

Nutra-Flo

COMPANY BACKGROUND



Nutra-Flo is a manufacturer and international distributor of crop nutrients and animal supplements. The company is family-owned and operated. It was founded in Sioux City, Iowa in 1928 and has since grown into six different divisions. Nutra-Flo produces products such as liquid phosphate fertilizers, plant foods, zinc micronutrients, concentrated protein feed supplements, protein blocks and energy tubes, and monocalcium phosphate nutrients.



ALEXANDER CONWAY
CHEMICAL ENGINEERING
UNIVERSITY OF IOWA

PROJECT BACKGROUND

Nutra-Flo is committed to its employees and the community in which it has prospered. The Nutra-Flo protein products division, located in Sioux City, Iowa, has onsite odor control equipment because the production of their DPS product can create an odor. Nutra-Flo modified their particulate scrubber to remove the odor as well, but the smell still

persists and the cost of running the scrubber is expensive due to recent sewer rate increases.

INCENTIVES TO CHANGE

The scrubber currently consumes an excessive amount of water and odor control is not 100 percent effective. Because Nutra-Flo is committed to the community it wants to greatly reduce the odor and conserve water. This solution would result in lower operating costs for Nutra-Flo and improve the company's image.

RESULTS

Evaluation of the scrubbing system through a material and energy balance led to several discoveries about the particulate/odor scrubber. The waste air comes to the scrubber from five drum dryers that evaporate water from process slurry, resulting in a steam release. The two stage scrubber removes particulates from the waste gas stream followed by a chemical injection to control generation.

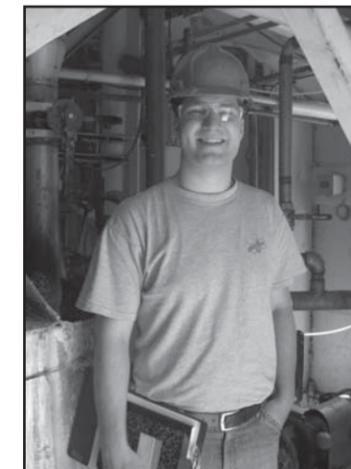
It was discovered that the scrubber was receiving approximately 30 gallons per minute make-up water and about that much was discharged through the sewer to the water treatment facility. The purchase and cleaning costs of this water are very high, so it was determined that the focus of the project would be to reduce this water demand.

Reduction of the large amount of water sent to the scrubber was a priority. A trial was run to evaluate the effects of lower flow rate on solids and chlorine concentrations. The results were favorable and the water reduction was implemented. Water use was reduced by 25 gallons per minute, or 13.1 million gallons per year.

After determining how to reduce water usage and waste, the problem of odor control was addressed. In the second stage of the scrubber a chlorine dioxide solution is sprayed into the waste gas stream. Chlorine



dioxide is an oxidizing agent that eliminates odor by oxidizing the odor-producing compounds in the air stream. To be effective, however, sufficient vapor/liquid interaction must be achieved to allow for oxidation of the odor-causing chemicals. Currently, only a mist eliminator pad was in place and this is designed for vapor/liquid separation without providing the necessary contact for proper oxidation. Therefore, a loose packing will be installed to increase the liquid/vapor contact and reduce odor. The installation of the loose packing increases the liquid/vapor contact by 90 percent, effectively reducing noticeable odor. The pay back for the proposed improvements is estimated at two months.



Air Pollutants Diverted in Tons

	Total for all sectors
SO2	0.65
CO	1.90
NOX	0.49
VOC	0.38
PM	0.19

Green House Gases Diverted in Tons (CO2 Equivalent)

	Total for all sectors
CO2	93
CH4	15.5
N2O	134
CFCS	1.0

Project	Annual Cost Savings	Environmental Results	Status
REDUCE WATER USAGE	\$80,000	13,100,000 GALLONS	IN PROGRESS