2014 24-WEEK INTERNSHIP

NUTRA-FLO COMPANY

NORTH SIOUX CITY, SD

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COMPANY PROFILE

Kay Flo Industries, Inc. is a family-owned agribusiness company that manufactures high performance crop and animal nutrients. The company has six facilities throughout the Midwest, located in South Dakota, Nebraska and Iowa. Nutra-Flo, a Kay Flo Industries subsidiary, is one of the largest independent liquid fertilizer manufacturers in the Midwest. Fertilizer goods manufactured by Nutra-Flo include brands such as PureGrade Liquid Fertilizer® and MicroSolutions Micronutrients®, and are sold across the United States and in Canada. In addition to fertilizer products, the company makes high protein animal feed for global distribution.

PROJECT BACKGROUND

As a fertilizer manufacturer, Nutra-Flo produces total phosphorus waste. While discharge levels vary throughout the year, peak levels occur from March through May, when fertilizer production is highest. Nutra-Flo discharges its effluent to the Sioux City Wastewater Treatment Plant. The company would like to reduce phosphorus concentration in its wastewater, as well as reduce the concentration of total suspended solids discharged.

INCENTIVES TO CHANGE

The Sioux City Wastewater Treatment Plant has adopted the Iowa Nutrient Reduction Strategy, a pretreatment standard. Furthermore, Nutra-Flo must comply with existing pretreatment standards for daily total suspended solids and must maintain its wastewater pH within a designated range. Compliance with these standards would have tremendous economic benefit for Nutra-Flo. Tier 2 sewage fees would no longer apply, and enforcement actions from the Sioux City Wastewater Pretreatment Department could be avoided.

RESULTS

North Containment Storm Water Recapture Tank: Leaking pumps, valves and piping collect an estimated 40 percent of total phosphorus concentrations. These concentrations are flushed into a designated tank after rainfall of 1" or more. This storm water could be collected and stored in a storm water surge tank to recycle back into the fertilizer manufacturing process. This would eliminate 428,419 pounds of phosphorus discharge from the sewer. An annual savings of $1,285,000 could be realized through the reduction of wastewater surcharge fees.

South Containment CPS Isolation and Storm Water Recapture: Additional phosphorus concentrations result when unloading products and materials from trucks. To collect storm water and any fertilizer spills from the loading area, it is recommended that all concentrated peptone soluble tank hoses be contained in a barrel or bin to prevent cross contamination. This change would reduce total phosphorus sent to the city sewer by an estimated 642,628 pounds, a $2,000,000 savings annually in wastewater surcharge fees.

Replace Solids Media Shed: To reduce total suspended solids (TSS) discharged to the city sewer, it is recommended that the existing metal holding shed be replaced with an impermeable concrete shed. This change would reduce TSS discharge by 357,000 pounds annually. Payback period for the new concrete shed is roughly two years.

Dry Cleanup of Solids Media: To further reduce TSS, any solids media spilled during waste removal handling should be collected and returned to the used-solids media shed using dry cleanup methods.

Recycle Micronutrient Totes: Micronutrient totes are used to transport components that are vital to Nutra-Flo's production process. The totes could be returned to Nutra-Flo's supplier, which would eliminate one waste stream. The supplier is able to rinse the totes and recycle any micronutrient residuals back into the production process. Additionally, the supplier can reuse the totes for further micronutrient distribution.

Recycle Dryer Drum Steam Condensate: Current practices allow steam condensate with low total dissolved solids to be discharged into floor drains. It is recommended that this steam condensate be recycled back to the boilers for an annual $67,000 savings in energy costs, and a 62,000 therms reduction.

Replace Chemical Scrubber with Bioscrubber: Nutra-Flo has employed a variety of chemical solutions to oxidize odorous compounds in the air. A new model bioscrubber and dry media polisher could reduce annual water consumption by more than 1,000 percent. In addition, $115,000 could be saved annually in chemical costs, and the odors from hydrogen sulfide, volatile organic compounds, and organic matter could be minimized. The payback period for this unit is less than six years.

CONVENTIONAL AIR POLLUTANTS AND GREENHOUSE GASES DIVERTED IN METRIC TONS

From **Implemented** and In **Progress** recommendations

TOTAL FOR ALL SECTORS								
CO_2	SO_2	CH_4	N_2O	CFC	NO_X	VOC	PM_{10}	$MTCO_2e$
1.54	0.01	10.15	5.32	0.02	0.01	0.01	0.01	17.07

CONVENTIONAL AIR POLLUTANTS AND GREENHOUSE GASES DIVERTED IN METRIC TONS

From Recommendations in **Recommended Status**

TOTAL FOR ALL SECTORS								
CO_2	SO_2	CH_4	N_2O	CFC	NO_X	VOC	PM_{10}	$MTCO_2e$
256.74	0.49	934.78	95.97	2.76	0.80	16.38	1.43	1309.35

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
NORTH CONTAINMENT STORM WATER RECAPTURE TANK	$1,338,174	440,276 GALLONS WATER 428,419 LBS PHOSPHORUS 4,930 LBS MICRONUTRIENTS	IMPLEMENTED
SOUTH CONTAINMENT CPS ISOLATION AND STORM WATER RECAPTURE	$2,005,458	296,341 GALLONS WATER 642,628 LBS PHOSPHORUS 7,397 LBS MICRONUTRIENTS	RECOMMENDED
REPLACE SOLIDS MEDIA SHED	$35,121	357,159 LBS TSS	IMPLEMENTED
DRY CLEANUP OF SOLIDS MEDIA	$28	285 LBS TSS	RECOMMENDED
RECYCLE MICRONUTRIENT TOTES	$25,702	7,000 GALLONS WATER 318 LBS MICRONUTRIENTS 90 CHEMICAL TOTES	RECOMMENDED
RECYCLE DRYER DRUM STEAM CONDENSATE	$70,090	620,700 GALLONS WATER 62,267 THERMS	RECOMMENDED
REPLACE CHEMICAL SCRUBBER WITH BIOSCRUBBER	$148,789	6,830,610 GALLONS WATER 16,425 GALLONS HYDROGEN PEROXIDE	RECOMMENDED