

IM4DC

Action Research Report

SUMMARY

Researchers:
Phong Pham, PhD Candidate

School/ Centre:
Centre for Mined Land Rehabilitation

University/ Institutions:
Sustainable Minerals Institute, The University of Queensland

Key themes:
Community and Environmental Sustainability
Operational Effectiveness

Key countries:
General application

Completion:
April 2013

Research aims:
The IM4DC funding supported the following research activities:

- Registration and travel expenses for two-day Geochemist's Workbench training workshop in Perth
- Payment for 18O-sulfate stable isotope compositions analyses

For further information on this action research:

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Application of Multi-isotope Techniques to Elucidate Source, Transport and Release of Contaminants by Acid Mine Drainage

Acid mine drainage generated from the oxidation of sulfidic minerals is a major environmental concern for mining companies and communities worldwide. Identification of water connectivity and sulfate sources can provide strong support for AMD management. This study used a combination of hydro-geochemical fingerprinting and stable isotope geochemistry to investigate the connectivity between surface and groundwater, and between mine water and a local stream system at a closed sulfidic Au-Cu-Zn mine in Queensland.

Four water types were identified, which corresponded to specific stable isotope compositions, sulfate sources, and concentrations and type of acidity. The stable isotopes indicated local mixing of tailings and waste rock seepages with the groundwater system. The application and improvement of titration methods into the examination of mine-related waters have shown the significance of potential long-term effects of residual mineral acidity; i.e. mineral acidities of hydrolysable metals.