Treating the hard to treat

Case Study: AquaPure

Reducing Hexavalent Chrome and Cadmium Simultaneously in Wastewater Treatment

The Challenge

A military metal finishing operation in Pennsylvania was repeatedly having trouble treating hexavalent chromate rinses, which contained cadmium in the wastewater.

The Approach

After investigating the system and doing a thorough analysis, the Hubbard-Hall team set up a system to treat the rinses bearing hex chrome and cadmium in the same tank.

AquaPure I-300 was used for chrome reduction. It is a ferrous-based liquid-blend cationic coagulant /metal precipitant that is superior in settling suspended solids. This coagulant also contains conditioning agents that help tie up oil and grease. It is generally used in conjunction with an anionic flocculant. **AquaPure I-300** can be used in an alkaline precipitation of metals or combination with a metal precipitant.

AquaPure P 601 was used to treat cadmium to low levels and ensure all chelated metals were reduced. **AquaPure P 601** is a wastewater treatment chemical designed as a heavy metal precipitant for waste treatment systems. It is effective for various metals and works over a wide pH range. The results with **AquaPure P 601** are instantaneous, and it may be added as a single dose, but it is most effective when metered into a waste stream.

Executive Summary

A Pennsylvania military metal finishing operation partnered with Hubbard-Hall to resolve challenges in treating hexavalent chromate and cadmium, achieving compliance through advanced treatment processes.

- Hubbard-Hall implemented a tailored solution for hexavalent chromate and cadmium treatment.
- Facilitated regulatory compliance through advanced chemistry and processes.
- Enabled efficient treatment of up to 30,000 gallons of wastewater daily.

The tank was simultaneously dosed using both **AquaPure I-300 and P 601** in the equalization tank. The pH is maintained at 6 in the equalization tank for the best reduction of the hex chrome. The **AquaPure P 601** is used to treat chelated cadmium to low levels. The second stage treatment tank was used for pH adjustment to 9.5, followed by adding a high-strength, boosted anionic flocculant: **AquaPure AS Plus**. The solids are then sent to a standard inclined plate clarifier for settling and pressed out in a plate and frame filter press.

The Outcome

The **AquaPure I-300**—which was added by simple ml/ gal dosing—not only reduced the hexavalent chrome at a pH of 6, but it also eliminated the addition of bisulfite at a pH of 2 while adding weight to the flocculant formation to aid in quick settling in the clarifier.

AquaPure P 601 was added by oxidation-reduction potential and was metered in simultaneously with the **AquaPure I-300** and caustic sodas used to maintain the pH at 6. The **AquaPure P 601**, a chelate breaker, ensured the cadmium would be precipitated out at the low level required for discharge. **AquaPure AS PLUS** was added as a standard 0.01% stock solution for quick settling.

After the installation, the wastewater was successfully treated between 15,000 and 30,000 gallons per day and was set up as a flow-through system with tanks in series. The starting concentrations showed hexavalent chromium at 12 ppm, cadmium at 0.6 ppm, zinc at 10 ppm, and nickel at 15 ppm. After treatment, the ending concentration demonstrated that hexavalent chromium was non-detected, cadmium was reduced to 150 ppb, zinc was down to 0.2 ppm, and nickel was lowered to 0.5 ppm.

"Our tailored treatment solution not only resolved persistent wastewater challenges but also ensured regulatory compliance and significantly enhanced operational efficiency."

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