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“An Unbiased and Independent Ag Services Business—Using Data to Make Decisions”

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

RE: Agronomist Review for Cargill Corn Milling – Eddyville, IA Permit # 68-SDP-12-11

The following is an agronomic review of waste byproducts applied from the Cargill Corn Milling plant in Eddyville, Iowa under permit #68-SDP-12-11. A brief description of the regulated waste byproduct 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 2025 crop year.

Byproduct Description:

There were three byproducts land applied; Precoat, Mycelium and Scrap Feed. Precoat is diatomaceous earth used to filter denatured proteins from a corn sugar refinery and the production of citric acid. Mycelium is a spore used in the production of citric acid. Scrap Feed is a corn milling byproduct. The totals land applied for the year consisted of 36 % precoat, 56 % mycelium, and 8 % scrap feed. Based on byproduct analysis, applications of the blended materials consisted of an average of 70 lbs. available N, 39 lbs. P and 19 lbs. K. The Cargill Plant is permitted to apply up to 8 dry tons per acre of precoat/mycelium and 5 dry tons per acre of scrap feed every year.

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 ± 20 ppm for phosphorus using the Mehlich test and 140 – 170 ppm for Potassium (acetate). The opinion in this review will be based on characteristics and rates of the applied waste byproduct, current soil tests and land application site conditions. However, it should be noted that this byproduct does not contain, in any significant amounts, nutrients that should be considered a potential environmental hazard.

Land Application Sites for 2025 Crop Year:

Site	Permitted Acres	Acres Applied	Rate	Dry Tons	By Product	Application Period
Cargill Miro	137	137	7.0	957.6	Blend	4th Quarter
Harris Powell	62	62	7.8	484	Blend	4th Quarter
Dykstra 107b	97	97	6.4	622.7	Blend	1st Quarter
Harris Terry	167	100	5.7	572.4	Blend	4th Quarter
Harris Mitrison	49	49	5.9	290.5	Blend	4th Quarter
Harris Lane	300	300	7.6	2276.8	Blend	4th Quarter
Cargill Wapello	137	137	7.3	995.9	Blend	4th Quarter
Harris Pearson	82	82	5.9	482.1	Blend	4th Quarter
Harris Ethel	50	40	7.5	298.3	Blend	1st Quarter
Cargill Monroe	414	280	4.8	1340.6	Blend	2nd Quarter
Harris East Shop	51	51	4.5	228.9	Blend	1st Quarter
Harris West Shop	46	46	3.6	164.7	Blend	1st Quarter
Harris McGee	41	41	4.3	176.4	Blend	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
Tom Dykstra	Cargill Miro	6.2	44	0.2	-58	-40
Luke Harris	Harris Powell	5.9	50	0.3	-101	-69
Tom Dykstra	Dykstra 107b	6.8	26	0.4	-43	-72
Luke Harris	Harris Terry	5.5	35	0.3	-58	-96
Luke Harris	Harris Mitrison	6.1	23	0.1	-75	-52
Luke Harris	Harris Lane	5.7	58	0.6	-95	-66
Luke Harris	Cargill Wapello	6.4	37	0.3	-77	-53
Luke Harris	Harris Pearson	6.1	18	0.2	-89	-61
Luke Harris	Harris Ethel	5.9	91	0.4	-64	-44
Tom Dykstra	Cargill Monroe	6.1	27	0.3	-58	-40
Luke Harris	Harris East Shop	5.7	10	0.2	-58	-96
Luke Harris	Harris West Shop	6.0	19	0.2	-78	-54
Luke Harris	Harris McGee	5.9	6	0.2	-58	-96

Land Application Sites for 2025 Crop Year:

Cargill Miro: This farm received 957.6 dry tons of product applied on approximately 137 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 180 Bushels per acre was harvested on the farm. Based on this yield, approximately 58 lbs. of P2O5 and 40 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.8%, the phosphorus ranges from a minimum of 5 and a max of 98 with an average of 44 ppm; the Very High range according to Iowa State University. Soil potassium averages 80 ppm; the Very Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -58 lbs of P2O5 and -40 lbs of K2O are calculated on these acres. Average soil pH is 6.2 - 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.

Harris Powell: This farm received 484.2 dry tons of product applied on approximately 62 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 315 Bushels per acre was harvested on the farm. Based on this yield, approximately 101 lbs. of P2O5 and 69 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 30 and a max of 71 with an average of 50 ppm; the Very High range according to Iowa State University. Soil potassium averages 218 ppm; the High range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -101 lbs of P2O5 and -69 lbs of K2O are calculated on these acres. Average soil pH is 5.9 - Very Acidic and should be treated with agricultural lime to raise the pH to 6.5. Reported salt (EC) levels are 0.3 mhoms/dm and there are no concerns related to current measured salt levels.

Dykstra 107b: This farm received 622.7 dry tons of product applied on approximately 97 acres in the 1st Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Soybeans yield of 60 Bushels per acre was harvested on the farm. Based on this yield, approximately 43 lbs. of P2O5 and 72 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.6%, the phosphorus ranges from a minimum of 21 and a max of 32 with an average of 26 ppm; the High range according to Iowa State University. Soil potassium averages 88 ppm; the Very Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -43 lbs of P2O5 and -72 lbs of K2O are calculated on these acres. Average soil pH is 6.8 - Neutral and no action is needed. Reported salt (EC) levels are 0.4 mhoms/dm and there are no concerns related to current measured salt levels.

Harris Terry: This farm received 572.4 dry tons of product applied on approximately 100 acres in the 4th Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Soybeans yield of 80 Bushels per acre was harvested on the farm. Based on this yield, approximately 58 lbs. of P2O5 and 96 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3%, the phosphorus ranges from a minimum of 21 and a max of 58 with an average of 35 ppm; the Very High range according to Iowa State University. Soil potassium averages 145 ppm; the Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -58 lbs of P2O5 and -96 lbs of K2O are calculated on these acres. Average soil pH is 5.5 - Very Acidic and should be treated with agricultural lime to raise the pH to 6.5. Reported salt (EC) levels are 0.3 mhoms/dm and there are no concerns related to current measured salt levels.

Harris Mitrison: This farm received 290.5 dry tons of product applied on approximately 49 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 235 Bushels per acre was harvested on the farm. Based on this yield, approximately 75 lbs. of P2O5 and 52 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.3%, the phosphorus ranges from a minimum of 12 and a max of 34 with an average of 23 ppm; the High range according to Iowa State University. Soil potassium averages 108 ppm; the Very Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -75 lbs of P2O5 and -52 lbs of K2O are calculated on these acres. Average soil pH is 6.1 - Slightly Acidic and should be monitored to maintain soil pH near 6.5. Reported salt (EC) levels are 0.1 mhoms/dm and there are no concerns related to current measured salt levels.

Harris Lane: This farm received 2276.8 dry tons of product applied on approximately 300 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 298 Bushels per acre was harvested on the farm. Based on this yield, approximately 95 lbs. of P2O5 and 66 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.4%, the phosphorus ranges from a minimum of 32 and a max of 76 with an average of 58 ppm; the Very High range according to Iowa State University. Soil potassium averages 197 ppm; the Optimum range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -95 lbs of P2O5 and -66 lbs of K2O are calculated on these acres. Average soil pH is 5.7 - Very Acidic and should be treated with agricultural lime to raise the pH to 6.5. Reported salt (EC) levels are 0.6 mhoms/dm and there are no concerns related to current measured salt levels.

Cargill Wapello: This farm received 995.9 dry tons of product applied on approximately 137 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 240 Bushels per acre was harvested on the farm. Based on this yield, approximately 77 lbs. of P2O5 and 53 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.4%, the phosphorus ranges from a minimum of 12 and a max of 73 with an average of 37 ppm; the Very High range according to Iowa State University. Soil potassium averages 99 ppm; the Very Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -77 lbs of P2O5 and -53 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.

Harris Pearson: This farm received 482.1 dry tons of product applied on approximately 82 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 277 Bushels per acre was harvested on the farm. Based on this yield, approximately 89 lbs. of P2O5 and 61 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.1%, the phosphorus ranges from a minimum of 14 and a max of 24 with an average of 18 ppm; the Optimum range according to Iowa State University. Soil potassium averages 115 ppm; the Very Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -89 lbs of P2O5 and -61 lbs of K2O are calculated on these acres. Average soil pH is 6.1 - 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.

Harris Ethel: This farm received 298.3 dry tons of product applied on approximately 40 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 200 Bushels per acre was harvested on the farm. Based on this yield, approximately 64 lbs. of P2O5 and 44 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 17 and a max of 162 with an average of 91 ppm; the Very High range according to Iowa State University. Soil potassium averages 252 ppm; the Very High range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -64 lbs of P2O5 and -44 lbs of K2O are calculated on these acres. Average soil pH is 5.9 - Very Acidic and should be treated with agricultural lime to raise the pH to 6.5. Reported salt (EC) levels are 0.4 mhoms/dm and there are no concerns related to current measured salt levels.

Cargill Monroe: This farm received 1340.6 dry tons of product applied on approximately 280 acres in the 2nd Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Corn yield of 180 Bushels per acre was harvested on the farm. Based on this yield, approximately 58 lbs. of P2O5 and 40 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 4%, the phosphorus ranges from a minimum of 14 and a max of 42 with an average of 27 ppm; the High range according to Iowa State University. Soil potassium averages 95 ppm; the Very Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -58 lbs of P2O5 and -40 lbs of K2O are calculated on these acres. Average soil pH is 6.1 - 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.

Harris East Shop: This farm received 228.9 dry tons of product applied on approximately 51 acres in the 1st Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Soybeans yield of 80 Bushels per acre was harvested on the farm. Based on this yield, approximately 58 lbs. of P2O5 and 96 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.3%, the phosphorus ranges from a minimum of 8 and a max of 13 with an average of 10 ppm; the Low range according to Iowa State University. Soil potassium averages 123 ppm; the Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -58 lbs of P2O5 and -96 lbs of K2O are calculated on these acres. Average soil pH is 5.7 - Very Acidic and should be treated with agricultural lime to raise the pH to 6.5. Reported salt (EC) levels are 0.2 mhoms/dm and there are no concerns related to current measured salt levels.

Harris West Shop: This farm received 164.7 dry tons of product applied on approximately 46 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 245 Bushels per acre was harvested on the farm. Based on this yield, approximately 78 lbs. of P2O5 and 54 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.3%, the phosphorus ranges from a minimum of 12 and a max of 28 with an average of 19 ppm; the Optimum range according to Iowa State University. Soil potassium averages 115 ppm; the Very Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -78 lbs of P2O5 and -54 lbs of K2O are calculated on these acres. Average

soil pH is 5.9 - Very Acidic and should be treated with agricultural lime to raise the pH to 6.5. Reported salt (EC) levels are 0.2 mhoms/dm and there are no concerns related to current measured salt levels.

Harris McGee: This farm received 176.4 dry tons of product applied on approximately 41 acres in the 1st Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Soybeans yield of 80 Bushels per acre was harvested on the farm. Based on this yield, approximately 58 lbs. of P₂O₅ and 96 lbs. of K₂O were removed. Soil test results show that the organic matter levels are approximately 3.1%, the phosphorus ranges from a minimum of 5 and a max of 6 with an average of 6 ppm; the Very Low range according to Iowa State University. Soil potassium averages 111 ppm; the Very Low range according to Iowa State University. Based on the cumulative application rate and reported crop yields, a net of -58 lbs of P₂O₅ and -96 lbs of K₂O are calculated on these acres. Average soil pH is 5.8 - Very Acidic and should be treated with agricultural lime to raise the pH to 6.5. 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 and phosphorus rates applied from the by-product do not pose a significant risk to environmental quality or public health. Fields in which soil phosphorus levels have increased above the Very High range should consider eliminating any phosphorus applications as there is little to no agronomic benefit and potential for increased phosphorus runoff increases with corresponding increases in soil test phosphorus. Best management practices in nutrient management and land application should always be followed.

Regards,



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