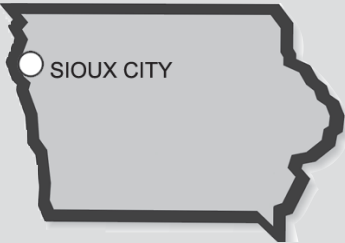


# Nutra-Flo



Nutra-Flo is a worldwide supplier of high-performance fertilizer and animal feed supplements. Founded in 1928, it has since developed six divisions; three dedicated to liquid fertilizer production, and three dealing with animal feed additives. Nutra-Flo is dedicated to improving animal performance through mineral, phosphate, and protein supplements. In addition, it is increasing agricultural yield through brand names such as GoldStart®, Diamond®, Super55® and NuStart®.

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### Project Background

Nutra-Flo recognizes the need for continuous process improvement, not only focused on increasing capacity, but also in reduction of waste and improving its community. Nutra-Flo’s protein products site has had a historical problem with odor control. The odor scrubber responsible for treating emissions from a bank of product dryers is inefficient at odor removal and requires an excessive amount of water to operate.

### Incentives to Change

The elimination of odors from Nutra-Flo’s product dryers is a priority because the company recognizes its responsibility as a facility to produce emissions that are not offensive to its neighbors. Nutra-Flo is also aware of savings in water and energy use that could be realized if the system was designed and operated properly.

### Results

*Consolidation to one scrubber*  
The source of the odor, a bank of four product dryers, will be expanded with the addition of another dryer. There was concern that the extra loading from this dryer would overwhelm the current odor control equipment, and a second scrubber would have to be utilized for further capacity. The intern’s analysis brought attention to the fact that enclosing the dryers will decrease the volume of air that the scrubber has to treat and the scrubber can operate at a lower capacity; therefore, no additional scrubber will be required.

*Keep atomizing nozzle off*  
An atomizing nozzle in the scrubber was designed to remove particulate from the discharge stack. This nozzle requires a 75 HP compressor to

create a fine mist of water for particle absorption. Further research concluded that particles are not contributing to odor from the scrubber emissions. The energy savings from shutting down the atomizing nozzle are 483,000 kWh per year.

*Adding Packing*  
The addition of loose packing would increase the mass transfer within the scrubber by 67 percent. The oxidation reaction that needs to occur between the scrubbing liquid and the odorous compounds requires contact time and adequate surface area to be efficient. Packing would increase this contact time by 400 percent.

*Increase Recycle Rates*  
The scrubber is operating at about half of what is recommended for coverage ratios in spray type scrubbers. An increase in overall recycle rates of 78 percent would give the recommended coverage ratio of 4 GPM/ft².

*Redesign of separator in scrubber*  
Recycle liquor is draining through the current separator within the scrubber, requiring makeup water in excess of 30 GPM. A new design of the separator plate would save 5.6 million gallons of water per year.

*Raise discharge stack*  
In the past, Nutra-Flo has raised the height of the discharge stack by 10 feet and the result was a noticeable difference in the perception of odor. Raising the stack 20 additional feet would allow a greater dispersion of the plume and dilution of any odor.

*Variable Frequency Drive (VFD) on blower*  
Enclosing the dryers will allow the scrubber to treat less volume of air, thereby reducing the load on the blower.



Air Pollutants Diverted in Tons

	Total for all sectors
SO2	0.134
CO	0.466
NOX	0.0
VOC	0.100
LEAD	0.0
PM	0.0

Green House Gases Diverted in Tons (CO2 Equivalent)

	Total for all sectors
CO2	60.0
CH4	13.8
N2O	12.8
CFCS	0.460

Project	Annual Cost Savings	Environmental Results	Status
CONSOLIDATE TO ONE SCRUBBER	\$55,000	285,000 kWh	Implemented
KEEP ATOMIZING NOZZLE OFF	\$22,000	483,000 kWh	Implemented
ADDITION OF PACKING		Reduce odorous emissions	Recommended
INCREASE RECYCLE RATES		Reduce odorous emissions	Recommended
REDESIGN SEPARATOR IN SCRUBBER	\$24,000	5.6 million gallons of water	Recommended
RAISE DISCHARGE STACK		Reduce odorous emissions	Recommended
INSTALL VFD ON BLOWER	\$2,700	60,000 kWh	Recommended

