

Client Success Story: Rare Earth Metals Recovery Company

Company profile

Application: Rare Earth Metals Recovery Company, which is located in Albany, Oregon, recovers rare earth metals (zirconium, hafnium and titanium) via various proprietary chemical processes.

Wastewater Description: The wastewater consists of methyl-isobutyl-ketone (MIBK) <2%, ferric chloride, hydrochloric acid, sulfuric acid, thiocyanic acid, lime, sodium hydroxide, zirconium, iron, hafnium, aluminum and water. The distillation bottoms containing metals are delivered to the existing precipitation clarifier for final treatment before discharge to the POTW.

Waste Disposal Goals: The company's waste disposal goal was to isolate and remove MIBK. The recovered MIBK was purified and used in the rare earth metal recovery process.

Wastewater treatment challenge

Former Process: Client was using a standard physical chemical treatment to precipitate residual metals and phase separate MIBK from their proprietary recovery processes. The prior system utilized coagulation, flocculation, pH control and post filtration. The current separation methodology utilizes copious amounts of water for the extraction and chemical make-up processes. All aqueous streams from the metals separation process either gravity drain or are pumped to a large circular clarifier. The waste is then treated with coagulants (FeCL₃) and then with lime to precipitate the metals. MIBK was removed by phase separation when concentrations allowed.

The settled sludge from the clarifier is then delivered to a plate and frame filter press for dewatering. The resulting press filtrate is reintroduced to the clarifier. The treated effluent is then discharged to the local POTW. The pressed sludge cake is removed as F-006 waste by a licensed hauler.

CASTion solution

The R-CAST designation implies a reversal of the normal distillation process. In the normal aqueous distillation technique there are two components present, water and solids (suspended and dissolved). With the normal CAST separation process, dissolved and suspended solids are separated from the combined mixture. The water fraction or distillate (condensed liquid) is collected in a separate tank and the still bottoms that contain the dissolved and suspended solids are delivered to a separate vessel (the concentrate tank). When using the R-CAST approach, there are normally three components to the mixture: water, solids and an organic solvent. When the R-CAST method is employed, the collected condensed liquid is the solvent fraction. The solvent fraction is delivered to the distillate tank, and the still bottoms that contain the water and solids fractions are continuously discharged from the system.



The R-CAST system for this application was designed for stripping MIBK (the solvent) from the three component feed stock. The process feed is circulated at 50 gallons per minute and mildly heated. The liquid is then sprayed into the process vessel, which is maintained at -28 inches of HG. The high operational vacuum combined with the lower enthalpy of vaporization for MIBK (compared to that of water) results in rapid stripping of the volatile solvent. The solvent is condensed and contained in separate product tank for reuse. Operational temperatures are kept at a minimum thereby decreasing the likelihood of water carry-over into the solvent fraction.

The MIBK solvent is pressurized with nitrogen and aspirated back to the Metal Separations Plant. The solvent is then reused in the metal reclamation process. The still bottoms that contain the remaining fractions (water and the solids) are delivered to the existing precipitation treatment plant. The final treated effluent is then sent to the local POTW.

Contact CASTion

Rare Earth Metal Recovery Company now operates more efficiently and cost effectively. Contact CASTion today to learn how we can help your company achieve its waste disposal and recovery goals.