CASE STUDY

Alpine County, California
Rotating-Cylinder Treatment System

August 2010

Prepared by
The Interstate Technology & Regulatory Council
Mining Waste Team
Permission is granted to refer to or quote from this publication with the customary acknowledgment of the source. The suggested citation for this document is as follows:


Acknowledgements
The ITRC Mining Waste Team would like to acknowledge Vance Weems and Timothy Tsukamoto, Ph.D., from Ionic Waters Technologies, who completed the April 2008 Mine Waste Case Study Survey, from which the information in this case study is taken.
**TABLE OF CONTENTS**

1. SITE INFORMATION ........................................................................................................... 1  
   1.1 Contacts ..................................................................................................................... 1  
   1.2 Name, Location, and Description ............................................................................. 1  

2. REMEDIAL ACTION AND TECHNOLOGIES ................................................................. 1  

3. PERFORMANCE .................................................................................................................. 2  

4. COSTS ................................................................................................................................ 2  

5. REGULATORY CHALLENGES ........................................................................................ 2  

6. STAKEHOLDER CHALLENGES ....................................................................................... 2  

7. OTHER CHALLENGES AND LESSONS LEARNED ....................................................... 2  

8. REFERENCES ...................................................................................................................... 2  

ALPINE COUNTY, CALIFORNIA
ROTATING-CYLINDER TREATMENT SYSTEM

1. SITE INFORMATION

1.1 Contacts

Ionic Waters Technologies
Vance Weems
Telephone: 775-321-8101

Dr. Timothy Tsukamoto
Telephone: 775-321-8101

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)₂]) 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