

INFORMATION SHEET
ORDER NO. ____
MUSCO FAMILY OLIVE COMPANY AND THE STUDLEY COMPANY
WASTEWATER TREATMENT AND LAND DISPOSAL FACILITY
SAN JOAQUIN COUNTY

Background

Musco Family Olive Company owns and operates an olive processing facility that processes approximately one-half of the state's total table olive crop. The facility began operations in 1983. The facility processes and cans olives year round and generates wastewater with high organic strength and high salinity. Processing generally consists of receiving olives, storage in acetic acid solution, curing in sodium hydroxide (lye), pitting, and canning in a brine solution. Process wastewater generated at the facility is regulated under two separate WDRs:

- a. Order No. R5-2005-0024 regulates two Class II surface impoundments that are regulated under Title 27 of the California Code of Regulations, §20005 et seq., (hereafter Title 27). The Class II surface impoundments are used to store and evaporate concentrated brines that have been determined to be designated waste.
- b. Order No. R5-2002-0148 regulates the treatment, storage, and land application of other wastewater. This Order updates Order No. R5-2002-0148 and only applies to wastewater that is not discharged to the Class II surface impoundments.

The Central Valley Water Board has issued the following enforcement orders to the Discharger for various violations since 1999:

- Cleanup and Abatement Order (CAO) No. 5-00-717;
- Time Schedule Order (TSO) No. R5-2002-0014;
- Time Schedule Order (TSO) No. R5-2002-0014-R01;
- Cleanup and Abatement Order No. R5-2002-0149;
- Administrative Civil Liability (ACL) Complaint No. R5-2002-0502 in the amount of \$150,000 for failure to comply with CAO No. 5-00-717,
- ACL Complaint No. R5-2004-0534 in the amount of \$493,500 for failure to comply with certain requirements set forth in TSO No. R5-2002-0014-R01
- ACL and Penalty Order No. R5-2007-0138, the Stipulation for Entry of Administrative Civil Liability and Penalty Order to settle ACL Complaint No. R5-2004-0534 (Stipulated Order); and
- Cease and Desist Order (CDO) No. R5-2007-0139.

The Discharger has paid the civil liabilities in full and timely submitted the required Site Closure and Maintenance Report. In addition, the Discharger submitted all of the reports required by the CDO. This Order rescinds the 2000 CAO. Staff anticipates recommending rescission of the Board-adopted enforcement orders in the near future.

Waste Character, Flows, and Discharge Operations

The Discharger proposes to continue the discharge of treated process wastewater to designated land application areas (LAAs). The olive brining process generates several liquid waste streams, some of which are discharged to the Class II surface impoundments for

disposal. The rest are discharged to the reservoir surge tank (RST), which is used as a pumping sump to convey the non-designated wastewater an 84-million gallon effluent treatment/storage reservoir. Following treatment to reduce biochemical oxygen demand (BOD), the effluent is discharged to the LAAs to irrigate crops. When capacity is available in the Class II surface impoundments, some waste streams normally discharged to the wastewater treatment/storage reservoir and the LAAs are routed to the Class II surface impoundments to minimize the flow and salt loadings on the LAAs.

The olive storage and processing tanks are outdoors in unroofed areas. Secondary containment berms are used to capture process spills and precipitation that falls on the containment areas and direct them to sumps equipped with electrical conductivity meters. If the electrical conductivity (EC) is less than 4,800 umhos/cm, the water is pumped to the wastewater treatment/storage reservoir. Otherwise, it is pumped to the Class II surface impoundments.

Wastewater flow rates are variable from month to month depending on production. Total annual flows ranged from 100 million gallons (MG) per year to 217 MG per year from 2000 through 2008. These flows account for both process wastewater and low salinity storm water collected in the outdoor processing areas.

The entire facility consists of 280 acres, of which approximately 80 acres are used for the processing plant. Of the remaining 200 acres, approximately 160 acres are currently used for land application of process wastewater, and another 11-acre former LAA is available for future use. Wastewater is applied to the LAAs by sprinkler irrigation. Irrigation tailwater is pumped to the effluent treatment/storage reservoir for recycling. Likewise, all storm water runoff from the LAAs drains to the treatment/storage reservoir.

Attempts to grow fodder crops such as Sudan grass and winter barley were unsuccessful due to the salinity of the waste. In 2004, the Discharger planted a 20-acre experimental plot of NyPa Forage™, a patented clone of *Distichlis spicata*, which is commonly known as salt grass. In the last two years, the Discharger has expanded the NyPa Forage™ cultivation to all of the LAAs.

Since adoption of the current WDRs, the Discharger has implemented several process changes, equipment modifications, and modifications to the process wastewater collection system to minimize the volume and reduce the salinity of the wastewater discharged to the LAAs. These changes include:

- Converting to a closed loop fluming system;
- Reclaiming and recycling lye solutions and other process streams;
- Using carbon dioxide to neutralize residual lye in the olives instead of rinsing several times in fresh water;
- Reducing the concentration of acetic acid used for olive storage solution;

- Changing the floatation brine solution less frequently; and
- Housekeeping changes to reduce water use and capture high salinity spillage for discharge to the Class II surface impoundments.

The average fixed dissolved solids (FDS) concentration of the raw wastewater has decreased significantly in the last two years, as has the maximum monthly FDS mass. Excluding the data from 2007 and 2009 (when the plant was closed for significant periods), the total annual FDS mass has also decreased since 2004 through 2006 despite relatively constant total annual wastewater volumes.

Residual solids include olive pits, stems, waste olives, and screened solids. The olive pits and stems are sold as biomass and burned at cogeneration plants or pulverized and incorporated into compost. Waste olives are transported offsite for animal feed or offsite land disposal. The Discharger is developing an onsite process to burn pits to generate energy for the processing plant and further concentrate certain waste streams for discharge to the Class II surface impoundments. Residuals from this process, such as ash, will not be discharged onsite.

Soil Conditions

The facility is sited on an alluvial fan that generally slopes to the northeast. Slopes range from approximately 20 percent to nearly flat. Site soils are predominantly very deep and well drained clay and clay loam. Due to the high salinity of the wastewater, the Discharger has been monitoring concentrations of waste constituents in shallow LAA soils since 2002. A total of 18 on-site sampling locations and five background sampling locations have been monitored at specific depth intervals. The background soil EC results to date vary significantly with location, depth, and time. The spatial and temporal variations in background soil EC are not readily explained by climate, topography, or soil type. The soil EC results for the LAA samples are also highly variable. Although some temporal trends seem to be present at some of the LAA sampling locations, the data do not conclusively show site-wide increases over time for any of the depth intervals monitored. Based on the spatial and temporal variability of the background soil monitoring data, it may not be possible to use the LAA soil monitoring data to make conclusions about salinity accumulation at each discrete sampling location. However, it may be possible to assess temporal trends by comparing the aggregate LAA data to the aggregate background data for each sampling interval. Based on a simplified statistical analysis of the historical soil monitoring data:

- The background EC is similar within each of the three depth intervals. This may indicate that the soil salinity does not naturally vary significantly with depth within the upper six feet of soil.
- The upper six inches of LAA soil shows significantly higher EC than the background soil on a site-wide basis; and
- The 27- to 39-inch interval shows some signs of salinity impacts although this interval is impacted with salt to a lesser degree than that found in the upper six inches. These impacts may be localized.

- For the 60- to 72-inch interval depth interval, background and LAA EC results are not statistically different.

Soil monitoring data for other salinity indicators indicate that background soils have a relatively high cation exchange capacity (CEC) and marginal sodium absorption ratio (SAR) and exchangeable sodium percentage (ESP). The upper six inches of LAA soils have become very sodic and soils in the 27- to 39-inch depth interval are also showing signs of increased sodicity. These data are consistent with the conclusions derived from the EC statistics.

Likewise, the soil monitoring data indicate that the total nitrogen content of LAA soils is not significantly different than that of background soils for all three depth intervals. The shallowest soils in the LAAs contain higher levels of nitrate nitrogen than the background sampling locations, but the LAAs appear to be relatively depleted of nitrate nitrogen in the deeper intervals. The data suggest that nitrification of ammonia may be slower than expected, but the overall levels when compared to nitrate nitrogen do not appear to be significant.

This Order requires that the Discharger continue to monitor soil moisture and waste constituent concentrations in soil, and to evaluate changes over time annually. This Order also requires that the Discharger have an approved closure plan and for the LAAs and wastewater treatment storage reservoir to ensure that residual waste constituents in soil do not pose a threat to surface water or groundwater quality following closure of the facility. Although the Discharger submitted the Site Closure and Maintenance Report required by ACL and Penalty Order No. R5-2007-0138, it did not adequately address site conditions, due in part to the fact that additional soil and groundwater data have been obtained since its submittal. This Order identifies specific concerns that must be addressed before the Executive Officer approves the closure plan. This Order also requires that the Discharger establish financial assurances for closure of the LAAs and wastewater treatment storage reservoir in 2010 and ensure that those assurances are fully funded by 30 December 2020.

Groundwater Conditions

The site geology and hydrogeology are complex. There are 37 onsite groundwater monitoring wells, five offsite groundwater monitoring wells, and one offsite domestic supply well that are monitored. Eleven of the onsite monitoring wells are currently dry and are monitored for the presence of water. Studies completed by the Discharger have identified three water-bearing zones on the site (shallow, intermediate, and deep). Groundwater in each of these zones exhibits a distinct chemical signature and different groundwater elevation. In general, the shallow groundwater zone is less than 60 feet below ground surface (bgs) in the southern portion of the site; the intermediate zone is between 60 and 120 feet bgs in the mid- to northern portion of the site; and the deep groundwater zone (greater than 120 feet bgs) is present in the northern portion of the site. Groundwater flow in the shallow zone is typically to the northeast; flow in the intermediate zone is to the northeast; and flow in the deep zone is to the northwest. Based on water elevation data indicate a downward to neutral vertical gradient.

MUSCO FAMILY OLIVE COMPANY AND THE STUDLEY COMPANY
WASTEWATER TREATMENT AND LAND DISPOSAL FACILITY
SAN JOAQUIN COUNTY

The Discharger's studies have identified several different types of groundwater beneath the site that range in quality from connate (naturally saline waters originating from ancient sea water) to meteoric (newer, fresh water from precipitation that recharges the aquifer). The connate waters may be the source of sulfate found in some onsite groundwater monitoring wells. Based on increases in bicarbonate concentrations after operation of the wastewater treatment/storage reservoir began in December of 2002, monitoring wells MW-15, MW-16, MW-3, and MW-5 have been impacted by wastewater from the wastewater treatment/storage reservoir. The increase in bicarbonate has been accompanied by a decrease in chloride, resulting in little change to total dissolved solids (TDS) concentrations in the shallow groundwater. The water table in these wells increased after the reservoir was first filled, providing physical evidence of seepage. However, groundwater at the downgradient edge of the facility does not appear to have been significantly impacted by site activities, including use of the LAAs for wastewater irrigation.

Based upon the available water quality data and several different methods of estimating ambient conditions upgradient of the site, the ambient background concentration for TDS is approximately 2,000 mg/L. Historical groundwater monitoring data for key waste constituents are summarized in the following table, and the well locations are depicted on Attachment E.

Well ID/ First Sampling Date	Statisti c	pH (s.u.)	Na (mg/L)	Fe (ug/L)	SO4 (mg/L)	Cl (mg/L)	HCO ₃ Alk. (mg/L)	NH ₃ (mg/L)	NO ₃ N (mg/L)	BOD (mg/L)	TDS (mg/L)
MW-1	Min.	7.85	240	510	45	67	300	<0.2	11.00	<2	692
4/10/2002	Max.	9.07	1,100	3,130	91	580	470	3.30	139.7 3	27.00	1,920
	Mean	8.09	445	1,900	61	395	368	0.90	89.76	12.10	1,529
MW-2	Min.	7.18	580	150	440	130	<10	0.10	<0.1	<1	330
4/11/2002	Max.	7.70	3,280	1,620	3,970	5,400	160	0.72	3.40	3.20	13,600
	Mean	7.45	2,279	589	2,461	3,768	106	0.28	1.44	2.45	9,836
MW-2C	Min.	6.80	1,630	1,310	1,100	2,710	50	<0.1	28.67	<2	6,080
6/23/2008	Max.	7.81	2,430	6,530	1,400	3,000	600	5.74	42.66	9.77	8,220
	Mean	7.55	1,874	3,154	1,231	2,833	307	1.31	32.98	5.19	6,728
MW-3	Min.	6.97	150	1,300	140	72	690	<0.2	0.91	<2	2,400
4/10/2002	Max.	8.08	1,800	29,300	260	1,100	1,530	2.30	77.00	7.70	3,170
	Mean	7.24	735	8,969	197	860	1,109	0.58	13.67	3.83	2,804
MW-3C	Min.	7.00	325	50	290	310	340	<0.2	8.13	<2	1,330
6/19/2008	Max.	7.90	392	110	370	410	385	0.90	13.09	5.10	1,510
	Mean	7.68	353	76	329	365	350	0.54	10.90	5.10	1,398

MUSCO FAMILY OLIVE COMPANY AND THE STUDLEY COMPANY
WASTEWATER TREATMENT AND LAND DISPOSAL FACILITY
SAN JOAQUIN COUNTY

Well ID/ First Sampling Date	Statisti c	pH (s.u.)	Na (mg/L)	Fe (ug/L)	SO4 (mg/L)	Cl (mg/L)	HCO ₃ Aik. (mg/L)	NH ₃ (mg/L)	NO ₃ N (mg/L)	BOD (mg/L)	TDS (mg/L)
MW-4	Min.	7.06	100	50	280	77	100	<0.2	2.55	<1	1,200
4/11/2002	Max.	8.29	626	240	470	2,220	410	1.80	3.80	75.00	1,900
	Mean	7.44	349	120	414	274	355	0.46	3.07	16.63	1,283
MW-5	Min.	7.00	490	1,200	260	400	780	<0.2	<0.1	<2	2,000
4/11/2002	Max.	8.79	1,600	3,250	510	740	1,700	1.30	0.84	65.00	4,100
	Mean	7.32	658	2,190	355	564	1,246	0.45	0.39	28.10	2,551
MW-6R	Min.	7.25	421	2,080	37	550	650	<0.2	10.40	<2	1,630
6/12/2007	Max.	8.01	606	3,500	71	680	800	0.60	17.50	<3.9	1,890
	Mean	7.57	553	2,810	49	600	749	0.37	15.09		1,749
MW-7	Min.	7.34	46	290	90	330	190	<0.2	3.30	<0.84	1,950
4/12/2002	Max.	8.02	600	1,830	1,300	540	320	0.40	8.80	4.20	2,400
	Mean	7.70	475	856	878	408	235	0.23	7.87	4.20	2,164
MW-8	Min.	7.39	67	1	350	130	230	<0.2	5.20	<2	1,280
4/12/2002	Max.	7.90	616	350	490	320	280	1.60	18.00	4.40	1,500
	Mean	7.61	285	113	403	276	248	0.37	14.12	3.25	1,341
MW-9R	Min.	7.40	360	420	500	220	340	<0.2	6.70	<0.84	1,480
6/11/2007	Max.	8.59	505	4,250	600	270	690	0.80	9.95	1.70	1,590
	Mean	7.88	452	1,627	559	239	407	0.50	8.74	1.70	1,537
MW-10R	Min.	7.30	412	1,390	212	420	230	<0.2	6.61	<0.84	1,440
6/11/2007	Max.	8.91	540	9,720	280	490	780	1.20	14.50	0.00	1,550
	Mean	7.81	484	3,531	243	449	531	0.50	7.98	--	1,509
MW-11	Well not sampled since 2003 (dry)										
4/11/2002											
MW-12	Min.	7.46	369	210	630	510	140	<0.2	14.00	< 1.8	2,060
4/11/2002	Max.	8.48	680	3,230	960	730	2,900	1.40	47.00	4.60	3,100
	Mean	7.81	542	1,524	804	600	465	0.49	30.22	3.73	2,353
MW-13R	Min.	7.30	444	2,250	23	800	290	<0.2	48.00	<0.84	1,980
6/12/2007	Max.	8.20	810	5,300	80	1,360	390	1.50	135.00	3.90	3,020
	Mean	7.75	617	3,787	38	983	319	0.53	93.88	3.90	2,296

MUSCO FAMILY OLIVE COMPANY AND THE STUDLEY COMPANY
WASTEWATER TREATMENT AND LAND DISPOSAL FACILITY
SAN JOAQUIN COUNTY

Well ID/ First Sampling Date	Statisti c	pH (s.u.)	Na (mg/L)	Fe (ug/L)	SO4 (mg/L)	Cl (mg/L)	HCO ₃ Alk. (mg/L)	NH ₃ (mg/L)	NO ₃ N (mg/L)	BOD (mg/L)	TDS (mg/L)
MW-13C 5/21/2008	Min.	7.40	555	60	580	570	200	<0.2	0.02	<2	2,300
	Max.	7.90	694	120	1,310	760	430	1.00	15.30	<2	2,430
	Mean	7.69	613	84	744	685	376	0.55	11.43	<2	2,379
MW-14 11/18/200 2	Min.	7.13	140	1,870	360	640	210	<0.2	34.80	<2	2,300
	Max.	8.56	968	5,560	670	1,120	710	1.80	83.00	87.00	3,430
	Mean	7.57	706	3,309	520	942	401	0.46	59.04	50.30	2,916
MW-15 11/19/200 2	Min.	7.30	319	1,340	35	154	530	<0.2	6.10	<1.3	1,000
	Max.	8.52	588	4,950	280	500	1,200	1.00	25.51	22.00	1,960
	Mean	7.73	415	2,615	120	327	754	0.39	15.35	8.75	1,361
MW-16 11/18/200 2	Min.	6.90	360	750	260	350	710	<0.2	0.29	<0.2	2,100
	Max.	8.29	770	4,000	470	690	1,900	1.20	18.00	4.40	2,800
	Mean	7.25	611	1,617	378	510	1,327	0.40	5.25	4.40	2,552
MW-17 6/17/2005	Min.	7.20	458	270	130	260	340	<0.2	6.48	<1.6	1,900
	Max.	8.41	769	2,160	310	810	900	0.50	31.00	8.60	2,120
	Mean	7.65	613	1,095	228	639	702	0.50	17.60	8.60	2,018
MW-18 6/17/2005	Min.	7.20	480	4,860	260	490	280	<0.2	6.00	<1.6	1,600
	Max.	8.81	695	8,100	658	680	1,070	0.35	9.60	2.30	1,980
	Mean	7.76	559	6,433	322	571	662	0.29	7.95	1.85	1,822
MW-22 11/16/200 6	Min.	7.29	318	580	310	300	190	<0.2	17.00	<1.6	1,390
	Max.	9.00	491	3,580	560	520	930	<0.2	41.60	32.00	1,720
	Mean	7.88	414	1,706	421	389	315	<0.2	24.34	32.00	1,545
MW-23 6/12/2007	Min.	7.50	437	630	380	320	410	<0.2	20.99	<1.3	1,790
	Max.	8.78	630	4,310	450	370	470	0.40	72.46	<2	1,960
	Mean	7.97	543	1,760	418	352	441	0.25	41.34	<2	1,835
MW-24 6/12/2007	Min.	6.70	160	930	111	80	250	<0.2	14.67	<0.84	80
	Max.	9.24	341	3,160	142	104	330	1.40	18.56	<2	730
	Mean	7.99	192	1,848	118	88	285	0.88	15.83	<2	639
MW-25 6/12/2007	Min.	7.20	1,200	210	1,450	2,700	60	0.20	<0.1	<0.1	4,400
	Max.	8.11	2,240	1,380	2,750	3,790	110	0.30	0.29	1.80	9,390

MUSCO FAMILY OLIVE COMPANY AND THE STUDLEY COMPANY
WASTEWATER TREATMENT AND LAND DISPOSAL FACILITY
SAN JOAQUIN COUNTY

Well ID/ First Sampling Date	Statisti c	pH (s.u.)	Na (mg/L)	Fe (ug/L)	SO4 (mg/L)	Cl (mg/L)	HCO ₃ Alk. (mg/L)	NH ₃ (mg/L)	NO ₃ N (mg/L)	BOD (mg/L)	TDS (mg/L)
	Mean	7.65	1,810	727	1,930	3,482	78	0.24	0.21	1.80	7,972
MW-26	Min.	7.50	281	570	129	374	160	<0.2	16.30	<2	1,140
5/14/2008	Max.	8.00	353	6,720	213	450	600	1.10	21.22	3.10	1,350
	Mean	7.72	305	1,882	151	403	293	0.55	18.35	3.10	1,195
MW-27	Min.	7.50	119	70	230	155	370	<0.2	9.00	<0.2	1,020
6/23/2008	Max.	8.30	267	8,630	290	171	410	1.90	11.06	<2	1,120
	Mean	7.77	233	2,288	259	162	398	0.53	10.18	<2	1,055
MW-28	Min.	7.20	611	1,190	480	700	470	<0.1	0.00	<2	2,680
6/23/2008	Max.	7.82	730	3,300	700	780	1,000	0.64	7.86	7.50	2,930
	Mean	7.54	677	2,153	573	727	790	0.38	5.55	4.75	2,769
MW-29	Min.	7.50	497	320	830	280	160	0.10	<0.1	2.10	1,810
7/31/2008	Max.	8.00	632	8,410	1,020	310	380	0.90	0.70	13.40	2,290
	Mean	7.81	573	1,835	947	296	258	0.43	0.40	6.60	2,010
SF-1	Min.	8.60	225	90	167	106	160	<0.1	2.19	<2	700
6/26/2008	Max	11.90	287	6,700	220	158	540	0.90	10.86	6.70	820
	Mean	9.50	254	1,038	187	122	264	0.42	3.17	4.65	736
SF-2	Min.	7.70	206	1,160	161	97	250	<0.2	3.18	<2	670
6/26/2008	Max	9.20	254	4,110	180	109	300	0.30	3.80	<2	700
	Mean	8.23	231	2,349	170	101	290	0.25	3.52	<2	687
SF-3	Min.	7.55	421	190	310	360	100	<0.2	1.94	<2	1,470
6/26/2008	Max.	8.25	515	2,840	390	470	420	1.30	14.40	7.60	1,630
	Mean	7.89	466	833	362	403	354	1.30	11.72	4.87	1,529
Hansen	Min.	7.10	120	90	420	220	210	<0.2	<0.1	<2	1,200
6/23/2003	Max.	8.90	1,300	230	510	310	310	0.13	<0.4	<2	1,300
	Mean	7.78	365	136	462	239	270	0.10	<0.4	<2	1,274
K-1	Min.	7.10	285	1,140	240	210	210	<0.2	14.00	<2	980
7/13/2004	Max.	8.54	1,200	4,010	330	350	320	0.40	20.99	1.90	1,800
	Mean	8.01	368	2,451	277	239	265	0.32	18.51	1.85	1,142

Key to abbreviations:

Na = sodium

SO4 = sulfate

HCO₃ Alk. = bicarbonate alkalinityNO₃ N = nitrate nitrogen

Fe = iron

Cl = chloride

NH₃ = ammonia

BOD = biochemical oxygen demand

TDS = total dissolved solids

< = less than

The olive processing facility has discharged wastewater at the site since 1983, when the first WDRs were issued. There are no site-specific data with which to evaluate shallow groundwater quality at the site prior to that date. Although the site is hydrogeologically complex, evaluation of local and areal groundwater conditions determined that the background groundwater TDS concentration is 2000 mg/L.

Basin Plan, Beneficial Uses, and Water Quality Objectives

Local surface water drainage is to the Sacramento San Joaquin Delta. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition* (hereafter 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 Resources Control Board. The Basin Plan establishes narrative water quality objectives for chemical constituents, tastes and odors, and toxicity in groundwater. It also sets forth numeric objectives for pH and total coliform organisms.

Antidegradation Analysis

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

- a. The degradation is consistent with the maximum benefit to the people of the State;
- b. The degradation will not unreasonably affect present and anticipated future beneficial uses;
- c. The degradation does not result in water quality less than that prescribed in state and regional policies, including violation of one or more water quality objectives; and
- d. The discharger employs best practicable treatment and control (BPTC) to minimize degradation.

Since adoption of the previous WDRs, the Discharger has implemented the following treatment and control measures to control or prevent water quality degradation:

- A long-term water conservation program has reduced the facility's average water use from approximately 5,100 to 4,000 gallons per ton of olives processed.
- A long-term chemical source reduction/control program has reduced the yearly average FDS concentration of wastewater approximately 2,000 mg/L to 1,450 mg/L. Additionally, the annual FDS mass discharged to the reservoir declined from over 1,300 to 880 tons per year. However, some of this reduction is attributed to crop failures in 2007 and 2008, and the Discharger believes that 1,050 tons per year is a sustainable annual mass loading at full production.

- The Discharger has planted a salt-loving perennial crop at the LAAs and has made efforts to increase the crop coverage to the maximum sustainable coverage. The crop is periodically harvested for use as fodder, thereby removing some salt from the LAAs.

The Discharger has also completed pilot-scale treatment studies and a feasibility study to evaluate other methods of treatment and control for salinity. The alternatives included two-stage reverse osmosis (RO); the “Renewable Energy/Wastewater System” or RENEWS (which uses heat energy to evaporate high-salinity wastewater and generate electricity); and additional Class II surface impoundments to evaporate wastewater.

The following table summarizes the economic analysis of these alternatives at a consistent FDS removal level of 400 tons per year. This mass removal rate is equivalent to the expected removal achieved by RENEWS at 60,000 gpd (approximately 22 MG per year). An FDS removal level of 400 tons per year is approximately equivalent to a 38 percent reduction of the FDS mass loading allowed by this Order.

Feasibility Factor	Reverse Osmosis	RENEWS	Class II Surface Impoundments
Tons of FDS Removed per Year	400	400	400
Resultant FDS Concentration ¹	1,400	1,300	1,700
Volume Treated per Year	20 MG	22 MG	22 MG
Capital Cost	\$3 million	\$4 million	\$30 million
Annual O&M Cost	\$400,000	-\$250,000 ²	Minimal ³
30-Year Net Present Cost	\$12 million	\$0 ²	\$30 million
Cost per Ton of FDS Removed	\$1,000	-\$200 ²	\$2,000
Land Area Required	Minimal	Minimal	25 acres

¹ The resultant FDS concentration discharged to the reservoir and LAAs would not be constant due to differences in the volume treated and the volume of treated wastewater discharged to the reservoir.

² For this alternative the annual O&M cost is negative because of the energy savings that would be achieved by generating steam power on-site. Over a 30-year planning horizon, this energy cost savings is expected to pay for the treatment system.

³ The economic analysis provided in the RWD assumed no O&M costs for this alternative. This is a conservative assumption, because O&M costs would increase the net present cost and cost per ton of FDS removed.

Based on this analysis, the RENEWS technology is the most economically feasible alternative to further reduce the mass of salt discharged to the reservoir and LAAs. The Discharger also completed a pilot study of the RENEWS system. The demonstration-scale RENEWS unit successfully reduced the FDS of one of the Discharger’s waste streams to below 100 mg/L.

The Discharger will build a 60,000-gpd RENEWS unit, which is expected to be operational in July 2010.

However, the Discharger has not committed to a time schedule for completion of the 60,000-gpd RENEWS system. This Order requires the Discharger to begin operation of the 60,000 gpd RENEWS system or demonstrate that it is infeasible within two years of adoption of this Order.

Additionally, the unlined wastewater treatment/storage reservoir does not incorporate any specific measures to reduce the potential for groundwater degradation. Based on the finding that the wastewater treatment/storage reservoir has not caused unreasonable groundwater degradation or exceedance of a water quality objective, additional measures such as pond lining are not required at this time. However, this Order requires that the Discharger continue groundwater monitoring and re-evaluate groundwater quality annually. The groundwater limitations of this Order do not allow statistically significant increases in concentrations of waste constituents in groundwater. If groundwater monitoring data show that the discharge has violated the groundwater limitations of this Order, this Order may be reopened to add additional requirements that address the violations.

Constituents of concern that have the potential to degrade groundwater include salts (primarily FDS, sodium, and chloride) and nitrogen. The discharge to the wastewater treatment/storage reservoir has degraded groundwater quality and the discharge to the LAAs has the potential to degrade groundwater quality. This Order imposes concentration- and mass-based effluent salinity limits that do not allow a significant increase over the recently achieved sustainable levels cited above and will prevent degradation that exceeds water quality objectives. The FDS limits of this Order are more stringent than those imposed by the CDO and should result in a significant decrease in the chloride concentration of the waste discharged to the LAAs. This Order does not impose separate effluent limits for sodium and chloride because FDS measures the overall salinity and the concentration of individual salinity constituents is expected to be relatively constant. The Discharger will be able to immediately comply with the FDS limits without further treatment or source control.

Groundwater monitoring data includes nitrate concentrations that cannot be fully explained at this time, and may indicate that the past discharges of wastewater to the LAAs has caused significant degradation due to nitrogen. The Discharger has significantly improved operation and management of the LAAs during the past few years. NyPa grass grown at the LAAs should remove most of the nitrogen in the applied wastewater if the Discharger continues the current level of wastewater treatment and maintains adequate crop coverage. Given the soil type and depth to groundwater at the LAAs, subsequent denitrification in the vadose zone is expected to prevent unreasonable groundwater degradation at the LAAs. This Order requires that the Discharger continue to treat the wastewater and maintain adequate crop cover at the LAAs.

This Order does not allow any increase in the volume of waste or the mass of waste constituents discharged. It imposes lower effluent flow limits based on the hydraulic capacity of the existing system, with which the Discharger can comply. This Order is consistent with the Basin Plan and Resolution No. 68-16, which allows some groundwater degradation because economic prosperity of local communities and associated industry is of benefit to the people of California.

This Order establishes terms and conditions of discharge to ensure that the discharge does not unreasonably affect present and anticipated uses of groundwater and includes groundwater limitations that apply water quality objectives established in the Basin Plan to protect beneficial uses. This Order also establishes effluent limitations that are protective of the beneficial uses of the underlying groundwater and requires periodic re-evaluation of groundwater quality. The Discharger has implemented certain best practicable treatment and control measures to minimize degradation and plans to further minimize potential degradation by operating a 60,000-gpd RENEWS system and increasing the LAA area to include the 11-acre "Checks" area, which has not been used since 2002.

Title 27

The process wastewater treatment and reuse facilities associated with the discharge authorized in this Order are exempt from the requirements of Title 27 based on the following:

- a. The wastewater regulated by this Order is not a hazardous waste.
- b. Based on extensive technical studies of the wastewater quality, discharge operations, and site-specific geology and hydrogeology, the discharge authorized by this Order will not cause exceedance of water quality objectives. This Order ensures that discharges from the LAAs comply with the antidegradation policy. Therefore, the discharge to the LAAs is consistent with the Basin Plan and is exempt from Title 27 pursuant to Section 20090, subdivision (b).
- c. Groundwater monitoring demonstrates that discharges from the treatment/storage reservoir have not caused underlying groundwater to exceed Basin Plan objectives. This Order ensures that discharges from the reservoir comply with the antidegradation policy. Therefore, the discharge to the treatment/storage reservoir is consistent with the Basin Plan and is exempt from Title 27 pursuant to Section 20090, subdivision (b).

California Environmental Quality Act

The Central Valley Water Board adopted a Negative Declaration for this project in 1997. The Negative Declaration described a discharge of 500,000 gpd to 200 acres of cropland at certain waste constituent concentrations. Subsequently, the San Joaquin County Community Development Department adopted a Negative Declaration for construction of the treatment/storage reservoir in 2001. The discharge authorized by this Order is consistent with the Negative Declarations because this Order:

- a. Does not authorize expansion of the wastewater treatment/storage reservoir or land application areas.

- b. Limits the discharge flow to an equivalent daily flow of no more than 482,000 gpd as a yearly average.
- c. Limits the annual FDS loading rate to the LAAs to a loading rate equivalent to the loading rate envisioned in the 1997 Negative Declaration.

Effluent Limitations

As discussed above, the salinity effluent limitations of this Order were developed based on recently achieved sustainable salinity reductions and are consistent with the 1997 CEQA document. Effluent limitations for nitrogen and BOD are consistent with those typically imposed on other discharges of food processing wastewater to protect groundwater quality and prevent nuisance conditions, and the Discharger will be able to immediately comply with these limits:

- The FDS concentration of wastewater discharged from the RST to the wastewater treatment/storage reservoir shall not exceed 2,000 mg/L as a monthly average.
- The mass of FDS discharged from the RST to the wastewater treatment/storage reservoir shall not exceed an annual total of 1,055 tons.
- The maximum total nitrogen loading to the LAAs shall not exceed the agronomic rate for the crop grown.
- The maximum BOD₅ mass loading to each LAA shall not exceed any of the following:
 - 300 lbs/acre on any single day;
 - 100 lbs/acre/day as a 7-day average; and
 - The maximum loading rate that ensures that the discharge will not create a nuisance.

Groundwater Limitations

As discussed above, groundwater beneath the LAAs has not been degraded by the discharge, and groundwater beneath the wastewater treatment storage reservoir has been degraded but the degradation has not cause exceedance of a water quality objective. Additionally, the Discharger has implemented certain best practicable treatment and control measures and plans additional measures in the near future. Therefore, the groundwater limitations of this Order specify that the discharge shall not cause a statistically significant increase in the concentration of the following constituents in groundwater:

- Total dissolved solids;
- Ammonia nitrogen
- Nitrate nitrogen
- Iron;
- Manganese;
- Sodium;
- Chloride;
- Sulfate;
- Total alkalinity; and

- Total hardness.

Additionally, the groundwater limitations implement the numeric water quality objectives for pH and the narrative water quality objectives for chemical constituents, tastes, odors, and toxicity, and do not allow impacts to beneficial uses of groundwater.

Other Requirements

The Provisions require that the Discharger submit the following technical reports:

- A *Groundwater Limitations Compliance Assessment Plan* that specifies the proposed means and methods for the required annual groundwater quality evaluation.
- A ***Workplan for Supplemental Evaluation of Nitrogen in Groundwater***.
- A *Financial Assurance Report* that documents the financial assurance instrument(s) that the Discharger has created to ensure that funds are available to complete site closure by 30 December 2020.
- A *Financial Assurance Account Annual Update Report* that demonstrates that the Discharger has increased the total amount of financial assurance each year as required.
- A *Sludge Management Plan* that describes periodic evaluation of the impact of sludge accumulation on reservoir storage capacity and a *Sludge Cleanout and Disposal Plan* due prior to any sludge disposal work.
- A *Conceptual Site Closure Plan* that addresses the issues identified the WDRs and provides a more detailed analysis of the Root Zone Salt Displacement and Excavation and Offsite Disposal alternatives.
- A *Supplemental Evaluation of Nitrogen in Groundwater and BPTC Measures Report* that includes a feasibility analysis of alternative treatment and control methods to ensure compliance with the Basin Plan; selection of the preferred treatment/control measures; and a schedule for full implementation of those measures.
- Certification of completion of the 60,000-gpd RENEWS or an *Infeasibility Report* demonstrating that it is not technically or administratively feasible to do so.
- A *Nitrogen BPTC Implementation Report* that documents completion of all treatment, operational and structural controls required pursuant to the approved *Supplemental Evaluation of Nitrogen in Groundwater and BPTC Measures Report*.
- A *Land Management Plan*, which is only required if the Discharger proposes to graze livestock on the LAAs.
- If there is any exceedance of the Groundwater Limitations, a plan and schedule to come into compliance with the Groundwater Limitations, or a detailed evaluation that demonstrates that the Groundwater Limitations should be revised.