Alex J. Sagady & Associates
657 Spartan Ave., East Lansing, MI 48823
(517) 332-6971 ajs@sagady.com

June 12, 2009

Memorandum

To: Attorney John Marshall - Reno, NV

From: Alexander J. Sagady, Environmental Consultant
(517) 332-6971 ajs@sagady.com http://www.sagady.com

RE: Project Activity -- Ponderosa Dairy -Review of CNMP & Nevada Wastewater Permit Application

---

1 Introduction

This memorandum memorializes the current state of my review of the Nutrient Management Plan (NMP) and related issues on the Nevada wastewater management permit application for the Ponderosa Dairy - Amargosa Valley, NV.

In conducting this review, I examined a large body of documents provided to me by Mr. John Bosta. These documents were substantial portions of the record that Mr. Bosta obtained from the Nevada Division of Environmental Protection. My review did not attempt to vet or specify the completeness as a whole of the materials describing Ponderosa Dairy that I was provided.

2 Review of Ponderosa Dairy Nutrient Management Plan (II)

2.1 CNMP Section: Emergency Action Plan and Safety Precautions

2.1.1 Ponderosa Dairy's Submittal Fails to Address Spill Prevention

This section of the submitted NMP does not contain any content describing spill & pollution prevention plans, either to address large, high impact events or chronic spill/discharge conditions from physical elements of the Ponderosa Dairy CAFO production and land application operation. Spill prevention plans would contain both physical elements and work practice standards to control both acute and chronic facility spill potential.

This particular portion of the CNMP document does not contain any spill prevention measures addressing such matters as work practices on lagoon level observation, operational

and maintenance procedures for earthen storage berms, measures to control spills by physical containment and isolation of drains and drainage pathways adjacent to lagoons or conservation practices addressed for wastewater storage and land application.

2.1.2 Some Other Elements are Missing from the Emergency Plan

While the NMP does identify equipment available to execute spill control and remediation, it does not show other needed elements, such as hoses for pumping and soil stockpiles for placement of temporary spill-control berms.

The Emergency section does not identify clear lines of authority and responsibility within Ponderosa Dairy for carrying out required emergency procedures and responsibilities. The Emergency section does not document how responses will be handled at nightime/on a 24-7 basis to ensure proper response during non-business, night and weekend hours.

2.1.3 'Trackout' and Equipment Cleaning Not Addressed

Trackout from truck/tanker movement off of fields or from trans-loading of compost, movement of mortalities, etc. can all be expected to lead to waste trackout onto site roads or public highways. Such wastes deposited on roads will contaminate incident precipitation and lead to contaminated site stormwater generation.

Production area and field land application trackout must be addressed with both physical elements (i.e. truck tire wash station) and required NMP operational work practices. Failure to control trackout to site-area private and public roads means the facility is also an air particulate emission source for adverse biological agents found in animal wastes. Such agents include endotoxin, fecal bacteria, viral particles, physical/chemical agents known to cause occupational asthma in animal agriculture settings, etc.

Nothing in the section addressed cleaning of spray application or solids spreading equipment and the resulting generation of wastewater.

2.1.4 Pumping Equipment Physical Elements & Operation

Neither the Emergency Plan nor the Safety Precautions contain either physical elements or operation/work practice requirements addressing pumping operations in support of spray irrigation. For example, there are no physical element addressing automatic pumping cutoff safety features on pumping equipment, whether pumping hoses/lines cross or have connectors near to drainages, whether pumping must be attended by personnel (or not), whether pumping can be stopped by radio-controlled operation, etc. These are fundamental

safety procedures for ensuring that wastewater pumping and irrigation operations are carried out without causing spills and effluents to surface waters.

2.2 CNMP Section: Comprehensive Nutrient Management Plan Facility Information

The submittal fails to explain why dry cow process wastewater generation is shown at 0 gpd/cow, why dry cows are shown generating waste in the milking parlor and why 400 animal units of heifers are showing 0 gpd/cow wastewater generation. [see p. 1 of section]

CNMP inventory shows no resource concerns and only a single field with a site problem in the field information inventory. However, there is no information showing how any such resource or site matters were reviewed.

2.3 CNMP Section: Job Sheets - Pest Management

The pest management job sheets do not show flies as pests to be managed and nothing appears to address fly control in the submitted materials. The dairy claims it is using "organic" methods, but its CNMP does not say how it intends to control flies and mosquitos associated with animal waste storage and management activities, nor are the "organic methods" identified. Fly-control related best management plan physical elements, operational practices and record keeping to show these measures are being effectively carried out should be a specifically stated part of the CNMP.

2.4 CNMP Section: Mortality Disposal Plan

In referring to the onsite mortality composting operations, the Mortality Disposal Plan (MDP) contains the following statement:

> "Provisions for control of run-on and runoff: The land designated for composting dead animals slopes from north to south at a grade of approximately 0.4 percent. The compost area is bermed on all sides to control runoff."[1]

There is a lack of detail in physical drawings in the plant showing the compost pad and its hydraulic relationship with other wastewater and solid waste management units at the site and the compost pad surrounding drainage.

There is no engineering or physical data support for claims that a compacted gravel layer under the mortality composting operations is, indeed, "impervious" as claimed. A state of the art approach would use concrete or asphalt pads with a sump. Nothing like that is

[1] p. 6 of 6, mid-page

described here. Compost pad wastewater effluent flows should be managed in the same manner as liquid animal waste and milk house wastewater. Under no circumstances should compost pad wastewater be allowed to discharged uncontrolled to general site stormwater. In the submitted MDP material, nothing provides any real assurances that compost pad wastewater is properly addressed.

The MDP does not indicate what the disposition is of animal bones in composted waste materials. Even a year of composting would not likely degrade large animal bones. Nothing in the MDP addresses this waste management issue..

2.5 Nutrient Management and Wastewater Irrigation

The nutrient management aspects of the Ponderosa Dairy NMP document were based on the nutrient planning job sheets used by the New Mexico NRCS staff. Unfortunately, at this writing I have not yet been able to get a password for the Excel spreadsheet version of this New Mexico NRCS job sheet spreadsheet so I am unable to view or verify the formulas used to calculate the final fertilizer rate in lbs/acre (as applied net to the field).

Most of the fields are being planned at a rate exceeding 500 lbs/acre of total nitrogen (as applied and available to the crop) [Note also, this is not the total nitrogen per acre that is physically applied; this per acre nutrient specification is only as a 'plant available' rate and the total nitrogen that is physically applied is higher. The 500+ lbs N/acres rate is a very high rate of nitrogen application. Most (but not all) of the fields planned for this high rate of application are for grazing fields in summer grass, in alfalfa or other forage crop. These high nutrient rates are justified with a series of New Mexico State University nitrogen balance spreadsheets. For fields 1, 12, 17, 18, 2, 3 and 4, a total of 1209 grazing heifers and dry cows for 240 days/year are considered to remove over 500 lbs/acre of nitrogen on a total of 580 acres.

The NMP sheets showing the NM State University "Grazing-N" spreadsheets with the 500+ lb/acre nitrogen removal rates are shown as being for "Grazing Dairy Heifers and Dry Cows." However, a sheet on p. 5 of the CNMP section shows the same fields specified with milking cows plus the heifers.

As noted previously, I don't have the spreadsheet formulas for the NM-NRCS code 590 job sheet, but it nevertheless appears that these job sheets do not consider the presence of what is traditionally call "manure residual" with past waste applications as a source of nitrogen in the present crop year in the final fertilizer rate. The New Mexico method discounts nitrogen plant availability from nitrogen mineralization by saying that only 40% of current year applied "organic N" is available for the current crop that year. However, the NM NRCS job sheet never shows the availability in the present crop year from past applications in previous crop years of applied "organic N." This failure, together with the NM State University soil testing practice of only testing nitrate-N means that a significant source of nitrogen field

inputs is not considered in nutrient planning. National nutrient management planning guidance of the USDA Natural Resources Conservation service requires all nutrients to be considered in nutrient budgeting. Allowing animal waste residuals in applied wastes to be excluded from nutrient planning conflicts with such national planning requirements.

Failure in the present crop year to consider plant available nitrogen in animal waste applied residuals from previous crop year applications that are now available in the present crop year means that more nitrogen-containing wastewater will be applied that can be justified for the present year.

In my working spreadsheet to evaluate waste application rates that will be sent along with this memo, I have organized the data so that annual volumetric rates for irrigation (NRCS 449 process) and nutrient applications (NRCS 590 process) can be seen together. This spreadsheet shows that for fields 3, 4, 17, 18 and 21, the authorized volumetric rate for applied nutrients developed under the 590 job sheets significantly exceeds the target irrigation rate for total gallons applied to the field.

NRCS Code 449-NV determines the best management practices required for physical elements, planning and operational practices for Ponderosa's irrigation operations. At the very least, the Ponderosa CNMP must address and explain how nutrient-allowed wastewater volumetric rates will comply with NRCS 449-NV irrigation planning requirements. The present circumstance in which five fields have annual nutrient-based wastewater application rates that exceed the corresponding annual target irrigation application rate cannot be considered as acceptable without further explanation to show such planning application rates comply with NRCS 449-NV planning requirements.

The NMP indicates the planned total liquid and solid waste generation rates are 2976 tons per year and 2.149E+08 gallons/year. No information is provided as the basis of these planned waste generation rates; it is not known if these rates are on an as-excreted basis, or on a Ponderosa waste volume output basis (allowing for evaporation). In another section, the liquid waste generation rate is depicted as about 122 gallons per day-cow, again with no basis cited. Such a rate on 8200 animals would generate 3.65E+08 gallons/year which is higher than the CNMP summary page cited rate.

The NMP only accounts for planned, on-site disposal of 1970 tons/year of animal waste solids. There is information from the Nevada agency (not the applicant) suggesting that the rest might be sold as compost and for non-site-NMP use, but this is not documented in the CNMP as near as I can determine.

Although the NMP summary indicates 2.149E+08 gallons per year liquid waste production, the NMP plan itself shows a total of over 3.75E+08 gallons/year of applied wastes under the nutrient management 590 job sheets. This means the facility is planned to have waste applications that somewhat exceeds 1 million gallons per day, which was to be a new ceiling requirement for the expansion permit.

The type of centerpivot irrigation is not specified. There is the most common type of conventional unit with high pressure nozzles, and there is a second type with lower pressure nozzles, more of them and mounted in a lower vertical position. The latter type could allow less water evaporation and ammonia volatilization, and lower odor release potential and less bioaerosol generation – all with better water conservation.

Although one part of the Applicant's CNMP claims the design basis of the system is 230 mg/L total Nitrogen,[2] all of the NRCS Code 590 Job Sheets are shown with a lab report value of 268 mg/L total N. The same sheets show high ammonia N at 185 mg/L. As a result, ammonia N is 69% of the total Nitrogen for the lab report wastewater. There is no explanation of this discrepancy in the report.

At a book value of 0.45 lbs N per 1000 lb live weight,[3] 8200 dairy cattle at 1400 lbs average weight will generate 943 tons of total nitrogen per year which partitions over the solids generations and the liquids generation.

At 2976 tons of solids per year waste generation at TKN of 19 lbs TKN per wet ton of solid waste, Ponderosa Dairy total N in solids accounts for 28.3 tons of total Nitrogen, leaving 915 tons of total N generated in liquid waste streams.

At 268 mg/L total N in the applied wastewater as shown in the 590 Job Sheets, the irrigation of the planned wastewater volume would physically apply 420 tons/year of total nitrogen [in liquid form only]. This means that the Applicant manages about 915 tons/year of total N generation in liquid form in an evaporation process leaving the physical 420 tons/year of total N in applied wastewater. So, the Applicant is running an atmospheric waste disposal operation for processing their nitrogen-containing wastewater that generates at least 495 tons per year of total nitrogen air pollution.....which will be nearly all in the form of ammonia.

Although there are physically 420 tons of total nitrogen in applied irrigation wastewater, the Applicant's planned nitrogen application rates on a net to the field/plant available basis (without regard to past year animal waste nitrogen residuals) total only 182 tons per year.

So, the facility as depicted only achieves final plant available use of about 19% of the total nitrogen generated, leaving all of the rest of the nitrogen to be disposed into air or groundwater.

---

[2] Page 5 of Applicant's CNMP Facility Information

[3] USDA-NRCS, Agricultural Waste Management Field Handbook, p. 4-8, Table 4-5, Dairy waste characterization – as excreted.

All of these calculations concerning nitrogen generated (as excreted basis) assume the book value for waste N generation as excreted. The book value will, in general, reflect a dairy milking operation with 2 milking operations per day. However, many large dairies will now milk 3 times a day and waste generation and thus nitrogen in waste will be larger in such an operation. I could not find any information in the material I had available on whether Ponderosa Dairy milks 2 or 3 times a day. If milking at Ponderosa were three times a day, the increased total nitrogen flux through the system would make the ammonia nitrogen evaporative method of waste disposal have greater pollution potential.

Operating an agricultural facility with such a high rate of nutrient nitrogen loss means that the facility is not effectively recycling nitrogen in the plant-animal nitrogen cycling system and, instead, is engaging in an atmospheric nitrogen disposal system. In operating in this manner, the facility must necessarily also waste limited water resources by evaporating away this limited resource as well. When the vast majority of the total nitrogen as excreted is lost to air pollution as it is for this facility, the nutrient management plan can therefor not be considered to "ensure appropriate agricultural utilization" as that term is considered in the Second Circuit Waterkeeper Decision.

Atmospheric ammonia discharges are damaging to the environment. Ammonia emissions will contribute to the formation of atmospheric PM-2.5 air pollution Such ammonia emissions will cause pollution of any exposed surface water from airborne deposition downwind.

The Applicant's NMP does not address off-specification milk and its disposal.

3 Conservation of Groundwater Resources and Best Management Practice Controls

The material I had available did not contain any Applicant submittal of the total water balance and disposition for the facility, showing all supply water, product water, evaporation and groundwater discharge in a comprehensive manner to show the sources, processing and final disposition of all water used and present at the site. However, it is apparent that the dairy wash water effluent flow dominates the total volume of wastewater generated at the site. A book value shows waste excretion volume at about 40 million gallons per year out of the over 375 million gallons per year applied wastewater rate.

This facility features considerable vapor-gas evaporative contact as it is designed with the open corrals and flushing systems and evaporation lagoons. Spraying waste on the corrals is used as a method for evaporating wastewater constituents. Nothing in the permit application or the CNMP appears to address groundwater and watershed conservation planning, or the fact that the dairy's evaporative discharge and milk shipments constitute consumptive use of groundwater resources and that such consumptive use constitutes an out-of-watershed basin water transfer.

The Application contains no information that justifies the 122 gallons/diary cow*day rate of dairy wash water. There is no information in the application showing how or whether the Applicant considered or evaluated measures to decrease the amount of wash water used. There is no information on methods of altering the washing process or on running a wastewater reclaim operation in order to reduce groundwater use.

The Applicant's facility is based on co-mingling feedlot-generated liquids with dairyhouse udder wash-water liquids and other dairy house wash effluents. Separating these wastewater flows may offer opportunities for wastewater reclamation and reuse rather than the Applicant's practice of using virgin Nevada groundwater resources for dairy house washing applications. For example, there appeared to be no consideration of irrigation application field tile-water recovery as a source of reclaimed washing water.

The Application did contain a depiction of waste water evaporation as part of a lagoon size application demonstration, but this review is defective because it only considered the evaporative process of the lagoons identified and did not identify the evaporation inherent with coral spraying of wastewater. As such, that analysis underestimated water evaporative losses and overestimate maximum wastewater volumes for storage.

4 Other Comments

Finally, the setting of an 'effluent limitation' of 10 mg/l in wells as an action level for remedial actions and responses is not likely to be a protective resource management and health protective measure. The aqueous concentration of 10 mg/l is commonly considered as a maximum nitrate concentration drinking water quality standard. However, a public policy that allows public use groundwater to reach this level is not sufficiently protective of public health. Drinking water nitrates at and above 10 mg/l constitute a threat to public health because of demonstrated adverse effects on infants with methemoglobinemia. As a resource management and conservation practice, the setting of a 10 mg/l ambient well water limitation does not constitute a sufficient preventative measure so as to preclude groundwater contamination problems that interfere with other uses and users of this resource and/or with public uses of this resource.

That the subject facility has already caused elevated groundwater contamination concentrations exceeding 10 mg/L from unlined lagoons illustrates that the area soils and subsoils are fully capable of allowing wastewater transfer to groundwater. Pollution of groundwater with pathogens and bacteria are also of concern and testing requirements for such pathogens should be incorporated for the monitoring wells.