

ENEL Power, Italy – La Spezia Project – ZLD Plant for FGD Wastewater Treatment

The Facility

The La Spezia Power Plant is equipped with 1 x 600 MW coal-fired power unit and 2 x 350 MWe gas-fired combined cycle power units for a total of 1300 MWe. The unit normally fires imported coal with < 1% Sulphur. The flue gases are treated sequentially by FGD absorber. It is equipped with a 1 x 100% DeSOx lines with an absorber. The blow down from the absorber, along with other wastewaters, is sent to a new wastewater treatment plant.



The Problem

Wastewaters from FGD treatment plant can no longer be discharged into the sea due to tough Italian and EU environmental regulations. In order to overcome this major environmental problem, ENEL decided to feed the absorbers with fresh and re-circulated waters and install the Zero Liquid Discharge (ZLD) plant so that no industrial wastewater discharges are allowed by the entire power plant.

The Solution

To overcome the problem, ENEL selected the Softening – Evaporation – Crystallization (SEC) process to treat the wastewaters and reuse/conserves fresh waters. Aquatech supplied, installed, and commissioned the ZLD plant as an EPC contractor with local associates.

The SEC plant comprises of three treatment tanks where lime, sodium sulfide, and coagulant are added. 1 x 100% Softener Clarifier is used for removal of suspended solids, temporary hardness, and precipitated metal hydroxides. Followed by 1 x 100% softener clarifier (calcium reduction by soda ash dosing) for removal of permanent hardness, 1 x 100% Falling Film type Brine Concentrators (equipped with Vapor Compressor), 1 x 100% Crystallizer (equipped with a Thermocompressor) and 2 x 50% Belt Filter Presses. The plant also includes several chemical dosing systems, storage tanks, pumping systems, electrical works (MCC, cable trays, cabling etc), controls & instrumentation.

The ZLD plant is a fully integrated automated system. The Brine Concentrators operate in seeded slurry mode. Each Brine Concentrator is equipped with external mist eliminator for ease in maintenance. The Crystallizer operates in forced circulation method.

The industrial grade soft water and high purity distillate produced in the system will be used in the main power plant.

PROJECT PROFILE SERIES # 53

DESIGN FGD WASTEWATER ANALYSIS

Design Flow 30 m³/hr (PT Plant)
Calcium:.....8400 ppm
Magnesium:.....1700 ppm
Sodium + Potassium.....Balance
TSS15000 ppm
pH4 to 6
Bicarbonate.....600 ppm
Phosphates.....25 ppm
Chlorides.....25000 ppm
Nitrates.....300 ppm

Sulfate.....1200 ppm
SiO₂.....20 ppm
Boron.....500 ppm
Ammonia.....10 ppm
Iron
Aluminum.....10 ppm
Vanadium.....10 ppm
Arsenic.....10 ppm
Manganese.....10 ppm

PROCESS FLOW DIAGRAM

