NALCO Water
An Ecolab Company

Gas processing plant reduces daily hot valve problem with innovative Inlet Integrity Program

CASE STUDY

BACKGROUND

When gas enters a gas processing facility, it contains more than just methane, ethane, and propane. Its composition will often contain acid gases, such as H_2S and CO_2, water, condensate, and various foulants, solids and salts. The function of the gas processing plant is to remove these contaminants to ensure the natural gas for domestic and industrial use burns cleanly and contains levels of the acidic gases, respectively, as required by the government and gas crackers that convert the gas to value-added ethylene and propylene.

The heart of the gas processing plant is the Acid Gas Removal Unit (AGRU) that will contain, among other components, an amine absorber and amine stripper to remove the H_2S and CO_2. These pieces of equipment use an amine to absorb the acid gases from the incoming sour stream and release them in the stripper. In order for this equipment to work properly, the plants will often have equipment in the front of the plant, such as an inlet separator to remove solids and compressors to get the gas to the correct pressure.

SITUATION

A gas processing facility near Midland, TX was processing 275 MMSCF of gas per day. About 75 MMSCFD of the gas was going through the Low-Pressure (LP) Compressors.

There are 7 LP Compressors at this facility, which were located immediately downstream of the inlet separator. The inlet separator was a three-phase separator, designed to separate the water, condensate, and gas.

The plant was experiencing high fouling rates in the LP Compressors, leading to frequent cleaning requirements. An average of one compressor per day went down due to hot valves and required maintenance and cleaning.

These cleanings were creating high costs for the plant, taking up personnel time, and would occasionally lead to flaring gas that is backed up.

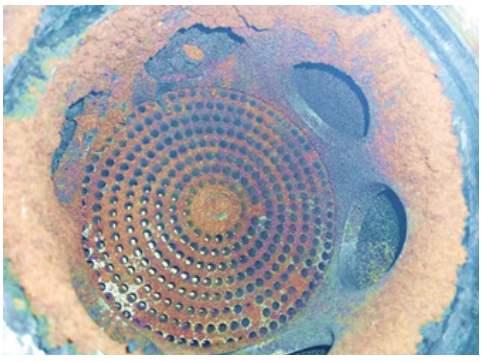

FIGURE 1: A typical compressor valve with fouling.

Figure 1 is a typical valve from the compressors with the fouling that would build up each week. This quickly became the biggest issue on the plant manager's mind.

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ANNUAL SAVINGS

GREENHOUSE GASES

1,255 metric tonnes of CO_2

LABOR PRODUCTIVITY

$71,600

reduced maintenance time

LOCATION PRODUCTIVITY

$58,647

228 MMSCFs not flared

ASSET PROTECTION

$179,000

TOTAL VALUE DELIVERED

$309,247

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SOLUTION

The plant manager asked Nalco Water to help find a solution to this ongoing issue. The first step was to identify the chemical composition of the deposits. Samples were sent to the Nalco Water Analytical Lab for analysis, and it found that the deposit mainly consisted of salt[1].

Nalco Water recommended feeding EC3699A, a compressor antifoulant that is part of the Inlet Integrity Program. This product is engineered to help remove more solids and dissolved salts (brine) from the gas stream in the inlet separator, allowing them to be blown down with the water.

The EC3699A[2] was fed into the pipeline a few feet in front of the inlet separator using an atomizer to ensure proper distribution into the gas stream. Samples of the blowdown water were taken and analyzed for salt content and the plant monitored the compressors to see if there was any change in the maintenance frequency of the compressors.

RESULTS

The blowdown samples showed a large salt increase in the water, see Figure 2. The average salt content in the water increased almost 250% from the pretrial samples. This data was a leading indicator that the product was removing the foulant in the inlet separator, preventing it from traveling to the compressors. However, the main criteria of the trial was to see an increase in the period between successive down times and a reduction in the frequency of compressor maintenance.

The plant had cleaned Compressor #7 directly before the beginning of the trial. This was their most troublesome compressor, requiring cleaning at least once every three days.

Compressor # 7 was chosen as a basis for the trial. Two weeks into the trial, the compressors were showing no signs of issues. The plant manager decided to open up Compressor #7 to see if there was any build up. Figure 3 is the Compressor #7 valve at the time of opening. According to the plant manager, he had never seen a valve this clean after more than three days of use.

The trial continued without any issues from Compressor #7 or the other compressors for the next 8 weeks. Eventually, the compressor was opened due to a mechanical failure unrelated to the fouling. Figure 4 shows the Compressor #7 valve after ten weeks of chemical feed.

CONCLUSION

During the 10-week trial, no compressors went down due to fouling or hot valves. The plant went from daily compressor maintenance to going two and a half months without incident, allowing them to focus their time and energy on improving other parts of the plant. The absence of compressor maintenance also saved them maintenance manhours, replacement parts for the compressors, and reduced flaring. In total, the savings was estimated to be about $310K per year.

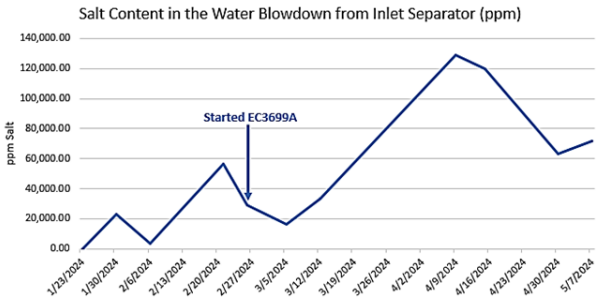

FIGURE 2: Blowdown samples.

FIGURE 3: Compressor #7 valve at the time of opening.

FIGURE 4: Compressor #7 valve after ten weeks of chemical feed.

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[1] Three samples were analyzed, which should an average of 74% NaCl in the deposits.
[2] EC3699A was fed at 14ppm into the gas stream.