

FACT SHEET 3 - POTENTIAL AMD SOURCES

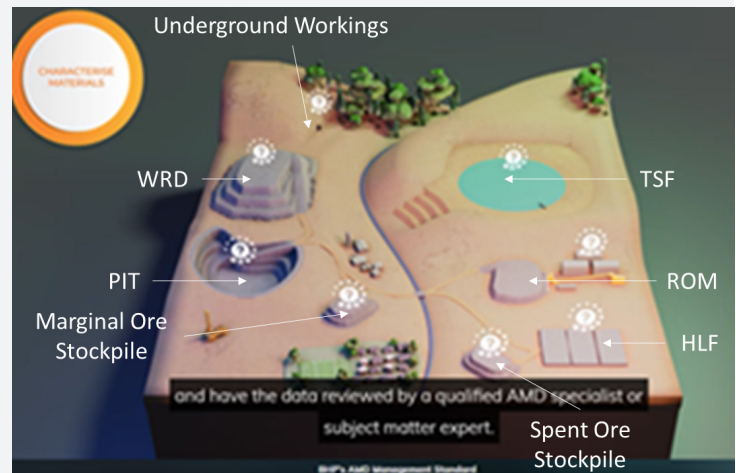
AMD MANAGEMENT TRAINING SERIES

This fact sheet gives an overview of different mine domains that may contain potential AMD sources that could generate AMD under specific conditions.

CONCEPTUAL SITE MODEL

The development of a conceptual site model will facilitate the identification of potential AMD sources and potential AMD risks and subsequently guide early data collection for the Prediction step of AMD Management. A conceptual site model should identify:

- ☛ All key mine domains (current and future) that may contain potentially AMD generating sources now and post closure.
- ☛ A transport model that considers flow across and/or within the physical model and the quality of the transport medium, such as water quality or air quality.
- ☛ Receptors such as human health, sensitive receiving environments, and compliance monitoring points.



The conceptual site model becomes a key platform for a source - pathway - receptor (SPR) risk analysis and subsequent consideration of management options where such AMD risks could compromise closure goals.

POTENTIAL AMD SOURCES

A potential AMD source is associated with materials that contain sulfide minerals or sulfide oxidation products. Generally, potential sources of AMD can include the following mine domains:

- ☛ Waste rock dumps.
- ☛ Ore and marginal ore stockpiles.
- ☛ Pit floors and pit walls.
- ☛ Underground workings.
- ☛ Tailings storage facilities.
- ☛ Heap leach pads.
- ☛ Spent ore stockpiles.
- ☛ Process residue stockpiles.

POTENTIAL AMD SOURCES

AMD MANAGEMENT TRAINING SERIES: FACT SHEET 3

SOURCE CHARACTERISATION

Source characterisation can be made through evaluations of data including:

- Deposit type (geology, lithologies, weathering, alteration) and sulfide content.
- Acid neutralisation capacity of the rocks.
- Known AMD issues at site.
- Project maturity, which can also be viewed as project uncertainty.
- Total volume of potential AMD source.
- Disturbance footprint.
- For legacy and operational sites, historical AMD source facility construction methods.



Waste Rock Dumps:

- Waste rock dumps (WRDs) contain materials that are below the cut-off grade for ore and marginal ore. They generally represent the greatest potential source of AMD for a site.
- WRDs can be backfilled within a mined out pit (in-pit WRD), or they can be constructed ex-pit. Particularly with ex-pit WRDs. The WRD construction method can contribute to significant AMD risks where the construction approach enables advective oxygen supply and increased sulfide mineral oxidation.

POTENTIAL AMD SOURCES

AMD MANAGEMENT TRAINING SERIES: FACT SHEET 3

Ore and Marginal Ore Stockpiles:

- ☛ Ore is the material that is processed to obtain the commodity being mined. Ore that is enriched in sulfide minerals or sulfide mineral oxidation products can generate AMD, and therefore, Run of Mine (ROM) pads are a potential source.
- ☛ Marginal ore is often stockpiled and is processed later. If it is not processed it can be a significant AMD source hazard; often being highly acid forming. From a risk management perspective, marginal ore stockpiles should be built to minimise AMD risks.

Heap Leach Facilities and Spent Ore Stockpiles:

- ☛ Heap leach facilities (HLF) are typically constructed as a lined pad, with ore placed on top of this pad. A liquid leaching reagent is added to the ore to extract the target commodity.
- ☛ Once the rate of production becomes uneconomic, the spent ore is removed and placed in a spent ore stockpile or the HLF is closed.

Pit Floor and Pit Walls:

- ☛ Pit floor and walls will be a cross section of the lithologies, weathering zones, mineralisation, and alteration styles associated with the deposit.
- ☛ If rocks are present that generate AMD, they are likely to be present in the pit walls and/or floor. This can lead to AMD impacted pit water during operations and post closure.



POTENTIAL AMD SOURCES

AMD MANAGEMENT TRAINING SERIES: FACT SHEET 3

Underground Workings:

- Underground mining creates underground workings. If sulfide minerals or sulfide mineral oxidation products are present, they can generate AMD.
- If the water table is higher than the access points to the mine, then underground workings may drain, and discharge AMD impacted waters.



Tailings Storage Facilities:

- Once ore is processed to extract the commodity, tailings generated are sent to a tailings storage facility (TSF). Similar to WRDs, TSF's can be both in-pit or ex-pit, depending on the mine plan.
- Often tailings contain significant sulfide minerals and can be a source of AMD. However, the oxygen flux is typically diffusion controlled, due to the fine-grained nature of the materials, which limits the oxidation rate of the AMD generating sulfides.

Process Residue Stockpiles:

- Process residue can involve other materials generated by the processing of the ore and can also be problematic from an AMD perspective. Such materials need to be characterised.
- Process residues include any by-product from processing other than tailings.

AUS - Perth Office

Key Contact: Josh Pearce
M: +61 409 882 823
E: josh.pearce@minewaste.com.au

AUS - Brisbane Office

Key Contact: Dr Karan Jain
M: +61 469 348 420
E: karan.jain@minewaste.com.au

NZ - Christchurch Office

Key Contact: Dr Paul Weber
M: +64 272 945 181
E: paul.weber@minewaste.com.au