

# CARGILL INC.

**IAN STEWART**  
ENVIRONMENTAL ENGINEERING, UNIVERSITY OF IOWA



## COMPANY BACKGROUND



**SIOUX CITY**

Cargill Inc. is an international producer and marketer of food, agricultural, financial, and industrial products and services. Globally, the company employs 138,000 people in 67 countries. Cargill's operations at its Sioux City, Iowa location include crushing soybeans, creating meal products, and extracting and refining oil into many products. This facility employs 95 individuals in the crush plant, administration office and refinery. Its main products are soy meal, bean hulls, and different blends of vegetable oil. Products are transported by truck or rail cars.

## PROJECT BACKGROUND

Cargill generates solid waste at several locations in its operations. The intern investigated opportunities to reduce the amount of solid waste sent to the landfill and to maximize the facility's material reuse and recycling efforts.

## INCENTIVES TO CHANGE

Since resource efficiency is a company goal and the costs of handling and disposing of waste are rising, increased recycling and beneficial reuse of materials is advantageous. Several recycling and reuse opportunities at the plant can save Cargill money while reducing its environmental footprint.

## RESULTS

**New Bean Dumpster:** An on-site dumpster collects soybean meal and other grain products that do not meet Cargill's food safety requirements. This dumpster is managed by a company that purchases salvage grain material. After proper separating, cleaning and disinfecting, the salvage grain company produces animal feed products.

Currently, a second on-site dumpster that is also commonly filled with grain products and soybeans that do not meet Cargill's food safety requirements is taken to the landfill. The grain product waste is the result of rock sifting, ground contamination and equipment cleaning. Installing another salvage grain dumpster at this second location would result in landfill diversion and cost savings.

**Soybean Reintroduction Door:** In one location, soybeans occasionally spill into an outdoor area. The area has an overhead cover to protect the spilled product from rain damage and other contamination. Investigation revealed that by fabricating a reintroduction door in a designated



production area, these soybeans could be fed back in to the production process. This process change would provide landfill diversion and increase revenue from the recovered product.

**Secondary Foreign Material Screening:** Most of the discarded soybeans are from the foreign material screening process. One way to increase revenue and yields while reducing landfill costs would be to implement a secondary screening process. The secondary screening could be small in scale, yet could more efficiently remove foreign material, ensuring that the maximum amounts of soybeans are processed.

**Cardboard Dumpster:** After performing a waste audit, the intern determined that the crush plant sent a significant amount of cardboard to the landfill. A dumpster for cardboard was placed at a convenient location for optimal usage. Use of this dumpster will reduce hauling of other dumpsters, recycle more material and save on costs.

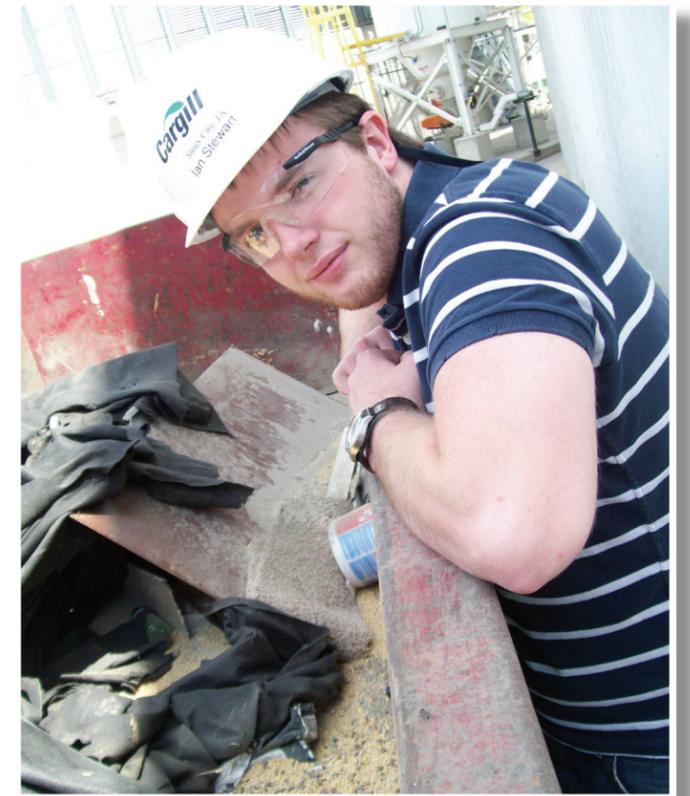
**Steel Drum Liner:** The refinery uses steel drums for trash collection. The drums are used at locations where material needing disposal may be of temperatures exceeding 100°F. Once it is cooled, this material also often sticks to the container so it cannot be emptied, causing the entire drum to be landfilled.

A solution to this problem is to use a high-density polyethylene bag that can handle material from -40°F to 212 °F and is designed to not stick to containers. This would allow for the drums to be emptied and reused. On-site reuse of the drums would reduce landfill costs and recycling excess drums could generate revenue.

**Spent Bleaching Clay:** The refinery produces spent bleaching clay daily. This material, under certain conditions, can be spontaneously-combustible. It also is the largest volume of waste generated at the plant. The clay contains between 20 percent and 30 percent oil, which gives it some beneficial reuse potential. Due to the properties of the material, finding a solution will require additional research.

One company expressed interest in receiving this material from Cargill and reusing it in producing animal feed. The clay is beneficial for this purpose because it boosts fat levels, makes the material flowable and is a mycotoxin binder. However, the cost of hauling the material to the company detracts from the appeal of this option.

Other options include composting and energy capture. A composting facility has expressed interest in the oil, as well as the conditioning nature of the clay itself. Systems set up for high-ash fuels can benefit from the high thermal value of the oil from the clay to produce energy.



## CONVENTIONAL AIR POLLUTANTS AND GREEN HOUSE GASES DIVERTED IN STANDARD TONS

| Total for all sectors |                 |                 |                  |     |       |
|-----------------------|-----------------|-----------------|------------------|-----|-------|
| CO <sub>2</sub>       | SO <sub>2</sub> | CH <sub>4</sub> | N <sub>2</sub> O | CFC | PM-10 |
| 5.81                  | 0.02            | 0.25            | 0.02             | --- | 0.02  |

| PROJECT                              | ANNUAL COST SAVINGS | ENVIRONMENTAL RESULTS | STATUS      |
|--------------------------------------|---------------------|-----------------------|-------------|
| NEW BEAN DUMPSTER                    | \$4,720             | 91 TONS               | IMPLEMENTED |
| SOYBEAN REINTRODUCTION DOOR          | \$8,132             | 20 TONS               | IMPLEMENTED |
| SECONDARY FOREIGN MATERIAL SCREENING | \$85,547            | 200 TONS              | RECOMMENDED |
| NEW CARDBOARD DUMPSTER               | \$340               | 4 TONS                | IMPLEMENTED |
| STEEL DRUM LINERS                    | \$800               | 1 TON                 | IMPLEMENTED |
| SPENT BLEACHING CLAY                 | \$200,000           | 2,339 TONS            | RECOMMENDED |

