

## **CASE STUDY**

# **Alpine County, California Rotating-Cylinder Treatment System**

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**Prepared by  
The Interstate Technology & Regulatory Council  
Mining Waste Team**

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# ALPINE COUNTY, CALIFORNIA ROTATING-CYLINDER TREATMENT SYSTEM

## 1. SITE INFORMATION

### 1.1 Contacts

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<https://wvmdtaskforce.files.wordpress.com/2016/01/06-tsukamoto.pdf>

### 1.2 Name, Location, and Description

Site is located in the Sierra Nevada Mountains of California. The two sources of acid mine drainage emanate from a waste rock pile. Seasonal treatment is maintained during times the site is deemed safely accessible.

## 2. REMEDIAL ACTION AND TECHNOLOGIES

The cleanup goals are based on mitigation of human health risk and mitigation of ecological risk. Lime neutralization using the Rotating-Cylinder Treatment System™ (RCTS™) (US Patent No. 7,011,745) for efficient and effective lime mixing and aeration/oxidation of reduced metals was used at this site. The RCTS was operated seasonally during 2004, 2007, and 2008.

The RCTS is a form of lime precipitation treatment. In lime precipitation processes, lime (calcium hydroxide [Ca(OH)<sub>2</sub>]) is used to increase the pH of the contaminated water. Increasing the pH facilitates the oxidation and/or precipitation of dissolved metals as metal hydroxides and oxides. Although lime precipitation has many inherent advantages, conventional and high-density systems are often difficult to control without constant monitoring and are not efficient at dissolving lime, which is delivered to the acid mine drainage (AMD) as slurry. As the lime slurry is added, the precipitated metal hydroxides and oxides coat the surface of the lime particle, trapping unused lime within the complex.

The RCTS uses shallow troughs that contain the water being treated and rotating, perforated cylinders to transfer oxygen and agitate the water. This technology has been implemented on multiple sites. When compared with conventional systems it, requires less power and less space, is more effective at mixing, and requires less maintenance associated with scaling, all of which results in lower overall costs. In addition, the oxidation reaction times are shortened, and

treatment can be achieved at a lower pH. These systems are portable and can be sized to suit the oxidation requirements of each individual site.

### **3. PERFORMANCE**

At this location, two RCTS-60HS systems were required due to the high concentrations of reduced iron in the mining-impacted water. When compared with a conventional lime precipitation system treating the same water, the RCTS demonstrated the ability to use 42% less lime to treat comparable flows. The reaction time required in the RCTS was 15% of the compared conventional system, and the power requirements were approximately 69% less. The dissolved oxygen concentrations in the water being treated with the RCTS system averaged 8 mg/L, compared to an average of 4 mg/L with the conventional system.

### **4. COSTS**

Cost of activities at these site are reported as follows:

- Capital: \$200,000
- Operation and maintenance: \$500,000 for 6 months

### **5. REGULATORY CHALLENGES**

No regulatory challenges encountered at this site.

### **6. STAKEHOLDER CHALLENGES**

No information available.

### **7. OTHER CHALLENGES AND LESSONS LEARNED**

No information available.

### **8. REFERENCES**

Tsukamoto, T. n.d. “Treatment of Mine Drainage with the Rotating Cylinder Treatment System™ (RCTS™): Multiple Applications.” <http://wvmdtaskforce.com/proceedings/06/Tsukamotopres.pdf>.