

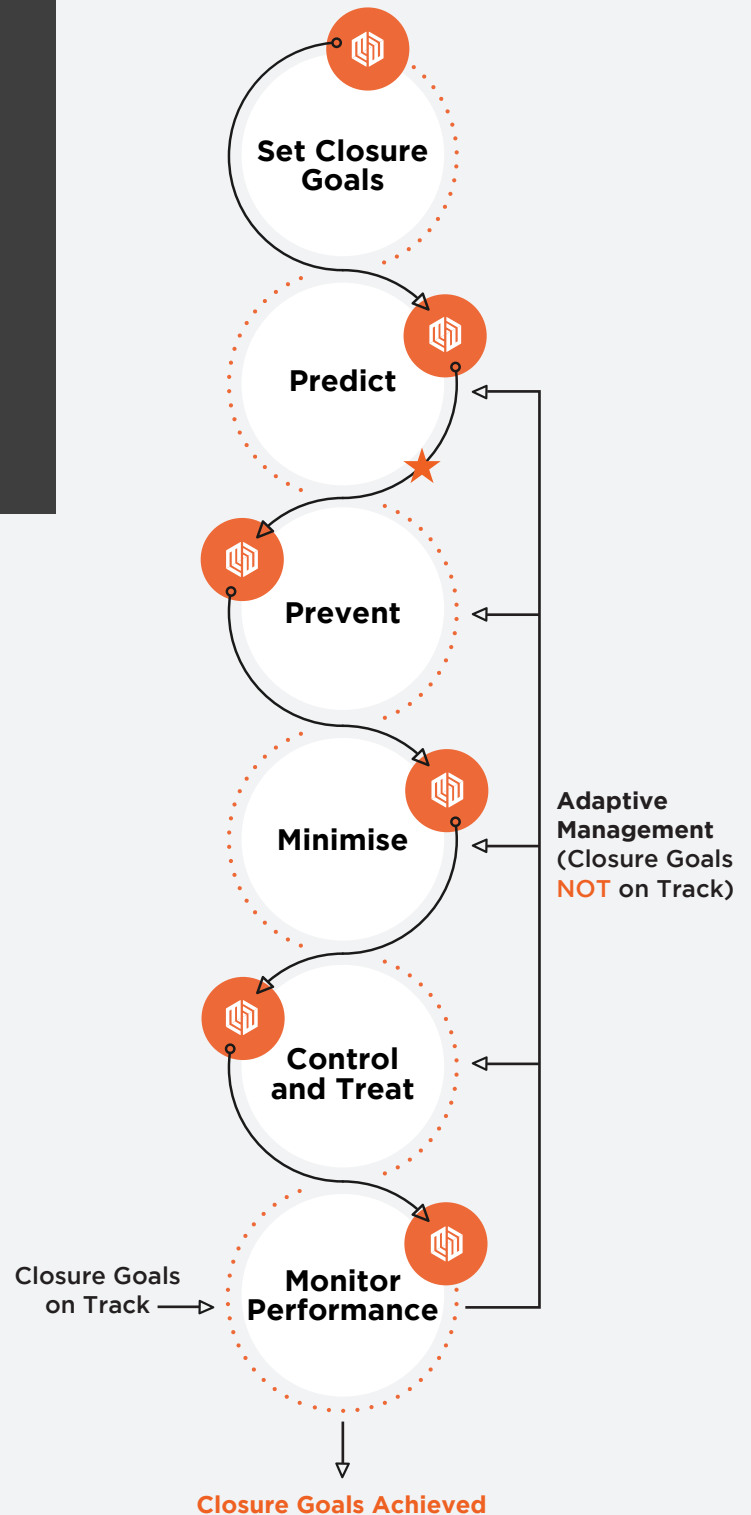
FACT SHEET 2 - HOW TO MANAGE AMD

AMD MANAGEMENT TRAINING SERIES

6 STEPS OF AMD MANAGEMENT

1. Set Closure Goals
2. Prediction
3. Prevention
4. Minimisation
5. Control and Treatment
6. Performance Monitoring

- Acid and metalliferous drainage (AMD) needs to be managed to reduce health and safety risks for on-site staff and communities, reduce deleterious effects to the environment, and ensure that appropriate closure of the site is achieved at the end of mining activities.
- This requires six key steps to be undertaken as a holistic approach to AMD management.
- These steps form the basis for any comprehensive AMD Management Plan (AMD MP), which is often supported by a risk assessment process and the development of site-specific operational procedures to manage these risks and/or uncertainties.
- ★ The **AMD Risk Assessment** process is based on data obtained from prediction activities and determines the management requirements for the project (e.g., prevention, minimisation, control and treat).



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1. CLOSURE GOALS

CLOSURE GOALS ARE SET in order to minimise legacy issues associated with potential AMD sources and any in-perpetuity uncontrolled AMD from mine domains containing AMD generating materials. These goals are reevaluated throughout the mine life against performance monitoring results.



Setting closure goals establishes a clear pathway that can be followed by all stakeholders including both current and future.



Closure goals need to consider generational changes in expectations by stakeholders.



2. PREDICTION

PREDICTION is critical to understanding the potential, severity, and longevity of AMD. Prediction is facilitated by geochemical analysis and interpretations. A key prediction objective is to estimate water quality generated by various materials and mine domains that have potential to generate AMD.



A waste rock block model facilitates the development of a materials schedule such that the in-situ location of AMD producing materials and acid neutralising materials are anticipated and are planned for as part of the mining schedule.



Understanding the potential AMD characteristics for various materials and subsequent mine domains enables a risk assessment based on scientific data to determine management options. An **AMD Risk Assessment** is a fundamental step in prediction and will be revisited many times over the project life.



The **AMD Risk Assessment** process determines the AMD management requirements for the project (e.g., prevention, minimisation, control and treat).



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3. PREVENTION

PREVENTION of sulfide mineral oxidation, where practicable, is a key management step for AMD. The prevention of AMD relates to avoiding sulfide mineral oxidation as much as practicable by preventing the ingress of oxygen into a mine domain where it can oxidise sulfide minerals.



A critical management process is to prevent the advective ingress of oxygen into a mine domain containing sulfide minerals (e.g., waste rock dumps, low grade ore stockpiles). Advection is often associated with a basal rubble layer generated by high end-tips that cause grainsize segregation down the tip face.



4. MINIMISATION

Where prevention is not practicable, or has already occurred, the next management step involves **MINIMISING** the contaminant load reporting to the receiving environment. This often involves minimising the interaction of sulfide oxidation products with net percolation through the waste rock.



Where a mine domain contains stored oxidation products (acidic / metalliferous / salinity) any water migration through these materials will likely mobilise the contaminant load.



Management of run-on water, rainwater infiltration, process water, wash-down water, dust suppression can all be mechanisms for mobilisation of stored oxidation products.



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5. CONTROL AND TREATMENT

Although the objective is to prevent and minimise AMD, **CONTROL AND TREAT** measures are an important step in managing the effects of AMD to the receiving environment.

- Often the purpose of this step is to ensure all impacted waters are delivered to one (or a few) location for treatment rather than having to manage diffuse contaminant loads.
- Treatment can involve both active and passive treatment technologies.



6. PERFORMANCE MONITORING

PERFORMANCE MONITORING should be conducted to regularly evaluate how AMD management techniques are performing against closure goals and targets.

- Monitoring should be focused on the most significant AMD risks and their subsequent management methodologies. This allows continuous validation (and revisiting) of any key assumptions made during the prediction stage while also enabling learnings to be incorporated into the evolving AMD MP.
- Closure goals and targets should be regularly assessed against performance monitoring data. If targets are achieved, then performance monitoring is continued throughout the mine life. If targets are not met, then adaptive management options are initiated.



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