Terra Nitrogen

CASE SUMMARY 21

TERRA NITROGEN

Sergeant Bluff, Iowa
Woodbury County

Intern: Noah Wiese
Major: Materials Engineering
School: Iowa State University

The Company

Terra Nitrogen is a leading manufacturer of nitrogen fertilizer, with more than $1 billion in annual sales of nitrogen products worldwide. At the Port Neal plant, ammonia, urea ammonium nitrate solution, and urea liquor are manufactured for retail sale. Transition products include nitric acid and liquid ammonium nitrate.

Project Background

Terra Nitrogen has previously hosted a P2 Intern and implemented a number of projects that have resulted in reduced emissions, water conservation, and minimization of oil wastes. The project focus this year dealt with identifying alternative uses for process waste and improving water quality.

Incentives to Change

One of Terra's key objectives is to be a responsible steward of the environment. Because of this, they were in search of more environmentally responsible ways of disposing of spent lime waste from their water softening process and removing ammonia and nitrate contaminants from a waste stream.

Results

Spent lime waste will be removed by an Iowa company that accepts lime waste from facilities such as Terra's and spreads it on local farm fields. This is a beneficial process for the farmer as it raises soil pH that may have been lowered by the use of fertilizers. This type of removal will also cost less than sending the lime to the landfill. Terra will save $238,750 annually by land applying the lime instead of sending it to a landfill.

Terra is evaluating a bioremediation system to treat a waste stream. This is an alternative to the pump and evaporate system that is currently in use. The proposed system will do a better job of eliminating the ammonia and nitrates by using specialized bacteria to convert the contaminants to nitrogen gas. This will result in more control over the waste leaving the Terra facility, as well as a shorter treatment time. In addition, Terra will realize an economic benefit because of the amount of electricity and steam saved by eliminating the wastewater evaporator. With the cost of setting up the bioremediation system, $188,402 will be saved the first year of use, and approximately $223,812 will be saved in every additional year the system is needed.

Terra planted 175 hybrid poplar trees to reduce the potential impact of ammonia and nitrate to the surrounding vicinity.

Project Summary Table

Project Description	Environmental Impact	Economic Cost Savings	Status
Agriculture application of Lime	25,000 tons of spent lime diverted from landfill, assistance to local agriculture	$238,750	Implementation in Progress
Bioremediation	Lower concentrations of NH3 and NO3 leaving plant, 2,329.7 MWh electricity 13,140 tons steam reduced airborne ammonia emissions	$188,402 first year	Feasibility Study in Progress
Phytoremediation	NH3 and NO3 concentrations reduced		Implemented