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M E M O R A N D U M

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SUBJECT: Staff Analysis for Draft Wastewater Reuse Permit LA-000022-05 (Industrial Wastewater)
Glanbia Foods Inc. – Richfield Facility

1. PURPOSE

The purpose of this memorandum is to satisfy the requirements of the *Recycled Water Rules,* IDAPA 58.01.17.400.05, for issuing wastewater reuse permits (WRPs). This memorandum addresses draft WRP No. LA-000022-05 for the industrial wastewater treatment and reuse system owned and operated by Glanbia Foods Inc. (GFI) – Richfield Facility. GFI's Richfield Facility treatment and reuse system is currently permitted under the terms of WRP No. LA-000022-04.

2. SUMMARY OF EVENTS

This facility is located at 1572 East Highway 26, Richfield, Idaho in Lincoln County. The Department of Environmental Quality (DEQ) issued Permit No. LA-000022-04 to GFI on April 04, 2007. As required in this permit, Section I. *Standard Permit Conditions: Procedures and Reporting*, Item 6, a permit renewal application, including seepage testing of lagoons, must be submitted to DEQ six (6) months prior to permit expiration. Permit No. LA-000022-04 will expire on April 04, 2012, which means a permit renewal application must be submitted to DEQ by October 04, 2011. GFI requested an extension of this date, to November 04, 2011, in a letter to DEQ dated September 16, 2011. DEQ approved this extension on September 21, 2011. A permit renewal application from GFI was received on November 04, 2011.

The permit renewal application, permit No. LA-000022-04, GFI's Annual Report reviews, and the annual site inspection reports were used to determine the basis for the terms and conditions contained in the draft permit. As required by the *Recycled Water Rules*, the draft permit will be presented for a public comment period. After the comment period has closed, DEQ will provide written responses to all relevant comments and prepare a final permit for GFI's Richfield wastewater reuse facility.

3. PROCESS AND SITE DESCRIPTIONS

GFI Richfield generates approximately 0.6 million gallons per day (MGD) of industrial wastewater from their whey processing facility. The wastewater flows from the plant where it is produced and then is stored in two wastewater holding ponds, the plant site pond, and the expansion site pond.

The GFI Richfield facility land application area consists of nine (9) hydraulic management units divided between two sites, the plant site acreage and the expansion acreage. The plant site acreage consists of 96.5 acres, and the expansion acreage consists of 466.8 acres, for a total of 563.3 acres. The plant site acreage is typically not used, as part of the plant site rehabilitation plan, and is reserved for emergency use only. The components of the soil on the plant site acreage are silt loams and loams. The components of the soil on the expansion acreage are loams and silt loams. The facility rotates the crops that are grown on the sites between alfalfa, grass, and corn. The crops are harvested from the sites and sold as animal feed.

4. PREVIOUS PERMITTING PERIOD

The permit renewal application did not compare the growing season hydraulic loading rate to the irrigation water requirement (IWR), except as noted in the report summary and conclusion. The report summary and conclusion states that the IWR was exceeded on management unit MU-002228 by 6% during the growing season in order to meet soil moisture and crop tissue requirements. The 2010 Annual Report included a table comparing the growing season hydraulic loading rate with the IWR which confirms the results presented in the application report summary and conclusion. The 2010 annual report also shows that while MU-002228 was hydraulically overloaded, that many of the other eight (8) management units were irrigated at a significant water deficit during the growing season. During the non-growing season hydraulic loading rates were all below the permitted loading limits.

The current constituent loading rates for the land application sites are as follows:

- The COD loading rate was below the permit limit for both land application sites and has generally decreased since 2006. However, the COD loading rate experienced a 7% increase from 2009 to 2010 (from 18.4 lbs/ac-day to 19.7 lbs/ac-day respectively).

- Although there is no permit limit for phosphorous, testing for phosphorous is a permit requirement. The phosphorous loading has steadily increased every year since 2007 and has increased by 34% since 2009 (from 67.7 lbs/ac in 2009 to 90.6 lbs/ac in 2010).

- The nitrogen loading limit of 150% of typical crop uptake (previous three-year median) value was exceeded by 6% at MU-002222, by 25% at MU-002224, and by 45% at MU-002225. However, six out of the ten active management units exceeded the nitrogen loading limit based on 2010 crop uptake values.

- No crop constituent analysis was performed for management units MU-002227, MU-002228, and MU-002230.

Even though all monitoring well testing shows constituent levels to be below the ground water quality maximum contaminant levels (MCL's), GW-002207 is consistently higher than surrounding wells in nitrate-nitrogen and chloride, and GW-002211 is consistently higher than other wells in chloride. Since the only up-gradient monitoring well is GW-002212, located near the expansion site, and there are several miles between the expansion site and the plant site, it is difficult to tell whether the increased nitrate-nitrogen seen in GW-002207 is from the activities on the plant site, or if it is from other activities from up-gradient farms.

As shown in the appendix of the permit renewal application, the nitrate-nitrogen levels over the past three years have decreased in most of the soil management units except SU-002223 and SU-002226; although many soil management units saw a spike in the nitrate-nitrogen levels in the 0–12 inch layer in 2009. SU-002223 has experienced an increase in nitrate-nitrogen in the 0–12 inch layer, while SU-002226 has experienced an increase of nitrate-nitrogen in all layers over the past three years. It is apparent that SU-002227 and SU-002230 were not

sampled during the permit cycle, as there isn't any tabulated sample results in the appendix, nor are these management units mentioned in the body of the permit renewal application even though these sites were used during the permit cycle.

5. PERMITTING DISCUSSION

The following sections outline the staff recommended changes made to the terms of the current permit based on the permit renewal application, items completed in Permit No. LA-000022-04, GFI's past performance of permit requirements, GFI's annual report reviews, evaluations based on the site inspection reports, and/or updates required by changes to the *Recycled Water Rules*, or any other applicable regulatory standards. Some changes were made to sections I and J to update these conditions to reflect the current *Recycled Water Rules* (IDAPA 58.01.17) but are not specifically addressed in this document. Terms and conditions that are unchanged from the current permit, and remain applicable to the facility, are not addressed in this document. Corrected typographical errors and other minor changes to the facility information or table of contents are also not addressed in this document.

5.1 Compliance Schedule for Required Activities – Section E

Compliance Activity No. CA-022-01, Plan of Operation (O&M Manual): GFI's current permit requires submittal of an updated Plan of Operation (O&M Manual); DEQ received this updated submittal on May 30, 2008, and the O&M Manual was approved on July 31, 2008. The O&M Manual for this facility will need to be updated again to address the current operations, the results of previously completed compliance activities, and the requirements of the final permit. The most current DEQ guidance entitled "Guidance for Reclamation and Reuse of Municipal and Industrial Water," with a revision date of September 2007, should be used as a reference for the updates and portions of the O&M Manual may need to be updated to reflect the most current guidance. Staff recommends that the updated O&M Manual be submitted to DEQ within six (6) months of permit issuance.

Compliance Activity No. CA-022-02, Seepage Testing Plan, was submitted to DEQ in December of 2007. An addendum to the plan was submitted to DEQ in July of 2010 and the plan and addendum were approved by DEQ on July 23, 2010. The DEQ approved Seepage Testing Plan will need to be updated and added to Compliance Activity No. CA-022-01 as part of the updated O&M manual.

Wastewater ponds may develop leaks over time and may no longer adequately contain the wastewater they were designed to hold. As such, periodic seepage testing of the ponds are required to ensure that the ponds are not in need of repair or replacement. Seepage testing on both the expansion pond and the plant pond were conducted in September 2010. Since industrial wastewater is typically a higher strength wastewater compared to municipal wastewater, DEQ requires that all industrial wastewater land application facilities seepage test their wastewater ponds once every five years. As a result, staff recommends adding a new compliance activity to the draft permit requiring seepage testing of all wastewater ponds prior to September 30, 2015. If any modifications are made to the existing wastewater ponds or additional ponds are added prior to September 30, 2015, additional seepage testing will be required at that time.

As discussed previously, some of the land application sites have experienced hydraulic and constituent overloading over the course of the current permit. Therefore, Staff recommends that a Nutrient Management Plan be developed for the land application sites to ensure proper nutrient loading on the sites. Supplemental irrigation water may need to be used at times in lieu of wastewater to prevent nutrient over loading of the wastewater land application management units. Staff recommends adding a new compliance activity to the draft permit to require the development of a Nutrient Management Plan. The new compliance activity will need to be completed within twelve (12) months of permit issuance.

Compliance Activity No. CA-022-03, Rehabilitation Plan for the plant site, was completed in August 2008. The resulting system has performed well during the 2009 and 2010 growing seasons. The DEQ approved Rehabilitation Plan will need to be updated and added to Compliance Activity No. CA-022-01 as part of the updated O&M manual.

Compliance Activity No. CA-022-04, Ground Water Monitoring Plan, was submitted in March 2008 and was approved by DEQ on June 09, 2008. The DEQ approved Ground Water Monitoring Plan will need to be updated and added to Compliance Activity No. CA-022-01 as part of the updated O&M manual.

As discussed previously, the only up-gradient monitoring well is GW-002212 with several miles between the expansion site and the plant site. As a result, it is difficult to tell whether the increased nitrate-nitrogen seen in GW-002207 is from the activities on the plant site, or if it is from other activities from up-gradient farms. Therefore, staff recommends adding a new compliance activity to the draft permit to require the installation of a new up-gradient monitoring well near the plant site, or locating an existing offsite well that can consistently be used as an up-gradient monitoring well for the plant site. If the use of an existing up-gradient well is used, an agreement between GFI and the well owner will be needed, stating that the well can be used for monitoring purposes for an extended period of time into the future, preferably for two permit cycles or more. The new compliance activity will need to be completed within eight (8) months of permit issuance. The installation of the new up-gradient monitoring well near the plant site, or locating an existing offsite well will need to be added as part of the Ground Water Monitoring Plan as an update in the O&M Manual.

Compliance Activity No. CA-022-05, Revised Expansion Acreage Vadose Zone Time of Travel Calculations, was completed and no further action is required at this time. However, DEQ reserves the right to require additional related studies, in the future, if site conditions indicate that these studies would be beneficial. As a result, this compliance activity can be removed from the draft permit.

Compliance Activity No. CA-022-06, Runoff Management Plan, was approved by DEQ on July 15, 2008. Construction began in the fall of 2008 and completed in the summer of 2009. It is reported that the runoff management design is working as expected, and that the pump back stations around the land application site has served to improve crop yields. The DEQ approved Runoff Management Plan will need to be updated and added to Compliance Activity No. CA-022-01 as part of the updated O&M manual.

5.2 Permit Limits and Conditions – Section F

During the site inspection conducted on January 20, 2011, the facility indicated that there was some clean-up grazing allowed in 2010. The permit states in Section F, Permit Limits and Conditions, that a Grazing Management Plan shall be submitted to DEQ for review and approval prior to any grazing activities. A Grazing Management Plan was submitted to DEQ and is currently part of the O&M manual. Therefore, Section F, Permit Limits and Conditions, will need to be changed to read, grazing activities shall be in accordance with the DEQ approved Grazing Management Plan in the O&M Manual.

The DEQ Guidance Manual recommends calculating the non-growing season maximum hydraulic loading limit as being equal to the Soil Available Water Holding Capacity (AWC) minus the average precipitation that occurs during the non-growing season, plus the average evaporation that occurs during the non-growing season for each HMU. In the staff analysis for the current permit, staff calculated the non-growing season hydraulic loading rate in this manner. GFI maintained that site conditions warranted a higher non-growing season hydraulic loading rate than staff had calculated. After further review, the agency determined that GFI's non-growing season hydraulic loading rate of 116 MG was acceptable for

the current permit cycle. Staff has re-calculated the non-growing season hydraulic loading rate using the actual acreages shown in appendix 1 of the draft permit. The re-calculated value shown in Section F of the draft permit for the non-growing season maximum hydraulic loading rate-expansion acreage is 119.9 MG. In addition, staff has reviewed the facilities ground water monitoring results in the permit application and in the annual reports to determine the environmental impact, if any, of this non-growing season hydraulic loading rate. Staff observed a potential for ground water contamination, which may be associated with the non-growing season hydraulic loading rate, as the increasing rise of TKN values in the soil monitoring reported in the 2010 Annual Report. This issue and resolution is discussed further beginning with paragraph three of the following section: Monitoring and Reporting – Sections G & H.

To better analyze the ground water quality at the site, staff recommends adding sulfate to the monitoring of ground water monitoring wells in Section G, Monitoring Requirements, in the draft permit for the first and last year only.

To be consistent with other current permits and to prevent unauthorized persons from gaining access to the potentially hazardous conditions found on a wastewater land application sites, staff recommends adding a permit condition, Posting Requirements, to Section F, Permit Limits and Conditions, in the draft permit. This condition shall state the following: Signs shall be posted around the land application systems near all homes located around the perimeter of the site and at the entrance of all access roads into the site. At a minimum, the signs shall state "No Trespassing" or equivalent.

5.3 Monitoring and Reporting – Sections G & H

Monitoring and reporting is required by the permit to demonstrate compliance with the permit limits and conditions specified in the permit. Most of the previous monitoring requirements are included in the draft permit, with the exception of quarterly monitoring of TDIS and semi-annual monitoring of the supplemental irrigation water. Both of these monitoring requirements were removed from the draft permit as these requirements were required only during the first year of the current permit and the associated information was collected and staff determined that further monitoring was not needed.

Since there are no domestic or municipal drinking water wells within a quarter mile of either the plant site or expansion site, the monitoring requirement to sample these wells can be removed from the draft permit.

In the appendix of the 2010 Annual Report, the soils report shows levels of TKN in the soil ranging from 0.03 to 3,600 ppm. Many of the soil samples taken in the last three years have exceeded 1,000 ppm of TKN. TKN is a combination of ammonia nitrogen and organic nitrogen. Since the ammonia nitrogen reported is a very small percentage of the TKN, most of the reported TKN value is in the organic form. Organic nitrogen acts as a slow release form of plant available nitrogen (nitrate plus ammonium nitrogen) over a period of several years.

Typically, plant uptake of nitrogen ranges from 20 to 40 ppm of the nitrogen available in the soil profile, based on crop type. If we assume that only two to three percent of the organic nitrogen is released as plant available nitrogen each year, this would result in more than 20 to 30 ppm of nitrogen from the organic form alone. Any additional nitrogen loading from wastewater could result in an overloading condition of nitrogen in the soil profile. This would result in a significant increase in nitrate nitrogen migrating to the ground water table.

Staff has calculated, in preparing the draft permit for the current permit, the time of travel of wastewater to the ground water surface as approximately 13.6 years. Therefore, the migration of excessive amounts of nitrate into ground water could take a few permit cycles before it is seen in the ground water. In order

to avoid a possible ground water nitrate contamination issue in the future, staff recommends adding an additional soil monitoring requirement in the draft permit requiring sampling of TKN, ammonium nitrogen, and nitrate nitrogen on a quarterly basis for the first three years of the draft permit to monitor soil nitrogen content.

If the monitoring results of the TKN, ammonium nitrogen, and nitrate nitrogen on a quarterly basis for the first three years of the permit show that nitrogen levels in the soil are rising, the maximum nitrogen loading rate of 150% of typical crop uptake (previous three-year median) value and/or the non-growing season maximum hydraulic loading rate may need to be changed to prevent further nitrogen loading in the soils.

5.4 Appendix 1

In the current permit (LA-000022-04), management unit MU-002227 is listed as inactive and management units MU-002228, MU-002229, and MU-002230 are listed as active and as emergency application sites only. Any site that receives wastewater during the course of the permit will be considered as active and all monitoring requirements will apply. Since MU-002227 received wastewater during the course of the current permit, MU-002227 should be considered active. Further examination of the expansion site layout revealed that MU-002227 is made up of two sites (Hand line area's Field A and Field B). These sites are separated by a significant distance, which makes soil monitoring as a single MU difficult. The sites are adjacent to other MU's, so the-facility and DEQ staff recommend splitting the current management unit (MU-002227) and combining the split portions to existing MU's. Therefore, Field A will be combined with MU-002226 and Field B will be combined with MU-002222 in the draft permit. To avoid confusion, staff recommends removing the terms active and inactive from the draft permit while showing only those sites that are permitted for use. Therefore, since the acres from MU-002227 will be included in MU-002222 and MU-002226, MU-002227 will not be shown in Appendix 1 of the draft permit.

Monitoring Wells GW-002212, GW-002210, and GW002211 were used as monitoring wells throughout the permit cycle but are not shown in Appendix 1 of the current permit. Therefore, all seven (7) monitoring wells currently in use, at the plant site and at the expansion site, will be included in Appendix 1 of the draft permit.

6. RECOMMENDATIONS

Based on review of applicable state rules, staff recommends that DEQ issue draft Permit Number LA-000022-05 for a public comment period. The draft permit contains pre-treatment requirements, effluent quality requirements for the wastewater treatment system, hydraulic and constituent loading requirements, and terms and conditions required for operation of the reuse system. Compliance activities have been incorporated into Section E of the permit to address outstanding compliance issues. Finally, monitoring and reporting requirements have been included to demonstrate compliance with the permit conditions, and demonstrate protection of human health and the environment with respect to operation of the facility.