produced wastewater, the WDRs may be reopened and modified to address the threat.

TITLE 27

Title 27 of the California Code of Regulations, section 20005 et seq (Title 27) contains regulations to address certain discharges to land. Title 27 establishes a waste classification system, specifies siting and construction standards for full containment of classified waste, requires extensive monitoring of groundwater and the unsaturated zone for any indication of failure of containment, and specifies closure and post-closure maintenance requirements. Generally, no degradation of groundwater quality by any waste constituent in a classified waste is acceptable under Title 27 regulations.

Unless exempt, the treatment, storage, processing, and disposal of solid waste is subject to full containment pursuant to Title 27 requirements. However, Title 27 exempts certain activities from its provisions. Title 27, section 20090 states, in relevant part:

> (b) Wastewater - Discharges of wastewater to land, including but not limited to evaporation ponds, percolation ponds, or subsurface leachfields if the following conditions are met:
>
> (1) the applicable RWQCB has issued WDRs, reclamation requirements, or waived such issuance;
>
> (2) the discharge is in compliance with the applicable water quality control plan; and
>
> (3) the wastewater does not need to be managed according to Chapter 11, Division 4.5, Title 22 of this code as a hazardous waste.

The discharge of produced wastewater from E&B's McVan Facility meets the above requirements and is, therefore, exempt from Title 27.

CEQA

In accordance with the requirements of the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.), Kern-Tulare prepared an Environmental Impact Report (EIR) for the Oilfield Water Reuse Project including the use of produced wastewater for irrigation and groundwater recharge. The EIR was circulated for public review and comment from 23 May 2016 through 6 July 2016 (State Clearinghouse No. 2015021024). The Board, acting as a responsible agency, was consulted during the development of these documents. The District certified the EIR, adopted a Mitigation Monitoring and Reporting Program (MMRP), and approved the produced wastewater project. The District filed a Notice of Determination (NOD) for the EIR with the Kern County Clerk and Governor's Office of Planning and Research (OPR) on 12 August 2016. The Central Valley Water Board as the responsible agency pursuant to CEQA (Public Resources Code, section 21069) and in making its determinations and findings, must presume that the Kern-Tulare EIR comports with the requirements of CEQA and is valid. (Public Resources Code, section 21167.3.) The Regional Board has determined that the Project, when implemented in accordance with the MMRP and the conditions in this Order, will not result in any significant adverse water resource impacts.

Constituent	Unit	Q1 2018 [1] Pond #7	Q1 2018 [1] JRMWC Reservoir	Q1 2018 [1] Big Four	Q2 2018 [1] Pond #7	Q2 2018 [1] JRMWC Reservoir	Q2 2018 [1] Big Four	Q3 2018 [1] Pond #7	Q3 2018 [1] JRMWC Reservoir	Q3 2018 [1] Big Four	Maximum Contaminant Levels (MCLs) [2] Primary [3]	Maximum Contaminant Levels (MCLs) [2] Secondary [4]
Boron	mg/L [5]	0.84	0.71	0.72	0.63	0.52	0.43	0.64	0.47	0.13	- [6]	-
Calcium	mg/L	9	8.6	8.8	8.6	7.9	7.1	8.2	6.5	3.7	-	-
Chloride	mg/L	60	61	61	67	53	45	59	42	9.7	-	250
Electrical Conductivity @ 25 C	umhos/cm[7]	611	582	616	674	542	469	680	493	122	-	900
Magnesium	mg/L	0.2	<0.02	0.26	0.086	0.21	0.26	0.032	0.13	0.38	-	-
Potassium	mg/L	2.4	0.64	2.5	1.3	1.2	1.2	1.6	1.3	0.74	-	-
Sodium	mg/L	140	140	140	140	110	95	130	92	26	-	-
Sulfate	mg/L	65	98	64	71	70	51	47	52	8	-	250
Total Dissolved Solids	mg/L	460	470	460	460	390	330	540	390	99	-	500
Total Suspended Solids	mg/L	<2.5 [8]	<2.5	<2.5	2.7	1.7	3.1	2.5	3.5	4.6	-	-
1,2,4-Trimethylbenzene	ug/L [9]	1.3	0.61	1.3	0.89	<0.12	0.32	1.1	1.2	0.14	-	-
1,3,5-Trimethylbenzene	ug/L	<0.25	<0.25	<0.25	0.22	<0.12	<0.12	0.25	0.4	<0.12	-	-
Benzene	ug/L	<0.25	<0.25	<0.25	<0.083	<0.083	<0.083	<0.083	0.12	<0.083	1	-
Ethylbenzene	ug/L	<0.25	<0.25	<0.25	<0.098	<0.098	<0.098	<0.098	0.52	<0.098	300	-
Naphthalene	ug/L	<0.25	<0.25	<0.25	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	-	-
n-Propylbenzene	ug/L	<0.25	<0.25	<0.25	<0.11	<0.11	<0.11	0.14	0.21	<0.11	-	-
o-Xylene	ug/L	NA [10]	NA	NA	0.22	<0.082	<0.082	0.27	0.86	<0.082	-	-
p- & m-Xylenes	ug/L	NA	NA	NA	<0.28	<0.28	<0.28	0.29	2.1	<0.28	-	-
Toluene	ug/L	0.55	<0.25	0.57	0.11	<0.093	<0.093	0.36	1.7	<0.093	150	-
Total Xylenes	ug/L	0.52	<0.27	0.59	0.43	<0.36	<0.36	0.55	3	<0.36	1750	-
Bromobenzene	ug/L	<0.25	<0.25	<0.25	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	-	-
Bromochloromethane	ug/L	<0.25	<0.25	<0.25	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	-	-
Bromodichloromethane	ug/L	<0.25	<0.25	<0.25	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	80	-
Bromoform	ug/L	<0.25	<0.25	<0.25	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	80	-
Bromomethane	ug/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	-	-
n-Butylbenzene	ug/L	<0.25	<0.25	<0.25	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	-	-
sec-Butylbenzene	ug/L	<0.25	<0.25	<0.25	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	-	-
tert-Butylbenzene	ug/L	<0.25	<0.25	<0.25	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	-	-
Carbon tetrachloride	ug/L	<0.25	<0.25	<0.25	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	0.5	-
Chlorobenzene	ug/L	<0.25	<0.25	<0.25	<0.093	<0.093	<0.093	<0.093	<0.093	<0.093	70	-
Chloroethane	ug/L	<0.25	<0.25	<0.25	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	-	-
Chloroform	ug/L	<0.25	<0.25	<0.25	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	80	-
Chloromethane	ug/L	<0.25	<0.25	<0.25	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	-	-
2-Chlorotoluene	ug/L	<0.25	<0.25	<0.25	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-

Constituent	Unit	Q1 2018 [1] Pond #7	Q1 2018 [1] JRMWC Reservoir	Q1 2018 [1] Big Four	Q2 2018 [1] Pond #7	Q2 2018 [1] JRMWC Reservoir	Q2 2018 [1] Big Four	Q3 2018 [1] Pond #7	Q3 2018 [1] JRMWC Reservoir	Q3 2018 [1] Big Four	Maximum Contaminant Levels (MCLs) [2] Primary [3]	Maximum Contaminant Levels (MCLs) [2] Secondary [4]
4-Chlorotoluene	ug/L	<0.25	<0.25	<0.25	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	-	-
Dibromochloromethane	ug/L	<0.25	<0.25	<0.25	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	80	-
1,2-Dibromo-3-chloropropane	ug/L	<0.75	<0.75	<0.75	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	0.2	-
1,2-Dibromoethane	ug/L	<0.25	<0.25	<0.25	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	0.05	-
Dibromomethane	ug/L	<0.25	<0.25	<0.25	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	-	-
1,2-Dichlorobenzene	ug/L	<0.25	<0.25	<0.25	<0.072	<0.072	<0.072	<0.072	<0.072	<0.072	600	-
1,3-Dichlorobenzene	ug/L	<0.25	<0.25	<0.25	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	-	-
1,4-Dichlorobenzene	ug/L	<0.25	<0.25	<0.25	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	5	-
Dichlorodifluoromethane	ug/L	<0.26	<0.26	<0.26	<0.099	<0.099	<0.099	<0.099	<0.099	<0.099	-	-
1,1-Dichloroethane	ug/L	<0.25	<0.25	<0.25	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	5	-
1,2-Dichloroethane	ug/L	<0.25	<0.25	<0.25	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	0.5	-
1,1-Dichloroethene	ug/L	<0.25	<0.25	<0.25	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	6	-
cis-1,2-Dichloroethene	ug/L	<0.25	<0.25	<0.25	<0.085	<0.085	<0.085	<0.085	<0.085	<0.085	6	-
trans-1,2-Dichloroethene	ug/L	<0.25	<0.25	<0.25	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	10	-
1,2-Dichloropropane	ug/L	<0.25	<0.25	<0.25	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	5	-
1,3-Dichloropropane	ug/L	<0.25	<0.25	<0.25	<0.086	<0.086	<0.086	<0.086	<0.086	<0.086	-	-
2,2-Dichloropropane	ug/L	<0.25	<0.25	<0.25	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	-	-
1,1-Dichloropropene	ug/L	<0.25	<0.25	<0.25	<0.085	<0.085	<0.085	<0.085	<0.085	<0.085	-	-
cis-1,3-Dichloropropene	ug/L	<0.25	<0.25	<0.25	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	-	-
trans-1,3-Dichloropropene	ug/L	<0.25	<0.25	<0.25	<0.079	<0.079	<0.079	<0.079	<0.079	<0.079	-	-
Hexachlorobutadiene	ug/L	<0.25	<0.25	<0.25	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	-	-
Isopropylbenzene	ug/L	<0.25	<0.25	<0.25	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	-	-
p-Isopropyltoluene	ug/L	<0.25	<0.25	<0.25	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	-	-
Methylene chloride	ug/L	<0.35	<0.35	<0.35	<0.48	<0.48	<0.48	<0.48	<0.48	<0.48	5	-
Methyl t-butyl ether	ug/L	-	-	-	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	13	5
Styrene	ug/L	<0.25	<0.25	<0.25	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	100	-
1,1,1,2-Tetrachloroethane	ug/L	<0.25	<0.25	<0.25	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	-	-
1,1,2,2-Tetrachloroethane	ug/L	<0.25	<0.25	<0.25	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	1	-
Tetrachloroethene	ug/L	<0.25	<0.25	<0.25	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	5	-
1,2,3-Trichlorobenzene	ug/L	<0.25	<0.25	<0.25	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	-	-
1,2,4-Trichlorobenzene	ug/L	<0.25	<0.25	<0.25	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	5	-
1,1,1-Trichloroethane	ug/L	<0.25	<0.25	<0.25	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	200	-

Constituent	Unit	Q1 2018 [1] Pond #7	Q1 2018 [1] JRMWC Reservoir	Q1 2018 [1] Big Four	Q2 2018 [1] Pond #7	Q2 2018 [1] JRMWC Reservoir	Q2 2018 [1] Big Four	Q3 2018 [1] Pond #7	Q3 2018 [1] JRMWC Reservoir	Q3 2018 [1] Big Four	Maximum Contaminant Levels (MCLs) [2] Primary [3]	Maximum Contaminant Levels (MCLs) [2] Secondary [4]
1,1,2-Trichloroethane	ug/L	<0.25	<0.25	<0.25	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	5	-
Trichloroethene	ug/L	<0.25	<0.25	<0.25	<0.085	<0.085	<0.085	<0.085	<0.085	<0.085	5	-
Trichlorofluoromethane	ug/L	<0.25	<0.25	<0.25	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	150	-
1,2,3-Trichloropropane	ug/L	<0.25	<0.25	<0.25	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	-	-
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	NA	NA	NA	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	1200	-
Vinyl chloride	ug/L	<0.25	<0.25	<0.25	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	0.5	-
Acenaphthene	ug/L	<0.063	<0.061	<0.062	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	-
Acenaphthylene	ug/L	<0.063	<0.061	<0.062	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	-
Anthracene	ug/L	<0.052	<0.051	<0.052	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	-
Benzo[a]anthracene	ug/L	<0.052	<0.051	<0.052	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	-
Benzo[b]fluoranthene	ug/L	<0.052	<0.051	<0.052	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	-	-
Benzo[k]fluoranthene	ug/L	<0.052	<0.051	<0.052	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	-	-
Benzo[a]pyrene	ug/L	<0.052	<0.051	<0.052	<0.043	<0.043	<0.043	<0.043	<0.043	<0.043	0.2	-
Benzo[g,h,i]perylene	ug/L	<0.052	<0.051	<0.052	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	-	-
Chrysene	ug/L	<0.052	<0.051	<0.052	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	-	-
Dibenzo[a,h]anthracene	ug/L	<0.052	<0.051	<0.052	<0.041	<0.041	<0.041	<0.041	<0.041	<0.041	-	-
Fluoranthene	ug/L	<0.052	<0.051	<0.052	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	-	-
Fluorene	ug/L	<0.063	<0.061	<0.062	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	-	-
Indeno[1,2,3-cd]pyrene	ug/L	<0.052	<0.051	<0.052	<0.043	<0.043	<0.043	<0.043	<0.043	<0.043	-	-
Phenanthrene	ug/L	<0.052	<0.051	<0.052	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	-	-
Pyrene	ug/L	<0.052	<0.051	<0.052	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	-	-
Oil and Grease	mg/L	5.1	<1.4	6.5	5.4	2.1	1.7	4.6	3	1.2	-	-
Total Petroleum Hydrocarbons	mg/L	NA	NA	NA	<0.79	<0.79	<0.79	1.9	1.2	<0.44	-	-
Hexavalent Chromium	ug/L	<5	<5	<5	<0.7	<0.7	0.91	0.076	<0.031	0.041	10	-
Total Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.000029	0.000035	0.000035	0.00005	0.00004	0.000055	-	-
Total Recoverable Antimony	mg/L	<0.001	<0.001	<0.001	<0.00011	<0.00011	<0.00011	<0.00011	0.00048	0.0011	0.006	-
Total Recoverable Arsenic	mg/L	<0.0015	<0.0015	<0.0015	<0.0007	<0.0007	0.00071	<0.0007	0.0014	0.0016	0.01	-
Total Recoverable Barium	mg/L	0.0051	0.0082	0.0065	0.0048	0.0084	0.0098	0.0043	0.0068	0.011	1	-

Constituent	Unit	Q1 2018 [1] Pond #7	Q1 2018 [1] JRMWC Reservoir	Q1 2018 [1] Big Four	Q2 2018 [1] Pond #7	Q2 2018 [1] JRMWC Reservoir	Q2 2018 [1] Big Four	Q3 2018 [1] Pond #7	Q3 2018 [1] JRMWC Reservoir	Q3 2018 [1] Big Four	Maximum Contaminant Levels (MCLs) [2] Primary [3]	Maximum Contaminant Levels (MCLs) [2] Secondary [4]
Total Recoverable Chromium	mg/L	<0.0015	<0.0015	<0.0015	0.00086	<0.0005	0.00063	0.00057	0.0015	0.0015	-	-
Total Recoverable Cobalt	mg/L	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00011	-	-
Total Recoverable Copper	mg/L	0.003	<0.001	0.005	0.0033	0.0029	0.0056	0.00052	0.0035	0.011	1.3	1
Total Recoverable Iron	mg/L	<0.025	<0.025	<0.025	<0.03	0.12	0.21	<0.03	0.1	0.26	-	0.3
Total Recoverable Lead	mg/L	<0.0005	<0.0005	<0.0005	0.00054	<0.0001	0.0005	<0.0001	<0.0001	0.00026	0.015	-
Total Recoverable Lithium	mg/L	<0.02	<0.02	<0.02	0.017	0.015	0.015	0.019	0.015	0.014	-	-
Total Recoverable Manganese	mg/L	<0.002	0.0061	<0.002	0.0044	0.0088	0.006	0.0029	0.0056	0.0069	-	0.05
Total Recoverable Molybdenum	mg/L	<0.0005	<0.0005	<0.0005	0.00032	0.00043	0.0005	0.00035	0.00065	0.00097	-	-
Total Recoverable Nickel	mg/L	<0.001	<0.001	<0.001	0.00051	0.0008	0.00067	0.00046	0.00047	0.00057	0.1	-
Total Recoverable Selenium	mg/L	<0.0007	0.0011	<0.0007	<0.00019	<0.00019	<0.00019	0.00087	0.00078	0.00066	0.05	-
Total Recoverable Strontium	mg/L	0.082	0.087	0.084	0.081	0.081	0.071	0.091	0.072	0.032	-	-
Total Recoverable Vanadium	mg/L	<0.003	<0.003	<0.003	<0.00078	<0.00078	0.00099	<0.00078	0.0017	0.0012	-	-
Total Recoverable Zinc	mg/L	<0.0025	<0.0025	<0.0025	0.02	0.0039	0.0028	0.0018	0.003	0.0038	-	5
Total Recoverable Beryllium	mg/L	<0.0005	<0.0005	<0.0005	<0.00014	<0.00014	<0.00014	<0.00014	<0.00014	<0.00014	0.004	-
Total Recoverable Cadmium	mg/L	<0.0005	<0.0005	<0.0005	<0.00011	<0.00011	<0.00011	<0.00011	<0.00011	<0.00011	0.005	-
Total Recoverable Silver	mg/L	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	0.1
Total Recoverable Uranium	pCi/L	NA	NA	NA	<0.067	<0.067	0.088	<0.067	<0.067	0.14	20	-
Total Recoverable Uranium	mg/L	<0.0005	<0.0005	<0.0005	NA	NA	NA	NA	NA	NA	-	-
Total Recoverable Thallium	mg/L	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.002	-
Gross Alpha	pCi/L	-1.5	-0.89	-0.88	0.36	-0.368	-0.617	-0.513	0.099	0.101	15	
Radium 226	pCi/L	0.25	0.27	0.47	-0.058	-0.055	0.059	0.098	0.488	0.262	5	
Radium 228	pCi/L	4.5	2.7	2.2	0.285	0.578	0.286	0.552	0.405	0.593		

Constituent	Unit	Q1 2018 [1]			Q2 2018 [1]			Q3 2018 [1]			Maximum Contaminant Levels (MCLs) [2]	
		Pond #7	JRMWC Reservoir	Big Four	Pond #7	JRMWC Reservoir	Big Four	Pond #7	JRMWC Reservoir	Big Four	Primary [3]	Secondary [4]
Uranium	pCi/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.088	<0.001	<0.001	0.14	20	

1. Water quality results compiled in Table 2 are from quarterly monitoring reports required under Revised Monitoring and Reporting Program Order No. 98-205.
2. Maximum contaminant levels (MCLs) are published by the State Water Resources Control Board, Division of Drinking Water.
3. Standard based on chronic, non-acute, or acute human health effects.
4. Guidelines established to manage water for aesthetic considerations, such as taste, color, and odor. These are not considered to present a risk to human health.
5. mg/L = milligrams per liter.
6. "-" = there is no MCL for this constituent.
7. µmhos/cm = micromhos per centimeter.
8. "<" = less than the minimum detection limit.
9. µg/L = micrograms per liter.
10. NA = Data not available.