#### The [aff actor] should create mine tailing treatment plants to contain pollution from copper mining, modeled off the Candelaria copper mine treatment plan.

PMP Chile 09 [(Preventing Mining pollution Chile) “Managing Mine Tailings To Protect Scarce Water Supply - Candelaria, Chile” cites Copiapó Government Website. Last date cited 2009] AT

As mentioned in the 2008 Report, mine tailings are the waste materials after the minerals are separated from the ore in a mineral processing plant. “Typically, the original rock is crushed or ground to a particle size of less than 0.1 mm in order to release the valuable constituents.”[1] They typically contain the valuable constituents in low concentrations, unrecovered by the process, and may also contain toxic residues of chemicals used in the separation process. Water is used as a binding agent in the impoundment process to extract the valuable mineral constituents. Supernatant water, once released into the environment, would change the current pH and heavy metal content of groundwater supply. Cyanide, which damages the brain and the heart, is commonly found in mine tailings. The U.S. EPA identified cyanide in at least 471 of the 1,662 National Priorities Listed sites for pollution remediation under Superfund. Site Details The Candelaria Copper Mine is located in the Sierra El Bronce mountain range in the Copiapó River valley approximately 20 km southwest of Copiapó in the Atacama region of Chile. At a 600-m elevation, this mine has an estimated life of 20 years. Although biodiversity is relatively low in this desert environment, its scarce water resources are integral to agricultural irrigation, urban residential and commercial, and industrial purposes. Mining is the most significant source of economic profit for the region, followed by agriculture and small-scale industry such as copper refinery [1]. Health Impact The U.S. Center for Disease Control and Prevention (CDC) states shortness of breath, seizures, and loss of consciousness as the early indications of cyanide poisoning. Short-term exposure causes brain damage and coma. Miners exposed to high levels of heavy metals could experience breathing difficulties, chest pains, vomiting, headaches, and enlargement of thyroid glands. Exposure Pathways The United Nations Environmental Programme (UNEP) and the International Council on Metal and the Environment (ICME) report on tailings management cited exposure pathways include being in contact with tailings transported by wind and water erosion and consuming ground and surface water contaminated by toxins including cyanide, sulfates, or other dissolved metals. Intervention

The Candelaria project focused on proper disposal of tailings with impoundment technology as well as effluent leakage prevention. A baseline study was conducted to determine the content and extent of tailings Effluent with tailings content is trapped by spill collection systems and a temporary containment pond and re-circulated back to the processing facility for treatment. This facility thickens tailings to 50 percent solids content for easier disposal. “The major component of the 450-hectare tailings disposal facility is the dam constructed of mine waste material.” Construction of this dam is divided into multiple stages to comprehensively trap and filter tailings from the water. This tailing impoundment/cut-off wall system was designed to contain more than 365 million tons of tailings combined and prevent storm surge with tailings content from entering the water treatment system. As a result, water pollution is prevented and through the recycling process, the quantity of limited ground and surface water supplies are preserved in this desert environment. Implementing Organizations The Compañia Contractual Minera Candelaria (CCM Candelaria)—a former joint venture of Phelps Dodge Corporation of the USA and Sumitomo Metal Corporation of Japan, currently owned by Freeport-McMoRan Copper & Gold, Inc. Remaining Challenges Treatment systems similar to the one installed at the Candelaria copper mine are able to extract and treat a majority of the water locked up in tailings. The remaining 20 percent of water bound up in tailings is generally difficult to remove. Additionally, design of the tailings disposal/water treatment structure must be able to confine the smaller particles of tailings, as leakage of these toxic materials could yield negative environmental and health impacts.