IOWA FERTILIZER COMPANY

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COMPANY PROFILE

Iowa Fertilizer Company in Wever, Iowa, is the first greenfield nitrogen fertilizer facility built in the United States in more than 30 years. Iowa Fertilizer produces four commercial products: anhydrous ammonia, granulated urea, urea ammonium nitrate solution (UAN) and diesel exhaust fluid. Their mission is to provide a reliable, stable, and domestic source of nitrogen fertilizer to farmers in Iowa and throughout the United States. The site is equipped with both a production facility and a loadout terminal for their products. The facility is able to produce two million metric tons of nitrogen-based fertilizer products each year at full capacity and currently employs 200 full-time people to operate the plant.

PROJECT BACKGROUND

Iowa Fertilizer Company began initial production operations on April 20, 2017, and was still in the process of commissioning the ancillary facilities to support production throughout the 2017 intern project. These commissioning efforts aim to optimize the operating efficiency of the plant. Wastewater treatment is a part of daily operations and it is key to discharge water within permit limits. A specific process within wastewater treatment is treatment of the blowdown water from the cooling towers to remove any ammonia before discharge. This process design had been installed and needed to be tested and verified before being put into operation. The intern was tasked with verifying the accuracy and efficacy of the ammonia treatment system and recommending system improvements.

INCENTIVES TO CHANGE

As a brand new facility, Iowa Fertilizer Company has worked hard to create an environmentally responsible and safety-first culture among its employees. Iowa Fertilizer is largely invested in the surrounding community and the environment and continually takes precautionary steps to reduce their environmental impact. Commissioning this facility will ensure that all systems are operating at optimum efficiency and in harmony with other processes. Optimizing the performance of the ammonia treatment system for cooling water blowdown will reduce chemical usage and associated costs and help Iowa Fertilizer Company meet its environmental goals.

RESULTS

Blowdown Wastewater Treatment System Improvements: Iowa Fertilizer Company relies heavily on its cooling towers to remove process heat and cool the working fluid used in production. There are two cooling towers on site that continuously discharge water (known as blowdown) to control the buildup of minerals in the cooling water. This blowdown water could also carry trace amounts of ammonia that must be treated before leaving in the effluent water stream for discharge.

The intern conducted a field test on the blowdown wastewater treatment facility to collect pertinent data and information to make recommendations for the company. Numerous tests were conducted that concluded that the treatment system had opportunities to function better. Based on the concentration of ammonia, there could be insufficient reaction time between successive chemical treatments which, if left unaddressed, could potentially result in the discharge of untreated wastewater. To solve this issue, it is recommended that the chemical injection points be relocated to increase the contact time between contaminated water and the chlorinating agent.

The intern developed and completed extensive supplementary tests to determine where the injection points should be placed for optimum treatment. Multiple options were evaluated, with the intern recommending that the reaction length distance be quadrupled as compared to its current length. This recommended design also includes the implementation of an additional static mixer to increase contact time. An additional static mixer in the line will act as a safeguard to ensure that as the flow rate of the blowdown varies, the chlorination reaction will proceed to completion prior to the dechlorination step. This project is a preventative measure that would improve ammonia removal and reduce the risk of unintended releases.

Downsize the Sodium Bisulfite Pump: Even at its lowest setting, the sodium bisulfite (SBS) pump currently doses six times the required amount of sodium bisulfite to the blowdown stream. Plans are currently underway to replace this oversized pump with a smaller one by the same manufacturer that is already onsite but currently unused. If dosed correctly with the substituted pump, Iowa Fertilizer Company could reduce their annual use of sodium bisulfite by nearly 69 tons. In addition to reduced chemical usage, the smaller pump would also consume less energy. Downsizing the sodium bisulfate pump could save Iowa Fertilizer $23,147 per year.

PROJECT	ANNUAL COST SAVINGS	ANNUAL ENVIRONMENTAL RESULTS	STATUS
BLOWDOWN WASTEWATER TREATMENT SYSTEM ANALYSIS	$35,850 (one time)	-	IMPLEMENTED
BLOWDOWN WASTEWATER TREATMENT SYSTEM IMPROVEMENTS	-	0.88 tons NH_3	IN PROGRESS
DOWNSIZE SBS PUMP	$23,147	68.99 tons SBS 1,778 kWh	RECOMMENDED