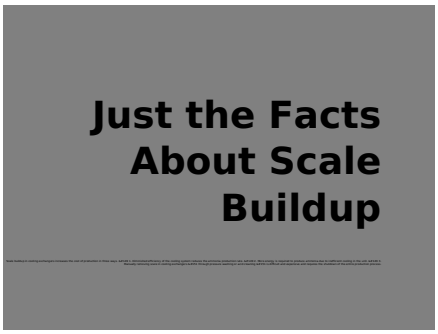
Unique Solution at Fertilizer Complex Brings About Much Better Efficiency With No Shutdown

Company saved 114 million cubic feet of natural gas through the use of a proprietary blend of organic acids formulated to remove calcium carbonate scale from its cooling systems

By Jean Sabourin



Agrium Redwater Fertilizer Operations, located northeast of Edmonton, Alberta, is considered the largest fertilizer complex in Canada and one of the largest in North America with an annual ammonia production capacity of 960,000 metric tons and a total nitrogen product capacity of 1,400,000 metric tons. Its Ammonia I Unit was experiencing low production efficiency due to suspected calcium carbonate scale in the cooling system, resulting in poor heat transfer in the cooling exchangers. The cooling system circulates water in an open loop between the process stream and the cooling exchangers. The heat from the process is released to the atmosphere in the form of water vapor at the cooling tower. The efficiency of the cooling system is critical in anhydrous ammonia production because the process involves the heating of gasses to 1,400&#176F and then the cooling of the product to -27&#176F. Scale buildup in the cooling exchangers dramatically increases the cost of production in three ways. First, diminished efficiency of the cooling system reduces the ammonia production rate. Second, more energy is required to produce ammonia due to inefficient cooling in the unit. Third, manually removing scale in the cooling exchangers &#151 through pressure washing or acid cleaning &#151 is a difficult and expensive process that requires a shutdown of the entire production process.

Agrium turned to GE Water & Process Technologies (W&PT) to analyze the reduced efficiency of the cooling system and recommend a solution. W&PT is the company's chemical supplier for water treatment and works closely with the fertilizer complex to find innovative ways to improve chemical usage efficiencies and reduce energy consumption. An analysis by W&PT confirmed that the diminished performance of the heat exchangers was caused by buildup of calcium carbonate scale, a type of precipitation. After

evaluating the possibility of localized chemical cleaning of specific exchanger components, W&PT recommended the application of Ferroquest LP-7202 to the entire cooling circuit. Ferroquest LP-7202 is a proprietary blend of three organic acids, specifically formulated to remove calcium carbonate scale from cooling systems. Ferroquest LP-7202 was used successfully to remove scale from the heat exchanger surfaces. In the four-month production run after the chemical cleaning, unit production increased while 114 million cubic feet of natural gas was saved due to better efficiency of the cooling system. This amount is equivalent to a reduction of the energy coefficient by 1.3 gigajoules per metric ton of ammonia produced. In addition, the use of Ferroquest LP-7202 eliminated production downtime for scale removal. The decreased energy consumption has produced not only a significant cost savings, but it also means that less natural gas, a limited natural resource, is required. Thus, less carbon dioxide and nitrogen oxide are emitted, which is good for the environment. *Jean Sabourin is the chief steam engineer at Agrium Redwater Fertilizer Operations. GE Water & Process Technologies is a leading supplier of water treatment, wastewater treatment and process systems solutions headquartered at 4636 Somerton Rd., Trevose, PA 19053. Additional information is available by calling 215-355-3300 or visiting www.gewater.com.*

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