

October 30, 2012

Theresa Stiner  
Iowa Department of Natural Resources  
Land Quality Bureau  
502 East 9<sup>th</sup> Street  
Des Moines, IA 50319-0034

***Agronomist Review for Cargill – Blair, NE***

***Permit # 43-SDP-12-10P-LAN***

The following is an agronomic review of waste products applied from the Cargill plant in Blair, Nebraska to land in one Iowa county; Harrison County under permit #43-SDP-12-10P-LAN. This shall be considered a supplemental report to the 2011 Agronomist review submitted in October 2011 by Mr. Jimmie L Andersen. 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. The review will include applications made for the 2011 and the 2012 crop years, respectively.

**Product Description:**

Calcium sulfate, otherwise known as gypsum, is a by-product of citric acid production in the wet corn milling plant operated by Cargill in Blair, NE. This industrial calcium sulfate is marketed under the trade name "CALmax". CALmax provides two essential crop nutrients, calcium and sulfur, in a form readily available to crops. One ton of CALmax will supply 200 pounds of calcium and 150 pounds of sulfur. Gypsum effectively changes the structure and fertility of heavy clay soils, especially those that are heavily weathered or subject to intensive crop production. Gypsum also improves sodic (saline) soils by removing sodium from the soil and replacing it with calcium. Therefore, one can see improvement in clay soil structure and fertility, and desalinization of sodium-rich soils, by using gypsum. Lastly, Gypsum can reduce ammonia volatilization from urea and UAN fertilizers.

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 pound 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  $\pm 20$  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 product, current soil tests and land application site conditions. However, it should be noted that this product does not contain, in any significant amounts, nutrients that should be considered a potential environmental hazard.

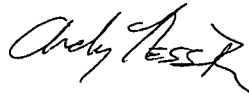
Land Application Sites for 2011 Crop Year:

- Gochenour, Site 456: As reported in 2011, this site received 766 tons of CALmax in the Spring of 2011 on 200 acres of tillable land. The farm is managed in a continuous corn rotation with minimum tillage. In 2011 a reported yield of 175 bushels per acre was harvested and in 2012 a reported yield of 110 bushels per acre was reported. Soil tests were taken in the spring of 2012. Organic matter levels were in the medium range. Soil test phosphorus and potassium were in the very high range. Soil pH was slightly alkaline. The farm is considered to be highly productive and the addition of CALmax should have no negative effects on crop production. Eroded hills and clay soils should benefit from the product and the continuous corn rotation will benefit from the elemental sulfur in the fertilizer program.
- Gochenour, Site 457: As reported in 2011, this site received 80 tons of CALmax in the Spring of 2011 on 80 acres of tillable land. The farm is managed in a continuous corn rotation with minimum tillage. In 2011 a reported yield of 185 bushels per acre was harvested and in 2012 a reported yield of 110 bushels per acre was reported. Soil tests were taken in the spring of 2012. Organic matter levels were in the medium range. Soil test phosphorus and potassium were in the very high range. Soil pH was slightly alkaline. The farm is considered to be highly productive and the addition of CALmax should have no negative effects on crop production. Eroded hills and clay soils should benefit from the product and corn production will benefit from the elemental sulfur in the fertilizer program.
- Mether, Site 71: As reported in 2011, this site received 360 tons of CALmax in the Spring of 2011 on 93 acres of tillable land. Soil tests were taken in the spring of 2012. Organic matter levels were in the medium to high range. Soil test phosphorus and potassium were variable, ranging from the low to the very high range. Soil pH was slightly acidic to very acidic in nature. The farm is considered to be highly productive and the addition of CALmax should have no negative effects on crop production. Eroded hills and clay soils should benefit from the product and the corn production will benefit from the elemental sulfur in the fertilizer program. Lastly, the product will help to improve the subsoil by raising the pH.
- Mether, Site 458: As reported in 2011, this site received 301 tons of CALmax in the Spring of 2011 on 80 acres of tillable land. Soil tests were taken in the spring of 2012. Organic matter levels were in the medium range. Soil test phosphorus and potassium were in the very high range. Soil pH was slightly alkaline. The farm is considered to be highly productive and the addition of CALmax should have no negative effects on crop production. Eroded hills and clay soils should benefit from the product and the continuous corn rotation will benefit from the elemental sulfur in the fertilizer program.

Regards,



Jim Nesseth  
Certified Agronomist  
License #: 17118



Andrew Nesseth  
Environmental Consultant