

HPD[®] technologies recover resources in mining

The Ambatovy mining and refinery site, located in Toamasina, Madagascar, is one of the largest lateritic nickel mines in the world with an annual estimated production of 60,000 tons of refined nickel and 5,600 tons of refined cobalt. Ambatovy has entrusted Veolia Water Technologies to design and build a wastewater treatment plant that incorporates the largest evaporation and crystallization project within Southern Africa, not to mention one of the largest in the world. Through a state-of-the-art evaporation and crystallization process, the wastewater plant enables Ambatovy to recover ammonium sulfate as a valuable by-product in the refining process. This also allows Ambatovy to produce an additional 210,000 tons of ammonium sulfate to be sold as agricultural fertilizer thus increasing the site's profitability.

Recovering valuable by-products

Veolia provided a solution that enables Ambatovy to not only meet its production objectives by recovering valuable by-products, but also its environmental objectives by reducing effluent volume thus limiting the impact of its activity

on Madagascar's rich and varied natural environment.

The solution includes unique HPD[®] evaporation and crystallization technology developed by Veolia.

The process selected is comprised of a purge crystallizer that removes high chlorides from the main crystallizer section, thereby enabling the use of



more traditional, and less expensive, 316L stainless steel materials in the construction of the process vessels and equipment without the risk of chloride corrosion.

Energy efficient process

The crystallization process, utilizing evaporation, occurs over three stages and is very energy efficient. First, the initial energy input of low pressure steam (43 tons per hour) results in a vapor that provides the energy input, as heat, to the subsequent stages. Then vapor is condensed and recovered as process condensate and returned to the

condensate system. Ultimately, the plant is capable of recovering 36 tons per hour of dry ammonium sulfate from an initial liquid inlet feed of 160 tons per hour.

The performance of the plant is also enhanced by its robust structure and systems design. The structures, 10m x 10m and 17m high in size, are designed to withstand 280 km/h hurricane winds, as well as mild earthquakes caused by nearby fault lines. Additionally, in order to avoid shutdowns and ensure optimization during the cyclone season, redundant systems have been included for the pumps and vessels.

Contribute to economic and social development

Veolia was capable of overcoming the challenge that the remote location of the site presented. Due to its remoteness, all equipment was transported to Madagascar resulting in a modular construction and assembly approach to the crystallizer section of the plant. The Ambatovy plant is not only one of the most ambitious industrial projects in Madagascar but also Sub-Saharan Africa. It is also expected to contribute to the economic and social development of Madagascar. ●