

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2008-0046

WASTE DISCHARGE REQUIREMENTS

FOR

LAND O' LAKES, INC.
ORLAND CHEESE PROCESSING PLANT
GLENN COUNTY

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

1. Land O' Lakes, Inc. (hereafter Discharger) submitted a Report of Waste Discharge (RWD) dated 18 January 2008 and requested a revision to their waste discharge requirements for the Orland Cheese Processing Plant (hereafter Facility). The revised WDRs reflect changes to the process, specifically the installation of a whey ultra filter permeate evaporator to decrease the BOD and waste salt load.
2. Waste Discharge Requirements Order No. 96-023 adopted by the Board on 26 January 1996 is neither adequate nor consistent with current plans and policies of the Regional Water Board.
3. The Facility was formerly owned by the Oxford Cheese and Dairy Company, who sold the facility to Land O' Lakes, Inc. in January 1995. Land O' Lakes, Inc., incorporated in 1921, is a cooperative organization of producers (Co-op) and has about 40 producer members, most of whom are within 50 miles of the plant. The member dairies deliver milk to the facility by refrigerated tankers. The producer members collectively milk about 17,000 cows. The facility processes approximately 130,000 gallons of milk per day. Raw milk is received from the tankers 20 hours a day. The off-loading area is closed to deliveries for approximately four hours each day for clean-up. The plant operates 24 hours per day, seven days per week, 365 days per year and produces approximately 125,000 lbs of white cheddar cheese per day.
4. The Land O' Lakes Facility is on County Road C, between County Roads 25 and 28, approximately six miles southwest of Orland in Sections 11, 13 and 14, T21N, R4W, MDB&M, (Latitude 39° 40' 37.95" N, Longitude -122° 16' 18.05" W) as shown in Attachment A, which is attached hereto and made part of the Order by reference. The Facility, including the plant area and the application area, comprises Assessor's Parcel Numbers 24-200-11 (160 acres), 24-210-24 (300 acres), 24-210-25 (20 acres), 24-210-26 (20 acres) and 24-210-27 (140 acres).

Existing Facility and Discharge

5. The Discharger produces approximately 125,000 lbs of cheddar cheese per day from 1.102 million pounds (127,842 gallons) of milk. A simplified narrative description of the process is as follows: Raw milk (13% solids) is delivered to the plant in refrigerated tanker trucks daily and stored in refrigerated tanks prior to coagulation by enzymes in agitated vats. The resulting slurry is pumped to drain tables where salt is added to enhance separation of the liquid whey from the cheese curd. The cheese (white cheddar) is compressed into 500 lb boxes and removed to refrigerated storage prior to sale. Whey is pasteurized and passed through a reverse osmosis (RO) membrane. The RO permeate is used as process water and clean-up water within the plant and is eventually discharged to the floor drains where it flows, along with other waste streams to the first of two retention ponds. RO concentrate is passed through the ultra filtration membrane unit. The ultra filter concentrate, or whey protein concentrate (WPC) is sold as a product. The ultra filter permeate is pumped to the evaporator where water is removed. The resulting evaporator concentrate or lactose concentrate is sold as a product. A schematic of the process with approximate flow rates is shown in Attachment B of this Order, which is attached hereto and made part of this Order by reference.
6. All industrial wastewater including plant waste, cooling tower blowdown and boiler blowdown is discharged to a single line, which in turn discharges to the lower pond. Flow in the line is measured immediately before the point of discharge by sensing the level in a Palmer Bowlus flume. The meter is calibrated annually.
7. The volume of industrial wastewater flow as measured in the Palmer Bowlus Flume in the discharge line to the lower pond ranges from approximately 0.125 to 0.200 million gallons per day (mgd). A typical analysis is as follows: BOD – 6,930 mg/L, COD – 9,120 mg/L, Total N - 268 mg/L, TDS – 3,820 mg/L, Na - 294 mg/L, Cl - 228 mg/L, NO₃ - 268 mg/L, SO₄ - 22.6 mg/L, Ca - 127 mg/L, Mg - 20 mg/L and K – 144 mg/L.
8. There are two wastewater retention ponds at the Facility. Initial discharge is to the lower pond, which was constructed in 1983 when the original cheese plant and dairy were built. The lower pond is approximately 200 yards to the north of the plant site. The lower pond has a compacted clay liner and a volume of about 6.4 million gallons, not including the contribution of the required two feet of freeboard. Enlargement of the lower pond from 3.3 million gallons to 6.4 million gallons was begun in the summer of 2005. The enlargement and clay lining was completed and the pond brought on-line in the winter of 2005/06. Prior to the enlargement of the lower pond, the Facility had a history of wet weather discharges due to lack of holding capacity. No discharges have occurred since the enlargement of the lower pond. Wastewater is pumped from the lower pond to the upper pond where it is used, in combination with pressurized water from the Orland-Artois Irrigation District, for center pivot irrigation of the five spray fields. The upper pond, constructed in 1998, is double lined with a 40-mil HDPE secondary liner and a 60-mil HDPE primary liner. Between the two liners is a HDPE geonet drainage layer. The upper pond volume is

approximately 6.6 million gallons not including the contribution of the required two feet of freeboard.

9. At the time the upper pond was enlarged in 2005, the irrigation/transfer pump was relocated from the pond berm to a concrete sump adjacent to the lower pond. The pump, a five stage centrifugal, can be used to transfer wastewater from the plant to the upper pond or to any of the five center pivot irrigation rigs.
10. The plant and application area are on a gently rolling fan surface underlain by alluvium of the Red Bluff Formation. Near surface soils consist primarily of very stiff to hard moderately to highly plastic clay, sandy clay and gravelly clay to depths of about 3-21 feet below grade. In addition, bands of sand and silty sand run through the formation.
11. Domestic wastewater is discharged to one of two septic tank leachfield systems, one serving the office and one the plant.
12. Domestic water supply is from a 12" well located immediately to the west of the plant and drilled to a depth of 630 feet bgs (below ground surface). As would be expected, the concentration of salts in the water from this well is considerably less than in the monitoring wells. An analysis of water from the supply well is presented in the Information Sheet.
13. Drainage from the plant site and spray field is to Walker Creek, thence to Willows Creek, thence to the Colusa Basin Drain, which is tributary to the Sacramento River.

Source Reduction of Salts and Organic Waste

14. Early in 2005 the Discharger installed an evaporator for removing water from the ultra filter permeate to produce lactose concentrate. This material could be sold rather than discharged to the ponds as waste, as was done previously. The evaporator has been operating since March of 2005 and all of the evaporator (lactose) concentrate is now being sold to V and V Enterprises who use it as a spray-on additive to cattle feed. By installing the evaporator, the Discharger reduced the salts and organic waste being discharged by approximately 50% and 75% respectively. A more thorough discussion of the waste reduction achieved by the evaporator installation appears in the Information Sheet.

Groundwater Quality and Conditions

15. Groundwater beneath the plant site and spray field area is encountered at approximately 100 feet bgs (below ground surface) and flows in roughly the same direction as the fall of the surface contour, i.e. from northwest to southeast. In 1994 MW-1 was installed immediately adjacent to the east side of the lower pond. In 1996 at the request of the Central Valley Regional Water Quality Control Board, the Discharger installed two additional monitoring wells, one upgradient (MW-3) and one downgradient (MW-2) of the lower pond. MW-1 is due east and approximately 6 feet from the edge of the lower pond, MW-2 is due south and approximately 40 feet from the edge of the lower pond, while MW-3

is approximately 250 feet to the northwest. These wells were installed to monitor the effect of the lower pond on groundwater. A review of the results from quarterly sampling of these three wells indicates that there has been an increasing trend in the concentration of sodium, chloride and TDS (but not nitrates) in MW-1. There is a suggestion of the same trend in MW-3, the upgradient well, but not in MW-2, the second downgradient well. The location of the wells and the lower pond is shown in Attachment A.

16. It is unclear why MW-1 was installed immediately adjacent to the lower pond, as the lower pond has only a single compacted clay liner, and could be expected to have some permeability. (MW-1 was installed in November 1994 by the Oxford Cheese and Dairy Company, three months before being purchased by Land O' Lakes Inc.). Under these conditions it would be assumed that a well as close as MW-1 would exhibit some elevation in the concentration of soluble pond constituents. Monitoring well MW-1, therefore, will provide no useful information and in addition could act as a conduit for contamination of groundwater. For these reasons, Provision E.1.a. of these requirements requires the abandonment and destruction of MW-1 as described in the California Well Standards. An additional monitoring well further downgradient of the lower pond is also required.
17. In August 2003, three additional monitoring wells were installed, MW-4 at the assumed upgradient property boundary, and MW-5 and 6 towards the southerly downgradient property line. These well locations are shown in Attachment A. The purpose of the new monitoring well installation was to determine if any downgradient effects were detectable at the property boundary. The assumed upgradient well, MW-4, which is approximately one mile and within a few degrees of true northwest from MW-3, has been dry since installation and has produced no results. Based on elevations recorded for MW-1, MW-2 and MW-3, the direction of groundwater flow in the vicinity of the lower pond has been consistently calculated to be to the southeast.

As MW-4 is dry, the level of groundwater at the location of MW-4 can be no higher than 177.6' (calculation based on well head elevation and depth of MW-4). The average levels of water in MW-1, MW-2 and MW-3 are 180.3', 181.7' and 198.1' respectively. Therefore, it must be concluded that MW-4 is in fact downgradient of the lower pond area unless there is a confined aquifer beneath it. Monitoring wells MW-5 and MW-6 are due south and approximately 1,750' and 3,750' respectively from the lower pond. The average levels of water in MW-5 and MW-6 are 176.5' and 156.2' respectively, which indicates that that these wells are downgradient of the lower pond area as would be expected. The fact that MW-4, MW-5 and MW-6 are all downgradient of the pond area suggests that groundwater in the vicinity of the monitoring wells may be mounded as a result of the application of irrigation water and wastewater by the Discharger.

18. A review of the Discharger's quarterly monitoring for the most downgradient well, MW-6, over the last four years has revealed no definite trend in the concentration of TDS, individual ions, or nitrate. The concentration of individual ions and TDS are considerably less in this well than in MW-1 and MW-2. MW-5 contained insufficient water for purging for

approximately 75% of the sampling events. A more thorough discussion of monitoring well results and groundwater quality is presented in the Information Sheet.

19. The Discharger is required in Provision 1.b. of these waste discharge requirements to submit a *Groundwater Quality Assessment Report*, which provides a summary and analysis of all monitoring well results for eight quarters subsequent to the installation of the new downgradient monitoring well MW-7. Regional Board Staff will review the report at the time of submittal, and make a determination as to the need for a double liner with leachate collection (Class II Surface Impoundment) in the lower pond and possible further reduction in salt load to the spray field.
20. The facility is in the center of Section 11 and most of the wells in this section and adjoining sections are agricultural wells with depths of between 500 and 600 feet. The nearest domestic well to the facility for which information is available is located at the intersection of County Roads 28 and D, which is approximately 1.5 miles southeast of the facility in Section 13. This well is drilled to a depth of 200' and is screened from 60' to 120' and from 140' to 180'.

Spray Field

21. The spray field consists of five individual application sites as shown in Attachment A. Total area of the five spray fields is approximately 380 acres. Pressurized water from the Orland-Artois Irrigation District is introduced into the facility's center pivot irrigation system and applied to the five individual spray fields as required. Annual irrigation water usage for the 2007 water year was 516.25 acre feet or 461,000 gallons per day. Wastewater is usually applied separately from the irrigation water by pumping wastewater from either the upper or lower pond through the same center pivot system, however, it can also be mixed in line with irrigation water if required. The irrigation pump is in a sump adjacent to the lower pond. Crops grown in the spray field area include alfalfa, forage maize, oats, rye grass and winter grains.
22. Based on a typical BOD₅ concentration of the wastewater of 6,930 mg/L the average BOD₅ loading rate to the spray field is 24.34 pounds/acre/day, which is considerably less than the USEPA recommended maximum rate of 100/lbs/acre/day (USEPA publication No. 625/3-77-0007, *Pollution Abatement in the Fruit and Vegetable Industry*).
23. The average loading rate in pounds per acre per year for individual ions over the entire spray field based on a typical analysis of flume contents is as follows: N – 343, Na – 377, Cl – 292, K – 184, Ca – 163, Mg – 25.6 and SO₄ – 28.9. This does not include the contribution from irrigation water.
24. The top six inches of soil in Fields 3, 4, 5, and 6 were sampled by Regional Water Board staff in March 2003. Results indicated that pH was within the optimum range, nitrogen was low, P, K, Mn, and Fe were excessive, and sodium adsorption ratio was medium to excessive. Results are tabulated in the Information Sheet. The Discharger has recently

applied lime to the spray field to improve soil permeability and general fertility. Crop yields have increased as a result.

Basin Plan, Beneficial Uses and Regulatory Considerations

25. 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. Pursuant to Section 13263(a) of the California Water Code (CWC), waste discharge requirements must implement the Basin Plan. Drainage from the plant site and spray field is to Walker Creek, thence to Willows Creek, thence to the Colusa Basin Drain, which is tributary to the Sacramento River.
26. The designated beneficial uses of the Colusa Basin Drain are agricultural supply; water contact recreation; warm and cold (potential) freshwater habitat; migration of warm water aquatic organisms; spawning, reproduction and/or early development of warm water aquatic organisms; and wildlife habitat.
27. The Facility is in the Colusa Basin Hydrologic Unit, Orland Hydrologic Sub Area (520.22) of the Sacramento Valley Groundwater Basin as depicted on interagency hydrologic maps prepared by DWR.
28. The designated beneficial uses of underlying groundwater are municipal and domestic supply, agricultural supply, industrial service supply, and industrial process supply.
29. The Basin Plan establishes numerical and narrative water quality objectives for surface water and groundwater that waste discharge requirements must implement. To implement narrative water quality objectives, relevant water quality criteria and guidelines are to be considered on a case-by-case basis to determine the appropriate numerical limitations.
30. The chemical constituent objective in the Basin Plan requires, at a minimum, compliance with California maximum contaminant levels (MCLs) for waters designated as municipal supply. More stringent criteria than MCLs are sometimes necessary to ensure that waters do not contain chemical constituents in concentrations that adversely affect beneficial uses.
31. The Basin Plan contains narrative water quality objectives for chemical constituents, tastes and odors, and toxicity. The toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants or animals associated with beneficial uses. The chemical constituent objective requires that groundwater shall not contain chemical constituents in concentrations that adversely affect beneficial uses. The tastes and odors objective requires that groundwater shall not contain taste or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

Groundwater Degradation/Anti Degradation Analysis

32. 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 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.
33. Existing groundwater data is insufficient to determine the effect of the Discharger's installation of ultra filter permeate evaporators, which has greatly reduced the quantity and concentration of salts and BOD discharged to the lower pond and subsequently the spray field.
34. The Discharger is required in Provision 1.b. of these waste discharge requirements to submit a *Groundwater Quality Assessment Report*, which provides a summary and analysis of all monitoring well results for eight quarters subsequent to the installation of the new downgradient monitoring well MW-7. This information will be reviewed by Regional Water Board staff and a decision made as to the need for double lining of the lower pond (Class II Surface Impoundment) and possible further reduction in salt load to the spray field.
35. Constituents of concern that are discharged to the lower pond and eventually applied to the spray field area and have the potential to degrade groundwater include TDS, individual cations and anions, nutrients and organic materials (BOD/COD). As noted in Finding No. 15 above, there has been a trend toward higher Na, Cl, and TDS in MW-1 adjacent to the east side of the lower pond which has a single compacted clay liner. The same trend is not seen in MW-2, which is 40 feet to the south (primarily downgradient) of the lower pond. Constituents of concern noted above should not adversely affect groundwater quality due to the following:
 - a. The total nitrogen loading rate to the spray field area is approximately 343 lbs/acre/year, which is in line with the nitrogen uptake rates of the crops being grown. It should be noted that approximately 25% of the nitrogen is lost during spray irrigation.

- b. The BOD loading rate to the sprayfield is approximately 25 pounds/acre/day, which is considerably less than the USEPA recommended maximum rate of 100/lbs/acre/day.
- c. The Na and Cl loading rates for the sprayfield are approximately 377 and 292 lbs/acre/year respectively. Neither Na nor Cl ions are plant nutrients and in sufficient concentrations can cause adverse soil and plant reactions. Crops being grown by the Discharger are not considered sensitive species, however, to ensure that the build-up of Na and Cl does not exceed acceptable limits or inhibit crop growth, the Discharger has been required to perform appropriate soil analysis annually for each of the five individual spray field areas. In order to minimize the effects of Na on soil permeability, the Discharger has instituted a lime application program.
- d. The loading rates for the plant nutrients K, Ca, Mg, and SO₄ as calculated from a typical analysis of flume contents and a flume flow of 160,000 gallons per day are approximately 184, 163, 25.6 and 28.9 lbs/acre/year, respectively. These rates are within acceptable limits for the crops being grown by the Discharger.
- e. The electrical conductivity of the wastewater being applied to the spray field is approximately 3,000 µmhos/cm, which is in excess of the 700 µmhos/cm limit for a Class I Irrigation Water as defined by the U.S. Department of Agriculture. A portion of the EC in the discharge can be attributed to organic compounds that will break down in the soil profile, and will not continue to exert an osmotic pressure gradient retarding plant uptake of water. A measured volume of a 24-hour composite sample of the flume discharge was analyzed for EC, evaporated to dryness, ignited in a muffle furnace at 550 degrees C for one hour and reconstituted to the original volume with DI water. After the residue had completely dissolved, the EC was re-measured and found to be 1,600 µmhos/cm. This is a measure of the EC attributable to inorganic constituents. Wastewater applied to the sprayfield is diluted approximately 3:1 with Orland-Artois Irrigation District water, which has an EC of approximately 164 µmhos/cm. The weighted average EC of the applied water is, therefore, approximately 523 µmhos/cm, which is within the limit for a Class I irrigation water (700 umhos/cm). Additionally it should be noted that the crops being grown by the Discharger are relatively salt tolerant and would not be greatly affected by higher EC levels.

Treatment and Control Practices

- 36. The Discharger provides treatment and control of the discharge that incorporate:
 - a. The use of reverse osmosis to concentrate salts in the product streams and thereby yield a permeate that can be used at the facility as a substitute for well water.

- b. Re-cycling of certain waste streams including salt whey skim to maximize product yield and minimize waste discharge.
 - c. The installation of an evaporator to reduce the volume of ultra filter permeate, thereby creating a useable product and greatly reducing the salt and organic loading to the ponds and spray field.
 - d. Application of wastewater at plant uptake rates for the plant nutrients K, Ca, Mg, S and N.
 - e. Application of wastewater at rates well below the maximum application rate for organic loading.
 - f. Operation of a tail water recovery system in the spray field to collect and recirculate water to improve irrigation efficiency and prevent standing water.
37. This Order establishes groundwater limitations 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. This Order includes a monitoring and reporting program that contains groundwater monitoring to assure that the highest water quality consistent with the maximum benefit to the people of the State will be achieved.

General Findings

38. Pursuant to CWC 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.
39. Section 13267(b) of the CWC states, in part, that *"In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging or who proposes to discharge within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste outside of its region that could affect the quality of waters of the state 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 reports 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"*
40. The technical reports required by this Order and the attached Monitoring and Reporting Program No. R5-2008- are necessary to assure compliance with these waste discharge requirements. The Discharger owns and operates facilities that discharge wastes subject to this Order.

41. The California Department of Water Resources set standards for the construction and destruction of groundwater wells, as described in *California Well Standards Bulletin 74-90* (June 1991) and *Water Well Standards: State of California Bulletin 94-81* (December 1981). These standards, and any more stringent standards adopted by the State or county pursuant to CWC Section 13801, apply to all monitoring wells.
42. The State Water Resources Control Board adopted Order No. 97-03-DWQ (General Permit No. CAS000001), specifying waste discharge requirements for discharges of storm water associated with certain industrial activities. Cheese production is covered under the Standard Industrial Classification (SIC) of 2022- Natural, Processed, and Imitation Cheese, and would be required to obtain coverage under the General Permit if any storm water from the Facility discharged to surface waters. However, the Discharger does not discharge storm water to surface waters, and therefore is not required to obtain coverage under the General Permit.
43. The action to adopt waste discharge requirements for this existing facility is exempt from the provisions of the California Environmental Quality Act (CEQA; Public Resources Code Section 21000 et. seq.) in accordance with Title 14, CCR, Section 15301.
44. Pursuant to CWC 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.

Public Notice

45. The Discharger and interested agencies and persons have been notified of the intent to prescribe waste discharge requirements for this discharge, and they have been provided an opportunity for a public hearing and an opportunity to submit their written views and recommendations.
46. All comments pertaining to the discharge were heard and considered in a public meeting.

IT IS HEREBY ORDERED that Order No. 96-023 is rescinded and Land O' Lakes, Inc., their agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, shall comply with the following:

A. Prohibitions

1. Discharge of wastes to surface waters or surface water drainage courses is prohibited.
2. Bypass or overflow of untreated wastes, except as allowed by Provision E.2 of Standard Provisions and Reporting Requirements, is prohibited.
3. Discharge of waste classified as 'hazardous', as defined in Section 2521(a) of Title 23, California Code of Regulations, Section 2510 et seq., is prohibited. Discharge of waste classified as 'designated', as defined in California Water Code Section 13173, in a manner that causes violation of groundwater limitations, is prohibited.

4. Application of treated wastewater in a manner or location other than that described herein is prohibited.

B. Discharge Specifications

1. The monthly average dry weather discharge of all process wastewaters to the wastewater pond system shall not exceed 220,000 gpd.
2. The maximum daily discharge of process wastewater shall not exceed 270,000 gpd.
3. Neither the treatment nor the discharge shall cause a condition of nuisance or pollution as defined by the CWC, Section 13050.
4. 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 the Groundwater Limitations.
5. The Discharger shall manage the discharge of wastewater so as to minimize the quantity of wastewater held in the lower pond. The purpose of this specification is to minimize percolation from the lower pond.
6. Objectionable odors originating at this Facility shall not be perceivable beyond the limits of the Discharger's property.
7. The wastewater treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.
8. The wastewater treatment facilities shall have sufficient capacity to accommodate allowable wastewater flow, inflow, and design seasonal precipitation. 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.
9. Freeboard shall not be less than two feet (measured vertically to the lowest point of overflow), except if lesser freeboard does not threaten the integrity of the pond, no overflow of the pond occurs, and lesser freeboard is due to direct precipitation or storm water runoff occurring as a result of annual precipitation with greater than a 100-year recurrence interval, or a storm event with an intensity greater than a 25-year, 24-hour storm event.
10. Ponds shall be managed to prevent breeding of mosquitoes. In particular,
 - a. erosion control measures shall be implemented to minimize small coves and irregularities around the perimeter of the water surface;

- b. weeds within and around the perimeter of the pond shall be minimized; and
- c. dead algae, vegetation, and debris shall not accumulate on the water surface.

11. The discharge of domestic waste to subsurface leaching systems shall remain underground at all times.

C. Solids Disposal Specifications

1. If not sold or beneficially reused, collected solids removed from liquid wastes shall be disposed of in a manner approved by the Executive Officer and consistent with *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste*, as set forth in CCR, Title 27, Division 2, Subdivision 1, Section 20005, et seq.
2. Sludge and other solids shall be removed from wastewater ponds, sumps, screens, etc. as needed to ensure adequate operation and adequate hydraulic capacity.
3. Any solids removed from the upper or lower pond and applied to soil within the plant or spray field area shall be analyzed for salts and organic material and applied at appropriate agronomic rates.
4. Any proposed change in solids use or disposal practice shall be reported to the Executive Officer at least **90 days** in advance of the change.

D. Spray field Specifications

1. The perimeter of the Spray Field Area shall be graded to prevent ponding along public roads or other public areas and prevent runoff onto adjacent properties not owned or controlled by the Discharger.
2. No physical connection shall exist between cheese processing wastewater and any domestic water supply or domestic well, or between wastewater piping and any irrigation well that does not have an air gap or reduce pressure principle device.
3. The Spray Field Area shall be managed to prevent breeding of mosquitoes. More specifically:
 - a. All applied irrigation water must infiltrate completely within a 48-hour period;
 - b. Ditches not serving as wildlife habitat should be maintained free of emergent, marginal, and floating vegetation; and
 - c. Low-pressure and unpressurized pipelines and ditches accessible to mosquitoes shall not be used to store recycled water.
4. The discharge shall remain within the spray field area at all times.

F. Groundwater Limitations:

1. Release of waste constituents from any treatment or storage component associated with the Facility shall not cause or contribute to groundwater:
 - a. Containing concentrations of constituents identified in Title 22 in excess of the MCLs quantified therein, or natural background quality, whichever is greater.
 - b. Containing taste or odor-producing constituents, toxic substances, or any other constituents in concentrations that cause nuisance or adversely affect beneficial uses.
 - c. Contain concentrations of chemical constituents in amounts that adversely affect agricultural use.

E. Provisions

1. All technical reports 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, persons 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 must bear the signatures(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.
 - a. The Discharger shall destroy monitoring well MW-1 as described in California Well Standards, Bulletin 74-90, Part III, Section 19. *Requirements for Destroying Monitoring Wells and Exploration Holes.*
 - b. The Discharger shall submit a report to this office **within 90 days of Order adoption** prepared by a registered geologist or engineering geologist which determines the direction of groundwater flow in the vicinity of the lower pond, taking into account possible mounding effects from the lower pond itself, and makes a recommendation for design and placement of an additional monitoring well downgradient of, and approximately 100 to 200 feet from the lower pond. The new well (MW-7) shall be installed **within 6 months of Order adoption. Within 30 months of monitoring well installation**, the Discharger shall submit a *Groundwater Quality Assessment Report* which provides a summary and analysis of all monitoring well results since the installation of MW-7. The report should cover at least eight quarters of results and should include a discussion of the lithology of the site and the validity of making well to well comparisons. A discussion of groundwater flow throughout the area covered by the monitoring wells should be included.
2. Upon completion of tasks set forth in Provision E.1, the Regional Water Board will

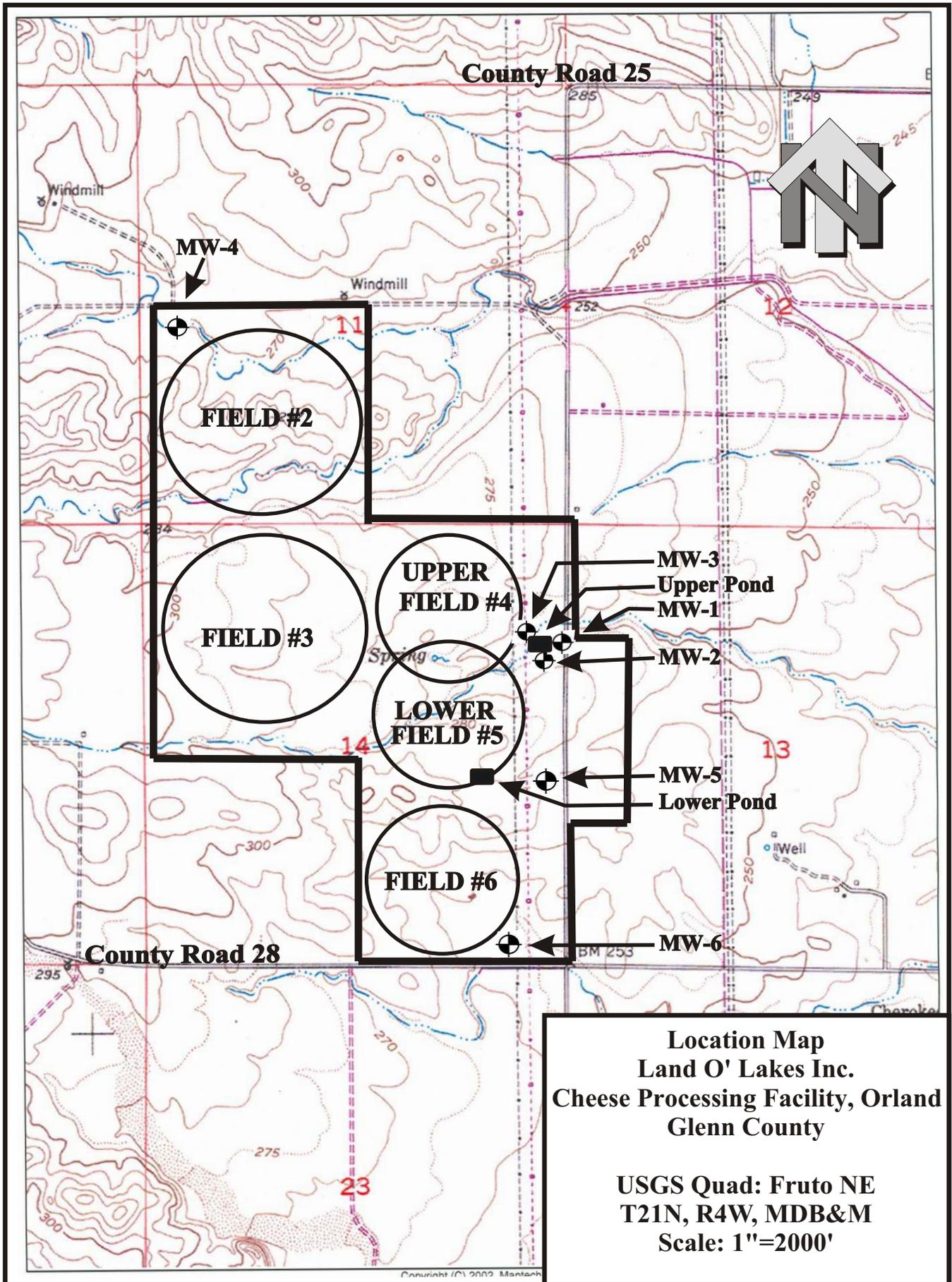
consider the evidence provided and make a determination as to whether the Discharger shall be required to double line the lower pond to meet Title 27 requirements for a Class II Surface Impoundment.

3. The Discharger shall submit a report to this office **within 1 year of Order adoption** which analyzes the remaining sources of TDS and BOD/COD discharged to the flume line and makes recommendations for further reductions. In particular the report should address possible isolation and disposal/treatment of streams with high concentrations of these constituents such as vessel rinse and salt whey skim.
4. The Discharger shall comply with Monitoring and Reporting Program No. R5-2008-0046, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.
5. The Discharger shall comply with the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" (Standard Provisions), dated 1 March 1991, which are attached hereto and a part of this Order by reference.
6. In the event of any change in control or ownership of the Facility described herein, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office. 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 name and address and telephone number of the persons responsible for contact with the Regional 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 CWC. Transfer shall be approved or disapproved by the Executive Officer.
7. The Discharger shall immediately notify the Regional Board by telephone whenever a violation of these WDRs or an adverse condition that may impair water quality occurs; written confirmation shall follow within two (2) weeks.
8. The Discharger shall report to the Regional Board any toxic chemical release data it reports to the State Emergency Response Commission within 15 days of reporting the data to the Commission pursuant to section 313 of the "Emergency Planning and Community Right to Know Act of 1986."
9. The Discharger shall submit to the Regional Board on or before each compliance report due date the specified document, or if appropriate, a written report detailing compliance or noncompliance with the specific schedule date and task. If noncompliance is reported, then the Discharger shall state the reasons for noncompliance and shall provide a schedule to come into compliance.

10. The Discharger shall report promptly to the Regional Board any material change or proposed change in the character, location, or volume of the discharge.
11. The Discharger must comply with all conditions of this Order, including timely submittal of technical and monitoring reports as directed by the Executive Officer. Violations may result in enforcement action, including Regional Board or court orders requiring corrective action or imposing civil monetary liability, or in revision or rescission of this Order.
12. A copy of this Order shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.
13. The Regional Board will review this Order periodically and will revise requirements when necessary.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 14 March 2008.

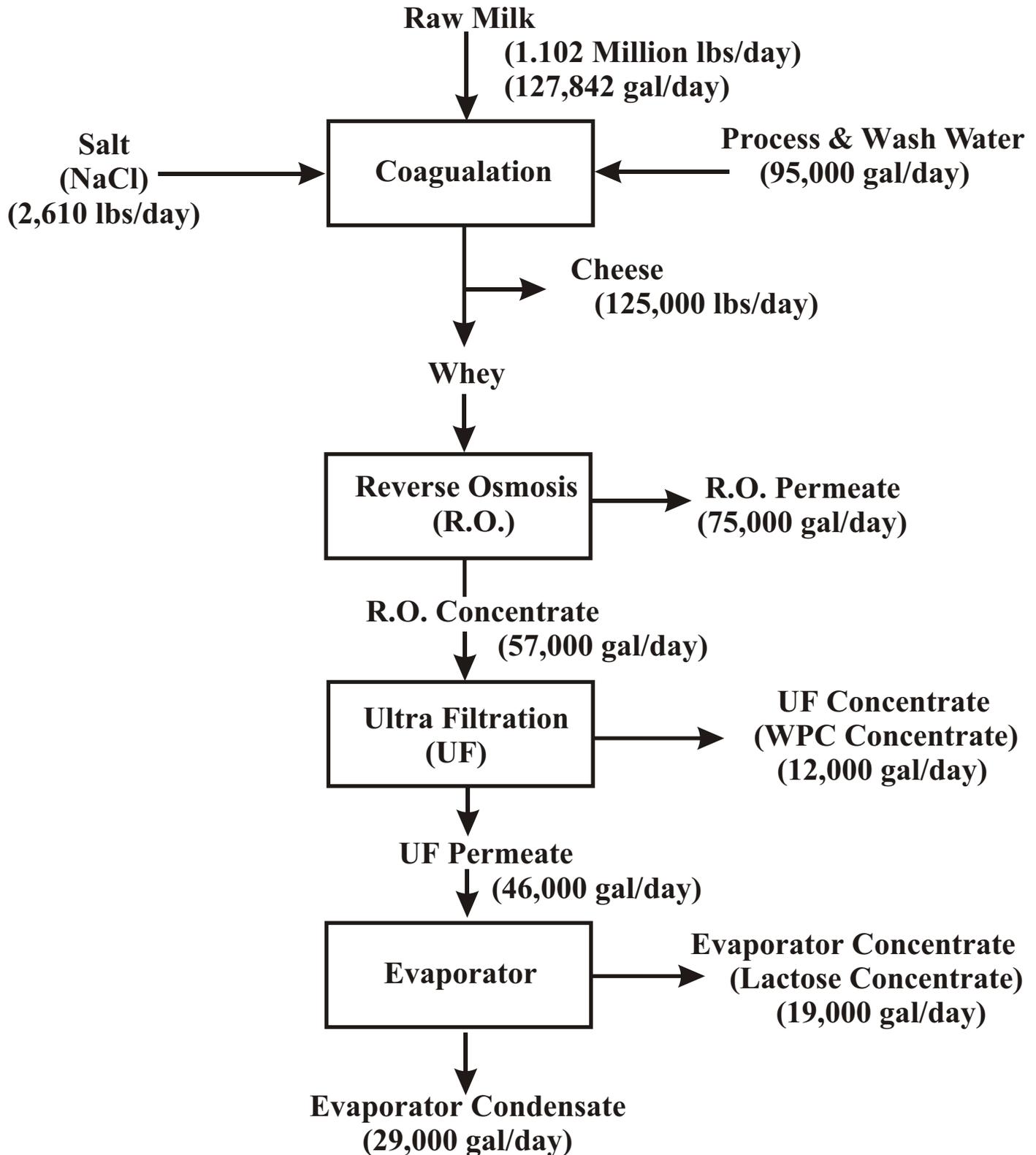
PAMELA C. CREEDON, Executive Officer



Location Map
Land O' Lakes Inc.
Cheese Processing Facility, Orland
Glenn County

USGS Quad: Fruto NE
T21N, R4W, MDB&M
Scale: 1"=2000'

Flow Diagram Cheese Production Land O' Lakes Inc., Orland



Note: Volumes and weights were supplied by Discharger and are approximate as regards internal streams.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2008-0046
FOR
LAND O' LAKES, INC.
ORLAND CHEESE PROCESSING PLANT
GLENN COUNTY

The Discharger shall comply with this Monitoring and Reporting Program (MRP), issued pursuant to California Water Code Section 13267, which describes requirements for monitoring industrial flows, wastewater ponds, groundwater, and solids. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer.

All samples should be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form. Field test instruments (such as those used to test pH and dissolved oxygen) may be used, provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are field calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated per the manufacturer's recommended frequency; and
4. A statement is provided annually, certifying when the flow meters and other monitoring instruments and devices were last calibrated (Standard Provision C.3).

If monitoring consistently shows no significant variation in magnitude of a constituent concentration after at least 12 months of monitoring, the Discharger may request the MRP be revised to reduce monitoring frequency. The proposal must include adequate technical justification for reduction in monitoring frequency.

DISCHARGE MONITORING

24-hour composite samples of the discharge shall be collected at a point immediately adjacent to the Palmer Bowlus Flume in the discharge line to the lower pond. The Discharger shall monitor the discharge for the constituents and frequencies specified below:

<u>Constituent/Parameter</u>	<u>Units</u>	<u>Type</u>	<u>Frequency</u>
Daily Flow	gal/day	Continuous	Daily
Electrical Conductivity	µmhos/cm	24 hr – Composite	Monthly
Sodium	mg/L	24 hr – Composite	Monthly
Potassium	mg/L	24 hr – Composite	Monthly
Calcium	mg/L	24 hr – Composite	Monthly

<u>Constituent/Parameter</u>	<u>Units</u>	<u>Type</u>	<u>Frequency</u>
Magnesium	mg/L	24 hr – Composite	Monthly
Chloride	mg/L	24 hr – Composite	Monthly
Sulfate	mg/L	24 hr – Composite	Monthly
Total Nitrogen	mg/L	24 hr – Composite	Monthly
COD	mg/L	24 hr – Composite	Monthly
Total Dissolved Solids (combined) ¹	mg/L	24 hr – Composite	Monthly
Dissolved Solids (inorganic) ¹	mg/L	24 hr – Composite	Monthly
BOD ₅	mg/L	24 hr – Composite	Monthly
pH	pH units	24 hr – Composite	Monthly

¹ Total (combined)TDS shall be determined using EPA Test Method No. 160.1 for combined organic and inorganic TDS. Inorganic TDS shall be determined by EPA Method No.160.4 for inorganic TDS.

GROUNDWATER MONITORING

Prior to collecting samples and after measuring the water level, each monitoring well shall be adequately purged to remove water that has been standing within the well screen and casing that may not be chemically representative of formation water. Depending on the hydraulic conductivity of the geologic setting, the volume removed during purging is typically from 3 to 5 volumes of the standing water within the well casing and screen, or additionally the filter pack pore volume.

Prior to the installation of MW-7, and after the completion of 8 quarters of sampling as required in Provision E.1.b., the Discharger shall monitor groundwater for the constituents and frequencies specified below. During the 8 quarters required of the report in Provision E.1.b., the Discharger shall analyze all constituents quarterly.

<u>Constituent/Parameter</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Frequency</u>
Depth to groundwater	Feet ¹	Measured	Quarterly ²
Groundwater elevation	Feet above mean sea level	Calculated	Quarterly ²
pH	pH units	Grab	Quarterly ²
Electrical Conductivity	µmhos/cm	Grab	Quarterly ²

<u>Constituent/Parameter</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Frequency</u>
Total Dissolved Solids ³	mg/L	Grab	Quarterly ²
Total Organic Carbon	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
COD	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Ammonia (as NH ₃ -N)	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Nitrate (as NO ₃ -N)	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Total Nitrogen	mg/L	Calculated	Semiannually ⁶ (Quarterly ⁷)
Ca ⁴	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Mg ⁴	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Na ⁴	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
K ⁴	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Chloride ⁴	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Sulfate ⁴	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Bicarbonate ⁴	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Cu ⁴	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Zn ⁴	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Iron ^{4,5}	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)
Manganese ^{4,5}	mg/L	Grab	Semiannually ⁶ (Quarterly ⁷)

¹ To the nearest hundredth of a foot.

² January, April, July and October.

³ If Total Organic Carbon in any sample is greater than 10 mg/L that sample should also be analyzed for Inorganic Dissolved Solids using EPA Method No. 160.4

⁴ The Discharger may, in the interest of cost savings, be able to combine some or all of these analytes into a

<u>Constituent/Parameter</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Frequency</u>
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single laboratory category such as standard minerals or general minerals.

⁵ Samples must be filtered prior to preservation.

⁶ To be taken in January and October and reported in February and November.

⁷ During the eight quarter period in which data is being collected for the report referenced in Provision E.1.b.

SOIL MONITORING

The Discharger shall take composite soil samples from the top six inches of soil from each of the six fields and monitor for the following:

<u>Constituent/Parameter</u>	<u>Units</u>	<u>Measurement</u>	<u>Frequency</u>
Sodium Absorption Ratio	Dimensionless	Grab	Annually ¹
Soluble Salts	umhos/cm	Grab	Annually ¹

¹ To be taken In May and reported in June.

SOURCE AND IRRIGATION WATER MONITORING

The Discharger's facility supply water and irrigation water from the Orland-Artois Irrigation District line shall be monitored for the following:

<u>Constituent/Parameter</u>	<u>Units</u>	<u>Measurement</u>	<u>Frequency</u>
Electrical Conductivity	µmhos/cm	Grab	Annually ¹
Total Dissolved Solids	mg/L	Grab	Annually ¹
General Minerals ²	mg/L	Grab	Annually ¹
Nitrate (as NO ₃ -N)	mg/L	Grab	Annually ¹

¹ To be taken In July and reported in August.

² Must include at a minimum the following : Na, K, Mg, Ca, NO₃, SO₄, bicarbonate, Cu, Zn, Fe, and Mn.

SPRAYFIELD AREA MONITORING

The Discharger shall monitor the spray field daily for the following during periods of irrigation or discharge of effluent. Results should be submitted monthly:

<u>Constituent/Parameter</u>	<u>Units</u>	<u>Type</u>	<u>Frequency</u>
Wastewater application field number	N/A	N/A	Daily
Precipitation	inches ¹	Rain gauge ²	Daily

Wastewater application area	acres	N/A	Daily
Wastewater flow	mgd	Continuous	Daily
Supplemental irrigation flow	mgd	Estimated	Daily
Crops being grown	N/A	N/A	Daily
Presence of runoff	N/A	N/A	Daily

¹ Report to the nearest 0.1 inch.

² National Weather Service data from the nearest weather station is acceptable.

SOLIDS MONITORING

The Discharger shall record and report **quarterly** the quantity, disposal location, and method of disposal of any solids disposed of, if applicable. If solid waste is shipped offsite, then a description of the quantity of each type of waste shipped offsite and the location of the disposal area(s) shall be included with the report.

Solids applied to the spray field area should be analyzed for Na, K, Cl, Ca, Mg, SO₄, Total N, % moisture and loss on ignition (EPA Method No. 160.4).

REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type (e.g., flow, pond, groundwater, solids, etc.), sample location, and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate whether discharge is occurring in compliance with waste discharge requirements and whether there are any spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the MRP shall be reported to the Regional Board.

Reports shall be submitted as follows:

Monthly reports shall be submitted to the Central Valley Water Board by the **first day of the second month after the month of sampling** (i.e., the March report is due by 1 May).

Quarterly reports shall be submitted to the Central Valley Water Board by the **first day of the second month following the end of the calendar quarter** (i.e., the January-March quarterly report is due by 1 May) and may be combined with the monthly report due at the same time.

An **annual** report shall be submitted to the Central Valley Water Board by **1 February** each year and may be combined with other reports.

At a minimum the reports shall include:

1. A comparison of monitoring data to the discharge specifications and an explanation of any violation of those requirements. Data shall be presented in tabular format.
2. If requested by staff, copies of laboratory analytical report(s).
3. A letter transmitting the self-monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain a statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements, Section B.3.

The Discharger shall implement the above monitoring program as of the date of this Order.

Ordered by:

PAMELA C. CREEDON, Executive Officer

14 March 2008

(Date)

INFORMATION SHEET

ORDER NO. R5-2008-0046
LAND O' LAKES, INC.
ORLAND CHEESE PROCESSING PLANT
GLENN COUNTY

Land O' Lakes, Inc. (hereafter Discharger) submitted a Report of Waste Discharge (RWD) dated 18 January 2008 and requested a revision to their waste discharge requirements for the Orland Cheese Processing Plant (hereafter Facility). These revised WDRs reflect changes to the process, specifically the installation of a whey ultra filter permeate evaporator to decrease the BOD and waste salt load.

The Facility was formerly owned by the Oxford Cheese and Dairy Company, who sold the facility to Land O' Lakes, Inc. in January 1995. Land O' Lakes Inc., incorporated in 1921, is a cooperative organization of producers (Co-op) and has about 40 producer members, most of whom are within 50 miles of the plant. The member dairies deliver milk to the facility by refrigerated tankers. The producer members collectively milk about 17,000 cows. The facility processes approximately 130,000 gallons of milk per day. Raw milk is received from the tankers 20 hours a day. The off-loading area is closed to deliveries for approximately four hours each day for clean-up. The plant operates 24 hours per day, seven days per week, 365 days per year and produces approximately 125,000 lbs of white cheddar cheese per day.

The Land O' Lakes facility is on County Road C, between County Roads 25 and 28, approximately six miles southwest of Orland in Sections 11, 13 and 14, T21N, R4W, MDB&M, (Latitude 39° 40' 37.95" N, Longitude -122° 16' 18.05") as shown in Attachment A, which is attached hereto and made part of the Order by reference. The Facility, including the plant area and the application area, comprises Assessor's Parcel Numbers 24-200-11 (160 acres), 24-210-24 (300 acres), 24-210-25 (20 acres), 24-210-26 (20 acres) and 24-210-27 (140 acres).

Existing Facility and Discharge

The Discharger produces approximately 125,000 lbs of cheddar cheese per day from 1.102 million pounds (127,842 gallons) of milk. A simplified narrative description of the process is as follows: Raw milk (13% solids) is delivered to the plant in refrigerated tanker trucks daily and stored in refrigerated tanks prior to coagulation by enzymes in agitated vats. The resulting slurry is pumped to drain tables where salt is added to enhance separation of the liquid whey from the cheese curd. The cheese (white cheddar) is compressed into 500 lb boxes and removed to refrigerated storage prior to sale. Whey is pasteurized and passed through a reverse osmosis (RO) membrane. The RO permeate is used as process and clean-up water within the plant and is eventually discharged to the floor drains where it flows, along with other waste streams, to the first of two ponds. RO concentrate is passed through the ultra filtration membrane unit. The ultra filter concentrate, or whey protein concentrate (WPC) is sold as a product. The ultra filter permeate is pumped to the evaporator where water is removed. The resulting evaporator concentrate, or lactose concentrate, is sold as a product. A schematic of the process with approximate flow rates is shown in Attachment B of this Order.

All industrial wastewater including plant waste, cooling tower blowdown and boiler blowdown is discharged to a single line, which in turn discharges to the lower pond. Flow in the line is measured immediately before the point of discharge by sensing the level in a Palmer Bowlus flume. The meter is calibrated annually.

The volume of industrial wastewater flow as measured in the Palmer Bowlus Flume in the discharge line to the lower pond ranges from approximately 0.125 to 0.200 million gallons per day (mgd). A typical analysis is as follows: BOD – 6,930 mg/L, COD – 9,120 mg/L, Total N - 268 mg/L, TDS – 3,820 mg/L, Na - 294 mg/L, Cl - 228 mg/L, NO₃ - 268 mg/L, SO₄ - 22.6 mg/L, Ca - 127 mg/L, Mg - 20 mg/L, E.C. – 3,000 and K – 144 mg/L.

There are two wastewater ponds at the facility. Initial discharge is to the lower pond that was constructed in 1983 when the original cheese plant and dairy were built. The lower pond is approximately 200 yards to the north of the plant site. The lower pond has a compacted clay liner and a volume of about 6.4 million gallons, not including the contribution of the required two feet of freeboard. Enlargement of the lower pond from 3.3 million gallons to 6.4 million gallons was begun in the summer of 2005. The enlargement and clay lining was completed and the pond brought on-line in the winter of 2005/06. Prior to the enlargement of the lower pond, the facility had a history of wet weather discharges due to lack of holding capacity. No discharges have occurred since the enlargement of the lower pond. Wastewater is pumped from the lower pond to the upper pond, which is the primary storage pond. Wastewater from either pond is used, in combination with pressurized water from the Orland-Artois Irrigation District, for center pivot irrigation of the five spray fields. The upper pond, constructed in 1998, is double lined with a 40-mil HDPE secondary liner and a 60-mil HDPE primary liner. Between the two liners is a HDPE geonet drainage layer. The upper pond volume is approximately 6.6 million gallons not including the contribution of the required two feet of freeboard.

At the time the upper pond was enlarged in 2005, the irrigation/transfer pump was relocated to a concrete sump adjacent to the lower pond. The pump is a five stage centrifugal, which can be used to transfer wastewater from the plant to the upper pond or to any of the five center pivot irrigation rigs.

The plant and application area are on a gently rolling fan surface underlain by alluvium of the Red Bluff Formation. Near surface soils consist primarily of very stiff to hard moderately to highly plastic clay, sandy clay and gravelly clay to depths of about 3-21 feet below grade. In addition, bands of sand and silty sand run through the formation.

Domestic wastewater is discharged to one of two septic tank leachfield systems, one serving the office and one the plant. The plant leachfield is approximately 50 feet to the southeast of the plant beneath the office parking lot. The office leachfield is approximately 50 feet to southwest of the office.

Drainage from the plant site and spray field is to Walker Creek, thence to Willows Creek, thence to the Colusa Basin Drain, which is tributary to the Sacramento River.

Source Reduction of Salts and Organic Waste (Material Balance)

Early in 2005 the Discharger installed an evaporator for removing water from the ultra filter permeate to produce lactose concentrate. This material could be sold rather than discharged to the ponds as waste, as was done previously. The evaporator has been operating since March of 2005 and all of the evaporator (lactose) concentrate is now being sold to V and V Enterprises who use it as a spray-on additive to cattle feed. In order to demonstrate that the reduction in waste constituents has actually occurred, a material balance for individual constituents has been conducted. A material balance is performed by defining a boundary, in this case an imaginary line around the Discharger's plant, and measuring the flow rate and concentration of every stream entering and leaving the bounded system. The material balance is a way to identify inconsistencies in what is reported and what actually exists, and to quantify their magnitude. In this way it is analogous to a financial audit. Analysis of waste and product streams and a material balance are presented in the following tables:

Table I. Conc. of Cations and Anions in Inlet, Waste and Product Streams

Sample	Ca	Mg	Na	K	SO4	Cl	Total Salts
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Raw Milk	1250	119	427	1240	88.2	899	4,023
RO Perm.	nd	nd	27	21	2.77	53.7	105
RO Conc.	1210	242	1190	3400	254	2340	8,636
UF Perm	1100	229	1160	3300	252	2280	8,321
UF Conc.	1550	278	1240	3500	218	1930	8,716
Evap. Conc.	1500	434	3720	8120	603	7250	
Cheese	7,440 ¹	300 ¹	5,520 ¹	936 ¹	62 ¹	8,330 ¹	21,627
Flume ²	127	20	294	144	22.6	228	836

¹ mg/Kg

² The flume carries all waste, including boiler blowdown, from the plant to the lower pond. These results are from the analysis of a 24 hour composite sample.

Table II. Conc. of COD, Total N, TDS and EC in Inlet, Waste and Product Streams

Sample	Total N	COD	TDS	EC
Units	mg/L	mg/L	mg/L	umhos/cm
Raw Milk	4200	226,000	27,600	7,460
RO Perm.	44.4	57	157	232
RO Conc.	2890	186,000	102,000	17,800
UF Perm	1190	153,000	97,300	18,000
UF Conc. (WPC)	10,300	290,000	177,000	17,700
Evap. Conc. (Lactose Conc.)	2050	362,000	196,000	41,600
Cheese	35,500 mg/Kg	1,46 x 10 ⁶ mg/Kg	-	-
Flume ¹	268	9,120	3,820	3,000

Table III. Material Balance

Stream	Gallons per Day	Pounds per Day	Na (lbs/day)	Cl (lbs/day)	COD (lbs/day)	Salts (lbs/day) (Na+Cl+Ca+Mg+SO ₄ +K)	Total N (lbs/day)
INLET STREAMS							
Raw Milk	127,842 ¹	1,102,000	456	959	241,097	4,292	4,481
Salt (NaCl)		2,610	1,035	1,575	-	-	-
Well Water	95,000	-	22.2	14.2	Neg.	65.4	Neg.
Total In	222,546	-	1,513	2,548	241,097	4,357	4,481
OUTLET STREAMS (Note – Dark shading indicates product streams. Product streams do not contribute to the waste. Light shading indicates internal streams. Internal streams do not contribute to either the product streams or the waste).							
Cheese	14,501 ¹	125,000	856	1,041	219,000	2,824	3,986
Process Water ²	95,000	-	22.2	14.2	Neg.	65	Neg.
RO Permeate	75,000	-	16.9	33.6	35.67	66	28
RO Conc. ³	57,000	-	-	-	-	-	-
UF Permeate ³	21,600	-	209	411	27,571	1,499	214
UF Concentrate	12,000	-	124	193	29,000	873	1,030
Evap Conc.	19,000	-	590	1,149	57,392	3,429	325.0
Evap. Cond.	29,000	-	-	-	-	-	-
Total Out (Products +Waste streams)	244,501 (109.9%)⁴	-	1,609 (106.3%)⁴	2,431 (95.4%)⁴	305,428 (126.7%)⁴	7,257 (165.6%)⁴	5,369 (119.8%)⁴
Total Out⁵ (Waste Streams only)	199,000	-	39.1 (6.22%)	47.8 (3.99%)	35.7 (.006%)	131 (3.68%)	28 (7.93%)
Total Out⁶ (Waste Streams + Evap. Conc.)	218,000	-	629.1	1,197	57,428	3,560	353
Total Out⁷ (Flume)	160,000	-	392.5⁷ (38%)	304.1⁷ (75%)	12,176⁷ (79%)	1,116⁷ (67%)	357.8⁷ (0%)

¹ Assumes density of 8.62 lbs/gal

² Water is assumed to be conserved, i.e. Water In =Water Out

³ RO Concentrate and UF Permeate are internal streams and not included in the totals.

⁴ Ratio of Outlet to Inlet expressed as percentage.

⁵ The waste stream also includes the boiler and cooling tower blowdown but as these are relatively small they have not been included. These figures do not take into account spills and leaks. The figures in parenthesis are

the percentage of the present quantity of waste discharged as compared to the quantity discharged when the evaporator concentrate was part of the discharge (assumes no leaks, spills or wash down).

⁶ This represents the waste stream as it theoretically would have been prior to the installation of the evaporators.

⁷ Calculated from analysis of discharge flume contents, assumes daily flow of 160,000 gallons. The figure in parenthesis is the percentage reduction in individual waste stream constituents before and after evaporator installation, i.e. $(\text{present waste stream} + \text{evaporator concentrate}) - (\text{total out from flume analysis}) / (\text{present waste stream} + \text{evaporator concentrate})$

If flow measurement and analysis of inflow and outflow streams are accurate and if truly representative samples have been collected, the mass of individual components in inlet and outlet streams should be the same. The ratio of outlet to inlet mass expressed as a percent has been calculated for each of the components in Table III. (See footnote ⁴). The agreement between the total inlet and total outlet streams for Na, and Cl is plus or minus about 6%, which is very close. The agreement for COD is within 27% which is acceptable given the difficulties in analysis of highly concentrated streams such as cheese, WPC concentrate and lactose concentrate. The + 65% difference in total salts (Na +K+Ca+Mg+SO₄+ Cl) between outlet and inlet flows is difficult to explain, especially considering that the balance for Na and Cl is good. The + 20% difference in total N between outlet and inlet streams is probably reasonable. Flow volumes in and out of the plant based on the in-plant measurements are within 10% which is relatively close. All of the discrepancies with the exception of the minus 5% chloride difference, are on the plus side, i.e. the balance indicates that the quantity of total volumetric flow and mass of individual constituents is greater in the combined outlet streams than in the combined inlet streams

The difference between the overall flow out of the plant and the overall flow into it, as determined by the flume flow rather than the in plant measurements, is minus 39,000 gallons per day or - 24.4% when expressed as a percentage of the flume flow. Theoretically the flow out should be the sum of the RO permeate, the evaporator condensate, process water, spills, boiler blowdown and cooling tower blowdown. The latter two streams are relatively small and can be ignored. There is no way to measure the volume of spills; however we assume that their volume is also relatively small. The combined flow of process water, evaporator condensate and RO Permeate, according to in plant measurements, is 199,000 gallons per day. The average daily flow from the Flume, however, is only 160,000 gallons. While this is a relatively large discrepancy, it is probably not unreasonable given the errors in measurement and the necessity of using average figures for many of the flows.

In theory RO permeate, evaporator condensate and process water are the only major discharges from the plant. However, if this were strictly true, the concentration of salts and COD in the Flume would be far less than actually observed. While the contribution of spills to the discharge volume is probably small, spills and tank wash out appear to account for a considerable quantity of salts and especially COD, given the discrepancy between the concentration and mass of these constituents in the flume versus the concentrations that result from a combination of process water and RO Permeate. The Discharger has explained that wash down and cleaning of process equipment are done frequently and that the generation of additional salts and COD in the waste is to be expected. The evaporator in particular is a source of organic and inorganic wastes, in that during operation a thick film of concentrated

salts and organic material build up on the evaporator surface. These surfaces must be cleaned and rinsed every 20 hours.

The primary purpose of the mass balance is to determine if the Discharger has in fact made a significant reduction in salt and COD wastes being discharged to the ponds and ultimately to the spray field. While the material balance is not as accurate as hoped, it appears clear that the Discharger has made a significant reduction in wastes discharged from the plant as a result of the installation of evaporator. (The evaporator essentially removes ultra filter permeate from the waste stream by removing a large part of the water from this stream, and thereby creating a saleable product). The material balance indicates that the evaporator concentrate stream comprises approximately 1/3 of the sodium, half the chloride and total salts, 18% of the COD and 25% of the total N generated at the plant. Table III above indicates that the reduction in waste load over pre-evaporator conditions would be 90% or better for all inorganic constituents and virtually 100% for COD (organic constituents). The actual reduction is much less than these calculated figures, as can be seen from the flume analysis. We assume this to be a result of spills, tank wash, leaks, and to some degree, meter error.

Another demonstration of the reduction in waste load is a comparison of flume analysis prior to and after the installation of the evaporators. Table IV below presents flume and upper pond analysis for the calendar year 2004 (before installation of the evaporators) and 2007 (after installation of the evaporators).

Table IV. Flume and Upper Pond Analysis

Site/Parameter	2004		2007	
	Mean	Std. Dev.	Mean	Std. Dev.
Pond/BOD	28,530	9,420	6,130	2,910
Pond/TDS	26,000	8,210	3,180	1,530
Pond/TKN (mg/L)	313.13	131.39	153.8	54.4
Flume/BOD	23,891	8,970	5,620	2,120
Flume/TDS	21,590	5,950	3,480	1,430
Flume/TKN (mg/L)	248.4	91.67	154.4	53.0

Table IV indicates that there has been a sizeable reduction in BOD and TDS, approximately 80%, which, predictably, is also observed in the pond contents. This is more in line with the theoretical prediction based on individual waste stream analysis (see Table III). Table IV suggests that there is about a 40% reduction in total N. No reduction was seen in the calculated reductions in Table III. It should be noted that while about 40 individual analyses were used to determine each of the average values in Table IV, there was considerable variability in these individual values, which is reflected in the high standard deviations. CV (Coefficient of Variation) values were around 0.3. This variability makes accurate assessment of performance more difficult.

On the basis of the information in Tables III and IV, it can be stated with reasonable confidence that the Discharger has eliminated at least half of the salt waste and perhaps $\frac{3}{4}$ of the BOD/COD (Organic) waste. There has been less reduction in total N.

Groundwater Quality and Conditions

The facility is in the Colusa Basin Hydrologic Unit, Orland Hydrologic Sub Area (520.22) of the Sacramento Valley Groundwater Basin as depicted on interagency hydrologic maps prepared by DWR.

Groundwater beneath the plant site and spray field area is encountered at approximately 100 feet bgs (below ground surface) and flows in roughly the same direction as the fall of the surface contour, i.e. from northwest to southeast. In 1994 MW-1 was installed immediately adjacent to the east side of the lower pond. In 1996 at the request of the Sacramento Office of the Regional Water Quality Control Board, the Discharger installed two additional monitoring wells, one upgradient (MW-3) and one downgradient (MW-2) of the lower pond. MW-1 is due east and approximately 6 feet from the edge of the lower pond. MW-2 is due south and approximately 40 feet from the edge of the lower pond. MW-3 is approximately 250 feet to the northwest. These wells were installed to monitor the effect of the lower pond on groundwater. A review of the results from quarterly sampling of these three wells indicates that there has been an increasing trend in the concentration of Na, Cl and TDS (but not nitrates) in MW-1. There is a suggestion of the same trend in MW-3, the upgradient well, but not in MW-2, the second downgradient well. The location of the wells and the lower pond is shown in Attachment A.

It is unclear why MW-1 was installed immediately adjacent to the lower pond, as the lower pond has only a single compacted clay liner, and could be expected to have some permeability. (MW-1 was installed in November 1994 by Oxford Cheese and Dairy, three months before being purchased by Land O' Lakes Inc.). Under these conditions it would be assumed that a well as close as MW-1 would exhibit some elevation in the concentration of soluble pond constituents. Monitoring well MW-1, therefore, will provide no useful information and in addition could act as a conduit for contamination of groundwater. For these reasons, Provision E.1.a of these requirements requires the abandonment and destruction of MW-1 as described in the California Well Standards. An additional monitoring well further downgradient of the lower pond is also required.

In August 2003, three additional monitoring wells were installed, MW-4 at the assumed upgradient property boundary, and MW-5 and MW-6 towards the southerly downgradient property line. These well locations are shown in Attachment A. The purpose of the new monitoring well installation was to determine if any downgradient effects were detectable at the property boundary. The assumed upgradient well, MW-4, which is approximately one mile and within a few degrees of true northwest from MW-3, has been dry since installation and has produced no results. Based on elevations recorded for MW-1, MW-2 and MW-3, the direction of groundwater flow in the vicinity of the lower pond has been consistently calculated to be southeast. Since we know, however, that based on its depth and casing

elevation, the level of water in MW-4 can be no higher than 177.6'. and that the average levels of water in MW-1, MW-2 and MW-3 are 180.3', 181.7' and 198.1' respectively, it must be concluded that MW-4 is in fact downgradient of the lower pond area unless there is a confined aquifer beneath it. Monitoring wells MW-5 and MW-6 are due south and approximately 1,750' and 3,750' respectively from the lower pond. The average levels of water in MW-5 and MW-6 are 176.5' and 156.2' respectively, which indicates that that these wells are downgradient of the lower pond area as would be expected. The apparent piezometric surface of groundwater in the vicinity of the facility raises the possibility that groundwater intercepted by MW-1, -2, -3, -5 and -6 is a result of the application of irrigation and wastewater by the Discharger.

A review of monitoring well analyses is presented below:

Table V. Monitoring well analysis for 2000/01, 2004 and 2007

Well No./Anal.	Well Orientation	Na (mg/L) (ave.)	Na (mg/L) (std.dev.)	Cl (mg/L) (ave.)	Cl (mg/L) (std.dev.)	TDS (mg/L) (ave)	TDS (mg/L) (std.dev.)	NO ₃ (mg/L) (ave.)	NO ₃ (mg/L) (std.dev.)
MW1, 2000/01	6 Ft Down-Grad.	43.25	2.36	39.5	3.31	347.5	5	6.175	0.29
MW1, 2004		57	2.16	77.5	8.19	619.25	75.56	4.8425	0.43
MW1, 2007		62	5.60	96	10.86	775	94.34	5.1	0.56
MW2, 2000/01	40 Ft Down-Grad.	56.5	1.29	45.25	2.87	412.5	17.07	4.025	0.13
MW2, 2004		56.5	5.51	36.75	3.30	410	102.3	3.9	0.39
MW2, 2007		52.5	5	34.75	5.56	477.5	66.02	2.8	0.98
MW3, 2000/01	250 Ft Up-Grad.	40.5	1.29	26.75	2.22	205	12.91	10.25	0.5
MW3, 2004		47	1.83	47.5	3	271.5	16.20	12.875	0.25
MW3, 2007		46	1.83	52	2.45	325	95.39	13.25	0.5
MW6, 2004	3,800 Ft. Down-Grad.	14	0.82	8.3	1.16	225.75	5.06	4.6	0.41
MW6, 2007		13.75	1.26	11	0.82	242.5	35.94	5.675	0.30

No results are reported for MW- 4 and MW-5, as MW- 4 has contained no water since the initial drilling, and MW -5 can only be sampled about 25% of the time due to low water levels. Each average value in Table V above consists of four individual results from the quarterly monitoring reports. The pattern between wells for a given constituent is consistent, however because the number of observations is relatively small, it is in general not possible to demonstrate statistical significance. An exception is nitrate for MW-3. Initially only the results for 2004 and 2007 were included, however as it appeared there was a trend in MW-1 for increasing concentrations of Na, Cl, and TDS with time, it was decided to include the earliest available analysis (2000/01) as well. With the inclusion of the 2000/01 results the trend in MW-1 appears very strong and is probably significant at the 95% level for Na, Cl, and TDS. The

trend for nitrate is absent or possibly reversed. The trend of increasing TDS also appears in MW-2 and MW-3. MW-1 is due east and approximately 6 feet from the edge of the lower pond. MW-2 is due south and approximately 40 feet from the edge of the lower pond. MW-3 is approximately 250 feet to the northwest, the calculated upgradient direction. MW-6 is approximately 3,800 ft due south of the lower pond and downgradient of field Nos. 4, 5, and 6. It appears likely that MW-1 and MW-2 are affected by leakage from the lower pond. This is not surprising considering their proximity to the pond. The case for MW-3 is less convincing, as it is in the upgradient direction and considerably further from the lower pond. It is recommended that no decision be made on the installation of a double liner (Class II Surface Impoundment) until further monitoring well analysis has been collected and compared with the existing data.

The Discharger is required in Provision 1.b. to submit a *Groundwater Quality Assessment Report*, which provides a summary and analysis of all monitoring well results for eight quarters subsequent to the installation of the new downgradient monitoring well MW-7. Staff will review the report at the time of submittal, and make a determination as to the need for a double liner with leachate collection (Class II Surface Impoundment) in the lower pond and possible further reduction in salt load to the spray field.

The facility is in the center of Section 11 and most of the wells in this section and adjoining sections are agricultural wells with depths of between 500 and 600 feet. The nearest domestic well for which information is available is located at the intersection of County Roads 28 and D, in Section 13, which is approximately 1.5 miles southeast of the facility. This well is drilled to a depth of 200' and is screened from 60' to 120' and from 140' to 180'.

Domestic water supply is from a 12" well located immediately west of the plant site and drilled to a depth of 630 feet bgs. As would be expected, the concentration of salts in the water from this well is considerably less than in the monitoring wells. An analysis of the domestic supply water and water from the Orland-Artois Irrigation District is presented below:

Analysis	LOL Domestic	Orland-Artois
Ca (mg/L)	16	21
Mg (mg/L)	15	4
Na (mg/L)	28	7
K (mg/L)	nd	2
pH (mg/L)	7.76	8.54
Cl (mg/L)	17.9	3
SO ₄ (mg/L)	5.47	3.3
HCO ₃ (mg/L)	144	-
NO ₃ (mg/L)	nd	-
EC (umhos/cm)	287	164
TDS (mg/L)	169	102
COD (mg/L)	<7	-
Fe (mg/L)	nd	ND
Mn (mg/L)	nd	ND
Zn (mg/L)	nd	ND
Total P	n	-

Spray Field

The spray field consists of five individual application sites as shown in Attachment A. Total area of the five spray fields is approximately 380 acres. Pressurized water from the Orland-Artois Irrigation District is introduced into the facility's center pivot irrigation system and applied to the five individual spray fields as required. Annual irrigation water usage for the 2007 water year was 516.25 acre-feet or 461,000 gallons per day. Wastewater is usually applied separately from the irrigation water by pumping wastewater from either the upper or lower pond through the same center pivot system, however, it can also be mixed in line with irrigation water if required. The irrigation pump is in a sump adjacent to the lower pond. Crops grown in the spray field area include alfalfa, forage maize, oats, rye grass and winter grains.

Based on a typical BOD₅ concentration of the wastewater of 6,930 mg/L the average BOD₅ loading rate to the spray field is 24.34 pounds/acre/day, which is considerably less than the USEPA recommended maximum rate of 100/lbs/acre/day (USEPA publication No. 625/3-77-0007, *Pollution Abatement in the Fruit and Vegetable Industry*).

The average loading rate in pounds per acre per year for individual ions over the entire spray field based on a typical analysis of flume contents is as follows: N – 343, Na – 377, Cl – 292, K – 184, Ca – 163, Mg – 25.6 and SO₄ – 28.9. This does not include the contribution from irrigation water.

The top six inches of soil in Fields 3, 4, 5, and 6 were sampled by staff in March 2003. Results indicated that pH was within the optimum range, nitrogen was low; P, K, Mn, and Fe were excessive; and sodium adsorption ratio was medium to excessive. Results are tabulated in the Information Sheet. The Discharger has recently applied lime to the spray field to improve soil permeability and general fertility. Crop yields have increased as a result.

Basin Plan, Beneficial Uses and Regulatory Considerations

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. Pursuant to Section 13263(a) of the California Water Code (CWC), waste discharge requirements must implement the Basin Plan.

The designated beneficial uses of the Colusa Basin Drain are agricultural supply; water contact recreation; warm and cold (potential) freshwater habitat; migration of warm water aquatic organisms; spawning, reproduction and/or early development of warm water aquatic organisms; and wildlife habitat.

The designated beneficial uses of underlying groundwater are municipal and domestic supply, agricultural supply, industrial service supply, and industrial process supply.

The Basin Plan establishes numerical and narrative water quality objectives for surface water and groundwater that waste discharge requirements must implement. To implement narrative water quality objectives, relevant water quality criteria and guidelines are to be considered on a case-by-case basis to determine the appropriate numerical limitations.

The chemical constituent objective in the Basin Plan requires, at a minimum, compliance with California maximum contaminant levels (MCLs) for waters designated as municipal supply. More stringent criteria than MCLs are sometimes necessary to ensure that waters do not contain chemical constituents in concentrations that adversely affect beneficial uses.

The Basin Plan contains narrative water quality objectives for chemical constituents, tastes and odors, and toxicity. The toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants or animals associated with beneficial uses. The chemical constituent objective requires that groundwater shall not contain chemical constituents in concentrations that adversely affect beneficial uses. The tastes and odors objective requires that groundwater shall not contain taste or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

Groundwater Degradation/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 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.

Existing groundwater data is insufficient to determine the effect of the Discharger's installation of an ultra filter permeate evaporator, which has greatly reduced the quantity and concentration of salts and BOD discharged to the lower pond and subsequently the spray field.

The Discharger is required in Provision 1.b. of the waste discharge requirements to submit a *Groundwater Quality Assessment Report*, which provides a summary and analysis of all monitoring well results for eight quarters subsequent to the installation of the new downgradient monitoring well MW-7. This information will be reviewed by Regional Water

Board staff and a decision made as to the need for double lining of the lower pond (Class II Surface Impoundment) and possible further reduction in salt load to the spray field.

Constituents of concern that are discharged to the lower pond and eventually applied to the spray field area and have the potential to degrade groundwater include TDS, individual cations and anions, nutrients and organic materials (BOD/COD). While there has been a trend toward higher Na, Cl, and TDS in MW-1 adjacent to the east side of the lower pond, the same trend is not seen in MW-2 which is 40 feet to the south (primarily downgradient) of the lower pond. Constituents of concern noted above should not adversely affect groundwater quality due to the following:

- The total nitrogen loading rate to the spray field area is approximately 343 lbs/acre/year, which is in line with the nitrogen uptake rates of the crops being grown. It should be noted that approximately 25% of the nitrogen is lost during spray irrigation.
- The BOD loading rate to the sprayfield is approximately 25 pounds/acre/day, which is considerably less than the USEPA recommended maximum rate of 100/lbs/acre/day.
- The Na and Cl loading rates for the sprayfield are approximately 377 and 292 lbs/acre/year respectively. Neither sodium nor chloride ions are plant nutrients and in sufficient concentrations can cause adverse soil and plant reactions. Crops being grown by the Discharger are not considered sensitive species. However, to insure that the build-up of Na and Cl does not exceed acceptable limits or inhibit crop growth, the Discharger has been required to perform appropriate soil analysis annually for each of the five individual spray field areas. In order to minimize the effects of Na on soil permeability, the Discharger has instituted a lime application program.
- The loading rates for the plant nutrients K, Ca, Mg, and SO₄ are approximately 184, 163, 25.6 and 28.9 lbs/acre/year respectively. These rates are within acceptable limits for the crops being grown by the Discharger.
- The electrical conductivity of the wastewater being applied to the spray field is approximately 3,000 µmhos/cm, which is in excess of the 700 µmhos/cm limit for a Class I Irrigation Water as defined by the U.S. Department of Agriculture. A portion of the EC in the discharge can be attributed to organic compounds that will break down in the soil profile, and will not continue to exert an osmotic pressure gradient retarding plant uptake of water. A measured volume of a 24-hour composite sample of the flume discharge was analyzed for EC, evaporated to dryness, ignited in a muffle furnace at 550 degrees C for one hour and reconstituted to the original volume with DI water. After the residue had completely dissolved, the EC was re-measured and found to be 1,600 µmhos/cm. This is a measure of the EC attributable to inorganic constituents. Wastewater applied to the sprayfield is diluted approximately 3:1 with Orland-

Artois Irrigation District water, which has an EC of approximately 164 $\mu\text{mhos/cm}$. The weighted average EC of the applied water is, therefore, approximately 523 $\mu\text{mhos/cm}$, which is within the limit for a Class I irrigation water (700 $\mu\text{mhos/cm}$). Additionally it should be noted that the crops being grown by the Discharger are relatively salt tolerant and would not be greatly affected by higher EC levels.

Treatment and Control Practices

The Discharger provides treatment and control of the discharge that incorporate:

- The use of reverse osmosis to concentrate salts in the product streams and thereby yield a permeate that can be used in the plant as a substitute for well water.
- Re-cycling of certain waste streams including salt whey skim to maximize product yield and minimize waste discharge.
- Installation of an ultra filter permeate evaporator to eliminate this highly concentrated stream from the waste discharge.
- Application of wastewater at plant uptake rates for the plant nutrients K, Ca, Mg, S, and N.
- Application of wastewater at rates well below the maximum application rate for organic loading.
- Operation of a tail water recovery system in the spray field to collect and recirculate water to improve irrigation efficiency and prevent standing water.