



SGM Environmental

Creating enduring value

SGME VALUES

Honest



Trust



Innovation



Safety



PROJECT CASE STUDY: Tailings Storage Facility Geochemistry Sampling and Assessment Program

SGM Environmental Pty Limited (SGME) has done geochemistry analysis for a tailings storage facility (TSF) to determine the potential for acid mine drainage (AMD), neutral mine drainage (NMD) and / or saline drainage (SD).

Site description: The mine is a gold, lead and zinc underground operation near Cobar, New South Wales. Ore is crushed and processed to produce Au-silver (Ag) dore. The processed ore (ie most metalliferous minerals have been removed) is pumped as thickened tailings slurry (the tailings) to a TSF and deposited from a series of raised spigots.

The problem: Past geochemical assessment shows that the tailings contained sulfide and is classified as potentially acid forming (PAF). Further, multi-element analysis shows enrichment with arsenic (As), lead (Pb), antimony (Sb) and tin (Sn). SGME was commissioned to do further geochemistry sampling and analysis of the TSF.

What SGME did: Tailings samples were collected using a backhoe to dig a pit down to one metre at each sample site. Samples were collected and care was taken to make sure that the oxidised and unoxidised tailings were not mixed.

The oxidation zone of the TSF is the unsaturated surface layer that has undergone extensive sulfide oxidation (ie AMD has already formed). This zone is high in non-reactive sulfur and soluble metals and is extremely acidic. In the unoxidised zone, less oxygen has reached the tailings resulting in lower levels of sulfide oxidation. Tailings in this zone have a higher pH (still very acidic), higher reactive sulfur content and lower soluble metals.

Geochemical characterisation of the tailings showed that the entire TSF will form AMD. Soluble sulfate, and to a lesser extent, chloride, indicate that of NMD or AMD forms, they would contribute to elevated salinity. Further, analysis of water-soluble metals showed that seepage and surface runoff may contain elevated metals and metalloids. The results of SGME's geochemistry characterisation was different to past assessment which had higher acid neutralising capacity. Understanding the geochemical properties of the tailings is important for successful rehabilitation and cover design.

