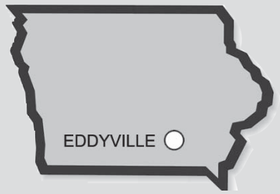
Cargill

David Salazar, Civil Engineering, University of Iowa



Cargill, headquartered in Minneapolis, Minnesota, is an international provider of food, agricultural and risk management products and services. Cargill has 149,000 employees in 63 countries and has annual sales of approximately $60 billion and growing. Cargill-Eddyville, Iowa, processes approximately 85 million bushels of corn a year to produce the following products: high fructose corn sweeteners, dextrose, Sweet Branfeed, crude corn oil, ethanol, citric acid, itaconic acid, glucosamine, natural source Vitamin E and phytosterols. Cargill-Eddyville spans more than 1,500 acres and employs more than 450 employees.

Project Background

A former P2 intern assessed Cargill-Eddyville's waste streams and noticed coal combustion ash as a large waste stream with potential beneficial use. The two main types of coal ash are fly ash and bottom ash. Cargill-Eddyville generates more than 20,000 tons of coal ash per year. Since the fly and bottom ash are commingled, they must be landfilled. If the fly and bottom ash were separated, there could be a potential beneficial use.

Incentives to Change

Cargill is proud of its strong commitment to safety, its support to the community in which employees live, and its continued improvement in the manner in which it operates. Cargill has a corporate goal to become ISO 14001 certified, and Cargill-Eddyville has a plant specific goal to reduce the amount of waste by 2 percent by 2010. Cargill-Eddyville is continuously lessening its environmental impacts by not only reducing the amount of generated waste but by also trying to find potential beneficial use for this waste.

Results

There are significant environmental benefits and cost savings to be obtained with regard to the coal ash at Cargill-Eddyville. Most of the internship was spent researching and discovering the following topics:

Criteria
There are specific criteria and standards that outline the beneficial coal ash use:

- Ash needs to be conveyed dry.
- Fly ash must be classified as Class C or Class F as defined by the American Society for Testing and Materials (ASTM).
- Ash must meet the requirements for beneficial uses other than alternative cover as defined by the DNR.

Fly Ash
Fly ash has the following beneficial uses:

- Portland cement concrete
- Portland cement manufacturing
- Stabilized base course
- Flowable fill
- Structural fills and embankments
- Soil improvements
- Asphalt pavements
- Grouts for pavement subsealing
- Caustic replacement for neutralization (fly ash has pH ~11)

Bottom Ash
Bottom ash has the following beneficial uses:

- Portland cement manufacturing
- Landfill daily top cover
- Landfill liner
- Road Improvements

Transportation
Based on the volume of the trailer and the weight of the coal ash, the P2 intern discovered that the volume of the ash was the limiting factor instead of its weight. In other words, the 40 ton highway weight limit was not being reached. Due to the fine particle size of coal ash, the most effective manner to transport coal ash is with the use of pneumatic trailers.

If the coal ash meets the specific criteria and standards, it has a potential value of $1-$40 per ton depending on the specific usage and transportation costs. With the increasing costs of freight, transportation determines the value of the coal ash.

The farther the distance the coal ash must be transported, the less the coal ash is worth.

Project	Annual Cost Savings	Environmental Results	Status
COAL COMBUSTION ASH	Not available	> 20,000 tons diverted from landfill	Recommended