

## Simultaneous Metal Treatment and Hexavalent Chrome Reduction

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A well known military metal finishing operation in Pennsylvania was having trouble treating hexavalent chromate rinses that also had cadmium in them. Our team of experts set the system up to treat both the hex chrome and cadmium bearing rinses in the same tank. The Aquapure I-300 was used for chrome reduction and the Aquapure™ P601 was used for treating cadmium to low levels and to ensure all chelated metals were reduced. This was achieved by simultaneously dosing both Aquapure™ I-300 and P 601 in the equalization tank. The pH is maintained at 6 in the equalization tank for best reduction of the hex chrome. The Aquapure™ P601 is used to treat chelated cadmium to low levels. The 2<sup>nd</sup> stage treatment tank was used for pH adjustment to 9.5 followed by the addition of 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 Aquapure™ I-300 (added by simple ml/ gal dosing) not only reduces the hexavalent chrome at a pH of 6, it also eliminates the addition of bisulfite at a pH of 2 while adding weight to the flocculant formation to aid in quick settling in the clarifier.

The Aquapure™ P 601 (added by oxidation-reduction potential) is metered in simultaneously; next to with the Aquapure™ I-300 and caustic sodas used t maintain the pH at 6. The Aquapure™ P 601, a chelate breaker, insures the cadmium will be precipitated out at the low level required for discharge.

Aquapure™ AS PLUS, a boosted anionic flocculant is added as a standard 0.01% stock solution for quick settling.

- 1). Volumes: wastewater is treated from 15,000 – 30,000 gallons/day
- 2). System is set up as a flow through system with tanks in series
- 3). Starting concentrations showed Cr= 12 ppm and Cd at 0.6 ppm, Zn=10 ppm, Ni= 15 ppm
- 4). After treatment ending concentration were Cr= non detect and Cd 150 ppb, Zn= 0.2 ppm, Ni = 0.5 ppm

Recommended procedure is as follows:

- 1). Tank #1 – Cr rinses pH 6, addition of Aquapure™ I-300 at 1 ½ ml/gallon and Aquapure™ P 601 added by ORP to -25mV.
- 2). Tank 2 – Equalization tank – mix acids and bases together with reduced Cr rinses. Adjust up to 8 with caustic soda.
- 3). Tank #3- adjust pH to 9.5 with caustic soda while feeding in Aquapure™ AS Plus at 10 ppm.



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4). OFF LINE is a flash mix tank where diluted polymer is made down and metered in from a “day tank”. The dilution is 0.1% with tap water and metered in to tank #3 at a dose of 10 ppm.

5). Clarifier: A clarifier with inclined plates is used to create a quiet area for the solids to fall against and run along the incline plates allowing the sludge to fall to the bottom where solids are pumped off to a sludge thickening tank or to a plate and frame filter press. This press fills with solids that are removed after the pump slows down and the press is full. The plates are loosened and sludge is scraped down allowing the solids to fall into a hopper for hauling away.

**PRODUCTS USED:**

Aquapure™ I-300: Coagulant for chrome reduction and charge neutralization

Aquapure™ P 601: Metal precipitant

Aquapure™ AS Plus: High charged powdered anionic flocculant