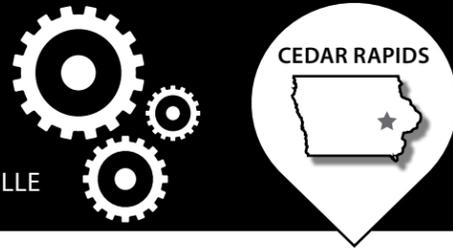


DUPONT INDUSTRIAL BIOSCIENCES



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COMPANY PROFILE

DuPont is a science company that has been bringing world-class science and engineering to the global marketplace in the form of innovative products, materials, and services since 1802. One business within DuPont, Industrial Biosciences (IB), works with customers across a wide range of industries to improve products and make processes more sustainable. Through a unique combination of agricultural, biotechnology, chemical and material science capabilities, coupled with the power of 2,500 talented individuals worldwide, the organization focuses on providing biobased solutions to meet the needs of a growing population. The

company follows four core values that guide the company's culture and practices; they are: respect for people, safety and health, environmental stewardship, and highest ethical behavior.

IB has numerous research and production facilities around the world, including our enzyme plant in Cedar Rapids, Iowa. The site opened in 1991, currently employs approximately 200 people and continues production 24/7. The Cedar Rapids facility produces industrial enzymes and fermentates via fermentation, which are used in detergents, animal feed, preservatives for food, and ethanol production. The products produced at the Cedar Rapids plant are shipped around the world.

PROJECT BACKGROUND

The intern focused on solid waste and water conservation to work towards DuPont Industrial Bioscience's sustainability goals. One of DuPont's methods of enzyme recovery produces solid waste. This waste is currently landfilled, so alternative disposal options and source reduction opportunities were investigated. Another enzyme recovery process that DuPont uses produces nutrient-rich sludge. To decrease the wastewater nutrient loading resulting from this process, the intern examined increasing the volume that is land applied. To decrease facility water usage, scrubber flow rates were studied and optimized.

INCENTIVES TO CHANGE

As a global business, Industrial Biosciences has committed to a set of sustainability goals to accomplish by 2020. The goals are to reduce solid waste, energy usage, and greenhouse gas emissions, and improve water stewardship. In addition, the wastewater treatment facility in Cedar Rapids has guaranteed rate increases to comply with the Iowa Nutrient Reduction Strategy. To jumpstart their environmental reduction goals, the Cedar Rapids DuPont facility partnered with the DNR's Pollution Prevention Intern Program to host an intern dedicated to compiling data and evaluating viable strategies.

RESULTS

Land Application: In order to divert the solid waste produced during enzyme recovery from the landfill, many options of disposal, recycling, and reuse were considered. This material contains nutrients and is continuously produced on site, creating a consistent source for an end use. Following a thorough analysis, the intern recommended agricultural land application. This recommendation is in progress, and when fully implemented, is expected to divert 7,200 tons of waste from the landfill, and save DuPont \$151,200 annually. In addition, less commercial fertilizer will be used by farmers, with the goal of reducing leaching into neighboring water bodies. Once land application is implemented, it is recommended that DuPont continue looking into other, even more environmentally beneficial options for this waste stream, such as biochar and composting.



Bag Cincher: Source reduction opportunities were also investigated to reduce the amount of solid waste generated by enzyme recovery. The waste stream recommended for land application is produced from regular addition of raw materials. Decreasing any unnecessary addition of raw materials would decrease the volume of waste produced. It is recommended that DuPont install a bag cincher to existing equipment used to dump bags of raw materials. Currently only whole bags of material are dumped because there is no efficient way of handling partially full bags. A bag cincher will allow partial bags to be easily used, decreasing the amount of raw material wasted, and decreasing labor for the technicians. This option is recommended, and could eliminate 109 tons of overdosed material and provide an annual savings of \$14,250 for DuPont.

Perlite Silo: A silo could provide another source reduction opportunity for one of the raw materials used in enzyme recovery. A silo would allow more precise metering of material, eliminating wasted material. The material could then be purchased in bulk, allowing reduced costs per kilogram, and warehouse storage space would no longer be required for this material. A silo would also eliminate the use of bags for this raw material, decreasing labor for the technicians. This option could eliminate 109 tons of wasted material and result in annual savings of \$234,000 for DuPont. Should this reduction option be implemented, there would be associated impacts on the savings and environmental results of the previous bag cincher recommendation.

Land Application of Sludge: To comply with the Iowa Nutrient Reduction Strategy, the wastewater treatment facility in Cedar Rapids must increase their treatment charges to implement new treatment strategies. In response to this, DuPont investigated decreasing the

nutrients in the plant's wastewater effluent through land applying more of the sludge produced from enzyme recovery. Samples were gathered and tested for land application requirements to verify feasibility. This project is currently in progress, and 4,500,000 gallons per year have been determined to be eligible for land application. This would divert a significant amount of nutrients from the wastewater treatment facility, and potentially save DuPont \$55,000 annually. In addition, nutrients could provide crop benefit and commercial fertilizer use could be decreased.

Scrubber Optimization: Optimization of the scrubbers could decrease the amount of water used at the Cedar Rapids facility. The scrubbers remove particulates efficiently, but use more water than necessary. This process was investigated by testing the solids content in the water retained in the scrubber and found that the flow rates of the scrubbers could be decreased while maintaining efficient particulate removal. By decreasing the flow rates through the scrubbers, more than 11,205,000 gallons could be saved each year, allowing potential annual savings of \$22,000 for DuPont.



PROJECT	ANNUAL COST SAVINGS	ANNUAL ENVIRONMENTAL RESULTS	STATUS
LAND APPLICATION	\$151,200	7,200 tons	IN PROGRESS
BAG CINCHER	\$14,250	109 tons	RECOMMENDED
PERLITE SILO	\$234,000	> 109 tons	RECOMMENDED
LAND APPLICATION OF SLUDGE	\$55,000	4,439,000 gallons	IN PROGRESS
SCRUBBER OPTIMIZATION	\$22,000	11,205,000 gallons	IN PROGRESS

