

# Ferroquest\* LP-7202 Helps Agrium Redwater Save 114 Million ft<sup>3</sup> of Natural Gas

## Challenge

Agrium Redwater Fertilizer Operations (RFO), located 28 miles (45 km) northeast of Edmonton, Alberta, is the largest fertilizer complex in Canada and one of the largest in North America, with an annual ammonia production capacity of 960,000 tonnes and a total nitrogen product capacity of 1,400,000 tonnes.

The Ammonia I unit at the RFO site 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 heating gasses to 1400°F (760°C) and then cooling the product down to -27°F (-33°C).

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 of scale in the cooling exchangers (through pressure washing or acid cleaning) is a difficult and expensive process that requires a shut-down of the entire production process.

## Solution

Jean Sabourin, the Chief Steam Engineer at the RFO complex, turned to GE Water & Process Technologies to analyze the reduced efficiency of the cooling system and to recommend a solution.

"We contract with GE as our treatment consultant and chemical supplier for water treatment," says Sabourin. "We work closely with them, and we expect innovation and improvement not only in the efficiencies of chemical usage, but also in other ways, such as reducing our energy consumption."



An analysis by GE 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, GE recommended the application of Ferroquest LP-7202 to the entire cooling circuit. Ferroquest LP-7202 is a GE proprietary blend of three organic acids, specifically formulated to remove calcium carbonate scale from cooling systems.

## Results

"Ferroquest LP-7202 has proven very successful in removing scale from the heat exchanger surfaces," according to Sabourin. "In a production run from July through October 2004, we increased our unit production and reduced our natural gas consumption by saved 114 million ft<sup>3</sup> of natural gas due to increased efficiency of the cooling system. This was equivalent to a reduction of our energy coefficient by 1.3 gigajoules per tonne of ammonia produced."

During the production run after the introduction of Ferroquest LP-7202, the efficiency of the cooling system has remained constant, eliminating any production downtime for scale removal.

"We are very pleased with the results," says Sabourin. "The decreased energy consumption has not only produced a significant cost savings, but it also means that we require less natural gas, a limited natural resource, and we are therefore emitting less carbon dioxide, and nitrogen oxide, which is good for the environment."



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