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Environmental Land Management  
1602 11<sup>th</sup> Drive NE  
Austin, MN 55912

RE: Agronomist Review for Danisco USA – Thomson, IL: Permit # 00-SDP-09-15

The following is an agronomic review of waste byproducts applied from the Danisco USA facility in Thomson, IL, permit# 00-SDP-09-15. A brief description of the regulated waste byproducts will be given to provide context of the review and a brief discussion of the land application sites, application rates and site characteristics will be done as well. The review will include applications made for the 2022 crop year.

#### Product Description:

The Danisco USA Facility is permitted to apply up to 10 wet tons per acre of Pressed Sludge by-product with immediate incorporation. The Pressed Sludge applied at the suggested rate will supply a 100-47-13-0.5 lbs./acre (N-P2O5-K2O-Zn) first year plant available analysis. The organic nitrogen in the products will be slowly converted to plant available nitrate as soil microbes convert it – thus, its ultimate availability will depend on numerous environmental conditions including, soil temperature, moisture, drainage and pH. With the higher levels of P2O5 being applied with both by-products they are recommended to be applied once every two to four years depending on soil tests. It should be noted that the product does not contain detectable levels of arsenic, lead or mercury and has only negligible amounts of sodium.

A corn crop with a yield of 200 bushels per acre will require approximately 180-190 pounds of nitrogen and will remove about 70 pounds of phosphorus and 60 pounds of potassium per acre. A soybean crop with a yield of 50 bushels per acre will require approximately 190 pounds of nitrogen (fixed on its own), 40 pounds of phosphorus and 75 pounds of potassium per acre each year. From an agronomic perspective, soil fertility in the medium to high range is preferred. This translates to  $\pm 41$  ppm for phosphorus using the Mehlich-3 ICP test and  $\pm 201$  ppm for Potassium (ammonium acetate or Mehlich-3 ICP). The opinion in this review will be based on characteristics and rates of the applied byproduct, current soil tests and land application site conditions.

### Land Application Sites for 2022 Crop Year:

Site	Permitted Acres	Acres Applied	RATE	Dry Tons Applied	Byproduct	Application Period
<b>Chambers</b>	159	40	0.7	27.1	Industrial Sludge	4 <sup>th</sup> Quarter
<b>Berg 2</b>	75	3	0.5	1	Industrial Sludge	4 <sup>th</sup> Quarter

The fields used for land application were evaluated for soil phosphorus levels, salts and soil pH. Farms with a soil pH below 6.0 should receive an application of agricultural lime. Salt levels should be managed to maintain levels below 1.0. Fields with a phosphorus level exceeding 41 ppm should be managed so that fertility levels do not increase, thus applying nutrients at crop removal rates. A summary of field characteristics is shown below:

Farmer	Site	pH	MEH-3 P	Salts	Net P2O5	Net K2O
Mike Chambers	<b>Chambers</b>	6.7	14	0.2	-32	-36
Loren Berg	<b>Berg 2</b>	7.0	63	0.2	-15	-55

### 2022 Site Specific Discussion:

**Chambers:** This farm received 27.1 dry tons of product applied on approximately 40 acres in the 4th Quarter of the 2021-2022 crop year. A single by-product source was applied to the acres. A reported Corn yield of 195 Bushels per acre was harvested on the farm. Based on this yield, approximately 62 lbs. of P2O5 and 43 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.2%, the phosphorus ranges from a minimum of 9 and a max of 21 with an average of 14 ppm; the Low range according to Iowa State University. Soil potassium averages 92 ppm; the Very Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -32 lbs of P2O5 and -36 lbs of K2O are calculated on these acres. Average soil pH is 6.7 - Neutral and no action is needed. Reported salt (EC) levels are 0.2 mhoms/dm and there are no concerns related to current measured salt levels.

**Berg 2:** This farm received 1.4 dry tons of product applied on approximately 3 acres in the 4th Quarter of the 2021-2022 crop year. A single by-product source was applied to the acres. A reported Soybeans yield of 50 Bushels per acre was harvested on the farm. Based on this yield, approximately 36 lbs. of P2O5 and 60 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.5%, the phosphorus ranges from a minimum of 42 and a max of 102 with an average of 63 ppm; the Very High range according to Iowa State University. Soil potassium averages 175 ppm; the Optimum range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -15 lbs of P2O5 and -55 lbs of K2O are calculated on these acres. Average soil pH is 7 - Neutral and no action is needed. Reported salt (EC) levels are 0.2 mhoms/dm and there are no concerns related to current measured salt levels.

Soil phosphorus and applied nitrogen are the primary nutrients of concern to water quality and public health. The reported rates of Nitrogen do not pose a risk to water quality. The applied phosphorus rates are generally above crop removal rates for the reported crop yields, but are within an agronomic norm for the region. If additional phosphorus applications are calibrated to soil test needs of the reported soil phosphorus levels, the applied phosphorus does not pose a significant risk to environmental quality or public health. Soil phosphorus levels that have increased significantly above the Very High range should be managed to reduce soil test levels through crop removal. As such long-term management should consider maintaining and not building additional soil phosphorus levels as there is little to no agronomic benefit, and potential for increased phosphorus runoff increases with corresponding increases in soil test phosphorus. Salt levels in the soils appears to be well below any thresholds for crop injury. Best management practices in nutrient management and land application should always be followed.

Regards,



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