

CHROME PLATING, MICHIGAN

THE CHALLENGE

The facility has a highly acidic waste stream (pH <1) that contains high levels of chromium, zinc, and iron as well as a number of chelating/complexing chemicals. The wastewater treatment system is running at a flow rate of 56 gpm. Ferrous iron (Fe²⁺) from the acid pickling bath is used to reduce Cr (VI) to Cr (III). Lime slurry is added to raise the pH and precipitate metal hydroxides and a flocculent is introduced to enhance sedimentation in the clarifier. Treated effluent passes through a sand filter and then released to POTW sewer. The treatment fails to maintain compliance and, consequently, dithiocarbamate which is noxious and toxic, is frequently applied to the effluent to reduce metal levels to meet discharge requirements. It also generates large volume of sludge which must be dried and hauled away as hazardous material.

THE SOLUTION

Due to the very acidic nature of the waste stream, it was recommended that the pH be adjusted with caustic to about 4 - 5 before the addition of AQUASIL® AMX-5M. The product is slurried, using a Powder-to-Slurry Feed System and metered directly into the treatment tank. Large, dense floc forms within a few minutes and settles quite efficiently in the clarifier. The treated effluent is very clear and free of pin floc and the use of the sand filter is no longer necessary. Metal concentrations in the effluent are more than ten times lower than municipal discharge limits. The treatment generates a much drier solid waste that passes the TCLP. Table below shows the analytical results of before and after treatment.

| Parameter | Daily Maximum (mg/L) | Before(mg/L) | After(mg/L) |
|-----------|----------------------|--------------|-------------|
| Cadmium | 1.20 | 1.30 | < 0.002 |
| Chromium | 7.00 | 127.00 | < 0.05 |
| Iron | 1000 | > 10,000 | < 1.0 |
| Zinc | 4.20 | 145.20 | 0.22 |
| pH | 6.5 – 9.5 | 7.40 | 8.7 |

The AQUASIL® treatment eliminated lime, flocculent, and the noxious dithiocarbamate. Analysis of the leachate (TCLP) showed zinc* at 339 ppm and chromium at < 0.5 ppm; regulatory limits are 500 ppm for zinc* and 5 ppm for chromium.

* Zinc is no longer regulated in the State of Michigan.

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