



# Geochemical Characterisation

Earth Systems has a specialist environmental geochemical team with industry-leading geochemical expertise founded on advanced understanding of the geochemical interactions between water and both natural and man-made materials. Our team has been providing leading practice geochemical advice and cost-effective, innovative management solutions for geochemical stability for over 20 years.

Interactions between water (and other solutions) and natural materials (eg. rock or soil) as well as man-made materials may result in reactions that change the composition, structural stability, toxicity or even pollutant-generating capacity of the materials involved. Geochemical processes, both naturally occurring and as a result of site development, can have a range of potential impacts, affecting the quality of air, water and soils and rocks, as well as vegetation, ecosystems and even human health. Earth Systems' specialist geochemistry team has been developing effective geochemistry-based solutions to these often complex environmental issues for over 20 years.

## SERVICES PROVIDED

- Assessment of the impacts of mine wastes on water quality – ie. acid and metalliferous drainage (AMD) or acid rock drainage (ARD), as well as neutral metalliferous drainage (NMD) and salinity.
- Salinity investigations, including potential causes and remediation options.
- Assessment of geological materials for use in the building and construction industry, including material stability and potential impacts on water quality.
- Contaminated site assessment, including interactions between contaminants and water or rock, contaminant transport mapping, risk assessment and remediation strategies.
- Static and kinetic geochemical testing to establish acid generation potential and rates of sulfide oxidation and acidity generation in order to assess potential impacts on water quality.
- Assessment and optimisation of water treatment plant processes, including treatment sludge stability and reuse.
- Assessment of geochemical impacts of construction activities, including road construction, tunnelling and foundation excavation.
- Investigations of process and waste water issues, including

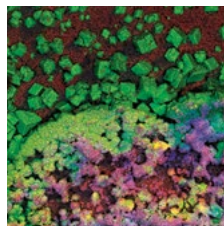
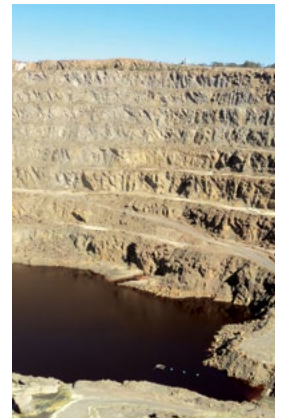
reuse, scaling, contaminant build up and waste water quality.

- Assessment of causes and impacts of groundwater contamination.

## EXPERIENCE

Earth Systems provides geochemical characterisation services for a broad range of industries in the private sector, as well as governments and research organisations. Recent projects completed by Earth Systems include:

- Geochemical assessment of the suitability of extracted waste rock from a mining operation for use in a variety of construction applications including as a road base and cement additive.
- Geochemical investigation of elevated copper and zinc levels in an abandoned tailings dam in Victoria, Australia, including water quality treatment and long-term remediation strategies.
- Assessment of AMD potential, including static and kinetic geochemical characterisation, of mine wastes at numerous sites in all states of Australia, as well as China, Indonesia, Laos, Peru, Tanzania, Mali, Senegal, Guinea, Kyrgyzstan, Solomon Islands, Papua New Guinea and South Africa.
- Geochemical study of groundwater quality at a manufacturing site as part of a monitoring and environmental risk assessment program.
- Geochemical study to determine if sewage treatment lagoons were adversely effecting groundwater quality.
- Design of a geochemical investigation program and potential groundwater remediation strategies for a contaminated landfill site in Sydney, Australia.
- Long-term geochemical stability and reuse options for water treatment sludges.
- Geochemical modelling of reactive materials.



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