



GEOCHEMISTRY AND HYDROCHEMISTRY

Understanding geochemistry and hydrochemistry is essential to manage risks, meet regulatory requirements and minimise social and environmental impacts throughout the mining life cycle.

MWH has experienced geoscientists that provide specialty knowledge in geochemical and hydrochemical studies to support mining projects and the natural resources sector worldwide. We have conducted geochemical and hydrochemical studies during every stage of the mining life cycle to fulfil various client objectives, from permitting and planning greenfield projects through to closing abandoned legacy mines. These capabilities, combined with our broad range of service offerings to the mining industry, enable us to deliver innovative technical solutions.

Our primary areas of expertise are acid and metalliferous drainage (AMD) prediction and modelling; AMD management and mitigation; contaminant fate and transport modelling; water quality characterisation and prediction, including pit lake assessment; and mine water treatment. MWH has conducted studies involving a variety of contaminants, including sulphate, metals and metalloids, cyanide, organics, and radionuclides.



Starting from the planning stage of a project, we support clients to identify key closure issues and appropriate mitigation and closure strategies. Data from AMD characterisation and predictive modelling, together with hydrological and hydrogeological site characterisation, form the basis for hydrogeochemical and fate and transport modelling that can be used to predict water quality impacts and identify potential risks to the environment. Viable management options for these risks can then be developed, evaluated and implemented as needed to meet regulatory requirements and minimise social and environmental impacts.

OUR CAPABILITY

- AMD prediction and waste rock characterisation, including static, leachability, kinetic, and mineralogical testing
- AMD management and mitigation, including passive and active treatment
- Geochemical and hydrochemical modelling (including PHREEQC and MINTEQA2)
- Flow and contaminant transport modelling through saturated and unsaturated zones
- Water quality characterisation
- Pit lake assessment, including rebound and hydrogeochemical modelling
- Soil and waste rock characterisation for rehabilitation planning
- Waste rock and tailings planning and management
- Landform and closure structure design
- Mine water treatment.



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Our recent experience

- **Murray's Hill Iron Ore Deposit waste rock characterisation and AMD prediction, Hancock Prospecting Pty Ltd, Western Australia**

We undertook a geochemical characterisation programme to delineate the AMD potential of the various lithologic units likely to constitute mine wastes. The characterisation programme included ABA, NAG, leachability, and mineralogical testing. These results supported the development of appropriate management and closure activities.

- **Pardoo DSO Project pit lake assessment for closure planning, Atlas Iron, Western Australia**

We conducted hydrological and hydrogeologic investigations to inform the mine closure plan. These investigations assessed long-term pit water quality, existing pit water and salt balances, and potential for post closure groundwater and surface water impacts. MWH determined the stable level of the pit lake, identified concentration trends and predicted seepage rates, and evaluated the potential impact on regional receptors. The model was then used to recommend operational and closure strategies.

- **Mt. Gordon Copper Mine AMD treatment evaluation, Aditya Birla Minerals, Queensland**

We evaluated options for treating pit water impacted by AMD. MWH conducted a site investigation and data analysis to identify and assess water treatment options. It was concluded that a High Density Sludge (HDS) system was appropriate to reduce acidity, sulphate and heavy metals concentrations and meet discharge water quality standards.

- **Proposed Rosia Montana Gold Mine AMD prediction and water quality assessment, Gabriel Resources, Romania**

We conducted a baseline characterisation of geochemistry and water quality, including existing sources of AMD. This evaluation included water quality predictions, cyanide fate and transport assessment and analyses, a cyanide mass balance and an AMD prediction programme, which comprised static and kinetic testing, including field-scale testing columns.

- **Resolution Copper Mine AMD prediction and modelling, Resolution Copper Mining, United States**

We undertook an AMD prediction programme, including static and kinetic testing, to evaluate AMD potential within this block cave underground mine. We also conducted mineralogical testing on the humidity cell tests after testing was complete to identify secondary soluble mineral phases that could affect rinse-out chemistry. Calculated leaching rates were utilised in a coupled GoldSim water balance model and chemical mass balance model to predict water quality for the mine during operation, closure, and post closure periods.

For more information, please contact:

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