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Environmental Land Management
1602 11th Drive NE
Austin, MN 55912

RE: Agronomist Review for JBS Facility – Marshalltown, IA Permit# 64-SDP-10-15

The following is an agronomic review of waste products applied from the JBS Facility to land in one Iowa county; Marshall under permit # 64-SDP-10-15. Waste was applied in 2025 crop year. A brief description of the regulated waste product 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.

Product Description:

The JBS Facility is permitted to land apply approximately 1.4 dry ton per acre per year. Application rates are required to follow appropriate agronomic requirements. The by-product consists of a pressed cake. An application of rate of approximately 1.0 dry tons per acre of pressed cake sludge will supply about 70 pounds of available nitrogen and about 55 lbs. of P₂O₅ and 10 lbs. of K₂O, assuming incorporation after 48 hours. The organic nitrogen in the product will be slowly converted to plant available nitrate as soil microbes convert it – thus, its availability will depend on numerous environmental conditions including, soil temperature, moisture, drainage and pH. It should be noted that the product does not contain significant levels of arsenic, lead or mercury.

A corn crop with a yield of 200 bushels per acre will require approximately 180-190 pounds of nitrogen and will remove about 64 pounds of phosphorus and 44 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), 36 pounds of phosphorus and 60 pounds of potassium per acre each year. An alfalfa crop will remove about 13 pounds of P₂O₅ and 43 pounds of K₂O. From an agronomic perspective, soil fertility in the high range is preferred. This translates to ±41 ppm for phosphorus using the Mehlich-3 ICP test and ±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 waste product, current soil tests and land application site conditions.

Land Application Sites for 2025 Crop Year:

Site	Permitted Acres	Acres Applied	Rate	Dry Tons Applied	By Product	Application Period
Mann Airport	263	180	1.1	197.7248	Industrial Sludge	4th Quarter
Mann E Albion	141	25	1.1	27	Industrial Sludge	4th Quarter
Mann NW Airport	525	90	0.9	81.5087	Industrial Sludge	1st Quarter
Mann Airport	263	80	0.9	72.7428	Industrial Sludge	1st Quarter
Mann E Albion	141	30	1.0	28.5233	Industrial Sludge	1st 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 31 ppm in the Mehlich P 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 – site specific discussion follows:

Farmer	Site	pH	MEH-3 P	Salts	Net P2O5	Net K2O
Duane Mann	Mann Airport	6.4	47	0.3	8	-30
Duane Mann	Mann E Albion	6.4	94	0.2	-19	-48
Duane Mann	Mann NW Airport	6.6	69	0.3	-27	-48
Duane Mann	Mann Airport	6.4	47	0.3	-3	-32
Duane Mann	Mann E Albion	6.4	94	0.2	-27	-50

Land Application Sites for 2025 Crop Year:

Mann Airport: This farm received 197.7 dry tons of product applied on approximately 180 acres in the 4th Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Corn yield of 178 Bushels per acre was harvested on the farm. Based on this yield, approximately 57 lbs. of P2O5 and 39 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 4%, the phosphorus ranges from a minimum of 17 and a max of 80 with an average of 47 ppm; the Very High range according to Iowa State University. Soil potassium averages 178 ppm; the Optimum range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of 8 lbs of P2O5 and -30 lbs of K2O are calculated on these acres.

Average soil pH is 6.4 - Slightly Acidic and should be monitored to maintain soil pH near 6.5. Reported salt (EC) levels are 0.3 mhoms/dm and there are no concerns related to current measured salt levels.

Mann E Albion: This farm received 27.4 dry tons of product applied on approximately 25 acres in the 4th Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Corn yield of 260 Bushels per acre was harvested on the farm. Based on this yield, approximately 83 lbs. of P2O5 and 57 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 4.5%, the phosphorus ranges from a minimum of 20 and a max of 167 with an average of 94 ppm; the Very High range according to Iowa State University. Soil potassium averages 337 ppm; the Very High range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -19 lbs of P2O5 and -48 lbs of K2O are calculated on these acres. Average soil pH is 6.4 - Slightly Acidic and should be monitored to maintain soil pH near 6.5. Reported salt (EC) levels are 0.2 mhoms/dm and there are no concerns related to current measured salt levels.

Mann NW Airport: This farm received 81.5 dry tons of product applied on approximately 90 acres in the 1st Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Corn yield of 250 Bushels per acre was harvested on the farm. Based on this yield, approximately 80 lbs. of P2O5 and 55 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.7%, the phosphorus ranges from a minimum of 57 and a max of 79 with an average of 69 ppm; the Very High range according to Iowa State University. Soil potassium averages 184 ppm; the Optimum range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -27 lbs of P2O5 and -48 lbs of K2O are calculated on these acres. Average soil pH is 6.6 - Neutral and no action is needed. Reported salt (EC) levels are 0.3 mhoms/dm and there are no concerns related to current measured salt levels.

Mann Airport: This farm received 72.7 dry tons of product applied on approximately 80 acres in the 1st Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Corn yield of 178 Bushels per acre was harvested on the farm. Based on this yield, approximately 57 lbs. of P2O5 and 39 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 4%, the phosphorus ranges from a minimum of 17 and a max of 80 with an average of 47 ppm; the Very High range according to Iowa State University. Soil potassium averages 178 ppm; the Optimum range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -3 lbs of P2O5 and -32 lbs of K2O are calculated on these acres. Average soil pH is 6.4 - Slightly Acidic and should be monitored to maintain soil pH near 6.5. Reported salt (EC) levels are 0.3 mhoms/dm and there are no concerns related to current measured salt levels.

Mann E Albion: This farm received 28.5 dry tons of product applied on approximately 30 acres in the 1st Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Corn yield of 260 Bushels per acre was harvested on the farm. Based on this yield, approximately 83 lbs. of P2O5 and 57 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 4.5%, the phosphorus ranges from a minimum of 20 and a max of 167 with an average of 94 ppm; the Very High range according to Iowa State University. Soil potassium averages 337 ppm; the Very High range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -27 lbs of P2O5 and -50 lbs of K2O are calculated on these acres. Average

soil pH is 6.4 - Slightly Acidic and should be monitored to maintain soil pH near 6.5. Reported salt (EC) levels are 0.2 mhoms/dm and there are no concerns related to current measured salt levels.

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 be receive an application of agricultural lime. Salt levels should be managed to maintain levels below 1.0, no levels were reported in this review. Fields with a phosphorus level exceeding 31 ppm should managed so that fertility levels do not increase, thus applying nutrients at crop removal rates.

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 in conjunction with the reported nutrient removal rates do not pose a significant risk to environmental quality or public health. Best management practices in nutrient management and land application should always be followed.

Regards,



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