SCALE-GUARD™
Increases Production at a Phosphoric Acid Plant

BACKGROUND
Throughout the world, calcium sulfate scale in phosphoric acid plants is a daily cost of doing business. This cost is especially felt in the evaporators, where the acid is concentrated up to 54%. This scale results in:

• Lost evaporator efficiency during the entire production campaign
• Lost production because of cleanings
• Increased expense because of cleaning
• Cleaning operations which can injure employees and damage equipment

Industry leaders have long desired a solution which would transform gypsum scale from a hard and tenacious crystalline structure, to a softer compound which would transfer heat more efficiently and be much easier to clean.

SITUATION
In a U.S. phosphoric acid plant, the evaporator production campaign lasted 3 weeks, on average. At the end of each campaign, the plant would spend a little over 1.5 days to clean the evaporator for the next production run. Each campaign would produce approximately 370 metric tons (MT) of 54% phosphoric acid per day.

This was their normal operation for many years. Then, their Nalco Water Mining sales rep approached them with a different way.

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<thead>
<tr>
<th>CUSTOMER IMPACT</th>
<th>ECONOMIC RESULTS</th>
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<tr>
<td>Increased daily production by 10 MT</td>
<td>Increased annual 54% annual acid produced $4,891,666</td>
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<td>Extended production campaigns by 100%</td>
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<td>Recovered 13.9 production days</td>
<td>$95,000 per year</td>
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Reduced maintenance cost by decreasing cleaning frequency from 16 times per year to 8.3.

eROI is our exponential value: the combined outcomes of improved performance, operational efficiency and sustainable impact delivered through our services and programs.
The SCALE-GUARD™ program, consisting of several products formulated to inhibit evaporator scale, was introduced with the goals of:

- Increasing the length of the production campaign
- Decreasing cleaning time
- Decreasing cleaning intensity

Scale samples from the evaporator’s heat exchanger were taken and sent to Nalco Water’s analytical laboratories, where the elements of the compounds, as well as the make-up of the crystalline structure, were identified. With this information, Nalco Water’s chemists were able to identify the correct SCALE-GUARD™ product and dosing regimen. EP310 was chosen. A plant trial was recommended.

**SOLUTION**

SCALE-GUARD EP310 was applied at the recommended dose and dosing points. The production campaign lasted 6 weeks, a 100% improvement over their historical operation. Not only did the campaign last longer, it produced more acid. With EP310, the average daily production of 54% acid increased by 10 MT to 380 MT during EP310 trial.

![Figure 3](image)

**CONCLUSION**

By implementing SCALE-GUARD EP310, Nalco Water was able to extend the production campaign of the evaporator from 3 weeks to six weeks, resulting in 13.9 additional days of production per year. This netted the plant an additional annual production 8152 MT of 54% phosphoric acid. Nalco Water’s SCALE-GUARD EP310 also decreased wash time by 66% and wash intensity by 33%, reducing cleaning and labor costs while increasing productivity.

The most valuable aspect of the program, according the customer, was that daily production was increased by 10 MT. The total potential revenue gained from this new program was $4,891,666 per year.