



ACID MINE DRAINAGE (AMD)

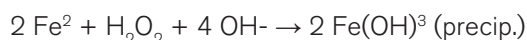
Project Scope

A Northeast Acid Mine Drainage (AMD) treatment facility was using calcium hydroxide (lime) to precipitate iron from the mine pool water. The iron in the water stream is in soluble form known as ferrous iron (Fe^{2+}). Lime was used to raise the pH of the water from 6.2 s.u. to over 8.0 s.u. to precipitate out ferrous hydroxide ($\text{Fe}(\text{OH})_2$).

USP Technologies (USP) was selected as the Hydrogen Peroxide program provider for this Northeast AMD treatment facility for our full service, turn-key approach.

Technology

Hydrogen peroxide (H_2O_2) has been widely used to accomplish the same task by oxidizing soluble ferrous iron (Fe^{2+}) to ferric iron (Fe^{3+}), creating ferric hydroxide ($\text{Fe}(\text{OH})_3$) which precipitates out of solution. The reaction is nearly instantaneous as follows:



A near neutral to alkaline pH is typically required for high levels of iron removal. Therefore, some pH adjustment may be necessary prior to hydrogen peroxide addition.

Solution

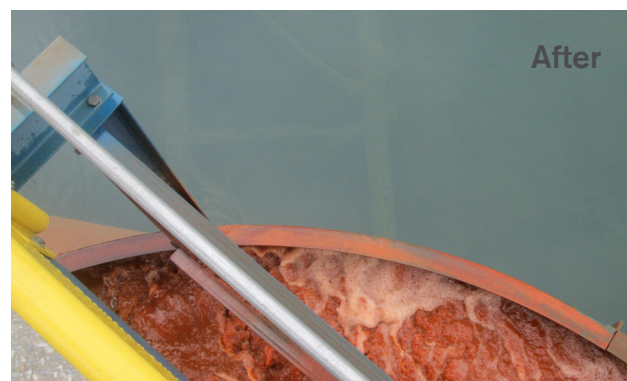
The facility treats an average flow of 4,000 gallons per minute (gpm) or roughly 5.67 million gallons per day (MGD) with an iron concentration of 30 mg/l. Before hydrogen peroxide was used, lime was added at a rate of 6.94 lbs per pound of iron. The theoretical dose rate of hydrogen peroxide required to oxidize iron is 0.3 lbs of hydrogen peroxide (100% weight basis) per pound of iron. Hydrogen peroxide's selectivity to react with iron is instantaneous. A complete reaction is accomplished in seconds and therefore, the actual dose rate was 0.37 lbs of hydrogen peroxide (100% weight basis) per lb of iron.

USP's turn-key program reduced chemical expenses by greater than 60%, solids were reduced more than 80%, and energy costs decreased by nearly 25%.



Before

Clarifier using Lime

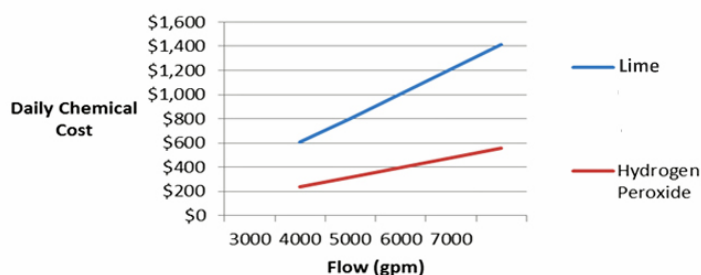


After

Clarifier using Hydrogen Peroxide

Upon addition of hydrogen peroxide and through continued operation, it was noted that the pH of 6.2 s.u. was sufficient to precipitate the iron out of solution; therefore, no additional adjustment was required. *The lime was completely eliminated, resulting in greater than 60% reduction in chemical expenses alone (Figure 1).* Additionally, there had been a significant reduction in solids generation of greater than 80%, which also resulted in an energy savings of nearly 25%, and significant reductions in labor associated with the maintenance of the lime system.

Fig 1. Cost Comparison Between Lime and Hydrogen Peroxide



Turn-Key Scope of Supply

Equipment

USP-3000 system consisting of a 3,000-gallon, double-wall HDPE storage tank with 110% integral secondary containment and all required placarding.

A dual pump chemical dosing module sized to meet chemical dosing requirements equipped with a PLC for SCADA integration, flow pacing, etc.

All system components are pre-plumbed, pre-wired, and passivated to ensure ease of installation and to maintain operational safety and product quality.

Field Services and Program Management

USP field service personnel installed, commissioned and maintained the entire system to ensure operational reliability. The dedicated Program Manager provides technical application support and program optimization for the duration of the program.

Chemical Inventory Management

USP's ChemWatch™ inventory management system provides remote monitoring capability and automated delivery notifications. This eliminates the need for our customer to place an order, and prevents running out of chemical, which ensures compliance with discharge requirements.

Pre Start-up Safety Review

Full process safety review and on-site training for associates.

About USP Technologies

USP Technologies is the leading supplier of peroxygen-based technologies and services for environmental applications. We have been serving the water, wastewater and remediation markets for over 20 years and have offices and field service locations throughout North America. Our consultative approach to problem solving includes application assessment, technology selection and development of a tailored treatment approach. Our full service programs successfully integrate storage and dosing equipment systems, chemical supply, inventory and logistics management, and ongoing field and technical support. This approach provides cost-effective, "hands-off" solutions to our customers. USP Technologies also can provide access to experienced application partners for a turn-key program encompassing engineering, site characterization and technology selection, program implementation, execution and report generation.

Getting Started

We look forward to supporting your treatment needs, whatever the scale of your requirements. To obtain a streamlined treatment solution tailored to your specific project, give us a call at (877) 346-4262.

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