



Online Deposit Monitoring and Antiscalant Program Improves Control of Scale and Reduces Operational Costs

OnGuard™ 3S analyzer and Zalta™ MA11-440 antiscalant

Customer Overview:

- Segment: Mining - Lead/Zinc Smelter
- Product(s): Lead and zinc
- Location: Eastern Canada

Application Overview:

- Type: Gypsum scale prevention
- Equipment: Reclaimed Water (RPW) System
- Capacity: 550 - 600 gpm
- Other: Conductivity: 15,000 - 31,000, pH: 1.8 - 6.0, Total hardness 7,000 - 8,000

Existing Treatment:

The incumbent treatment program consisted of two antiscalants being fed to the process water. Performance was monitored through the use of retractable scale coupons, visually inspected weekly by mine personnel.

Problem Summary:

The incumbent antiscalant program was not controlling scale formation to an acceptable level, resulting in reduced production and extended maintenance, including cleaning of the scrubber, process water lines, and spray nozzles. During operations of low pH, antiscalant feedrates were increased, with minimal effect. Consequently, a second antiscalant was introduced into the program. Its use during low pH conditions reduced some of the scale formation, but added significantly to the program costs.

Retractable scale coupons were installed in the process water to monitor antiscalant performance. They were inspected weekly by mine personnel. The coupons typically showed significant deposition of calcium sulfate scale (gypsum) over short periods of time.

Customer Objectives:

- Single product application
- Ability to control scale across a wide pH range (1.8-6.0)

- A method of monitoring performance of the antiscalant program on a continuous basis
- Reduce the overall operational cost without negatively impacting performance
- Reduce the time needed for maintenance involved with removing scale formed in the scrubber, pipes and spray nozzles

Solenis Solution:

Solenis recommended a multi-faceted approach to addressing the customer needs. In preparation for a trial, process water samples were analyzed and lab tests were run to determine the optimum antiscalant. Zalta MA11-440 antiscalant was selected based on the test results, showing efficacy to control gypsum scale across a wide pH range.

To address the mine's desire to monitor antiscalant performance continuously, Solenis utilized its patented OnGuard 3S analyzer to measure deposit formation, as well as probes to monitor pH and conductivity on-line. The analyzers were installed in the process water line and connected to the Solenis' OnGuard™ OnLine program, to allow for continuous remote monitoring. Base line data was generated for one month prior to the Zalta MA11-440 antiscalant trial. During this time, a hard scale deposited onto the OnGuard 3S probe, to a depth of 220 micrometers.

At the start of the trial, Zalta MA11-440 antiscalant was dosed at 50 ppm based on process water flow, and results were excellent based on scale monitoring, with no visible fouling noted on the probe. In optimizing the treatment based on the data being generated by the OnGuard 3S analyzer, the antiscalant feedrate was reduced to 35 ppm. At this dosage, a soft mud-like material deposited on the analyzer, which was periodically washed off by the normal flow through the operation. At a lower treatment of 30 ppm, a hard deposit that was not easily removed began to form on the probe. This indicated that the minimal threshold for the Zalta MA 11-440 antiscalant was 35 ppm for the application.

The mine opted for this dosage, and was able to monitor its performance remotely through Solenis' OnGuard OnLine program.

Customer Benefits:

- Improved results through the elimination of hard gypsum scale, across the wide pH range of the mine operation
- Real time visibility into deposition and program performance
- Reduced maintenance costs associated with cleaning fouled equipment
- Simpler approach through feeding a single product at all times
- Reduction in mine antiscalant treatment spend, with no adverse impact on the process

Conclusion:

The Solenis program helped the smelting operation to achieve its key objectives of improving scale control

performance at a lower operational cost, and the ability to more accurately monitor antiscalant performance, on a continuous basis. The Solenis program reduced the mine's spend by \$150,000 through the use of Zalta MA11-440 antiscalant.

Additionally, the mine reduced the costs and time associated with cleaning and removing hard gypsum scale from the process lines, spray nozzles and scrubber. This increased their run time, improving their production rates.

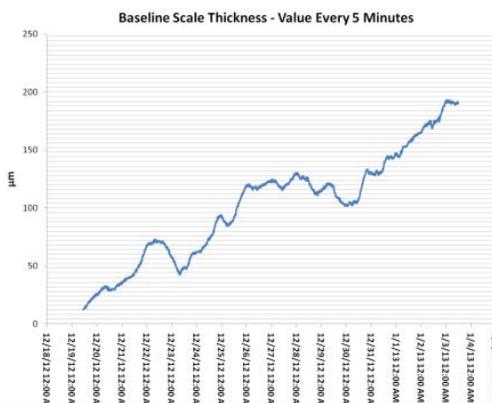
The OnGuard 3S analyzer allowed the mine to optimize the treatment level to realize economic savings without compromising their operation. Additionally, the analyzer, in conjunction with the conductivity and pH probes, helped the mine to identify process upsets and address them with adjustments to the antiscalant feedrate in a proactive manner, optimizing the cleanliness of the process.



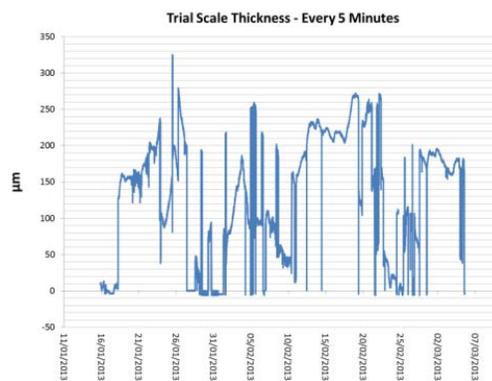
Scale on probe during competitive trial; difficult to remove



Soft, easily removable deposit at 40-50 ppm of Zalta 11-440 antiscalant



Continuous build-up of scale during competitive program



Build-up and slough off of soft deposit at 40 - 50 ppm of Zalta 11-440 antiscalant