COBEAL S.A. DE C.V.

CFE
COMISIÓN FEDERAL DE ELECTRICIDAD

ESTADOS UNIDOS MEXICANOS

Geothermal Facility
Mexico City

Overview: Geothermal systems are found around the world in various geological settings. The high temperature fields are found in the volcanic regions, but medium and low temperature fields are found in most parts of the world. The utilization of geothermal is not without environmental problems.

Challenge: The corrosive potential of geothermal fluids varies. Low pH waters corrode carbon steel and cause corrosion cracking in stainless steels. Chloride ions accelerate corrosion of metallic surfaces, resulting in "pitting" as well as uniform corrosion. Copper and its alloys are attacked by hydrogen sulphide. Sulphide stress cracking in high strength steel is a problem. Carbon dioxide increases corrosion of plain carbon steels. Mild steels are adversely affected by ammonia. Sulphate is the primary aggressive ion in some geothermal fluids.

Case: The selection of environmental equipment for geothermal facilities is one of the factors of importance in design and operation schemes which are expected for long service life. Most corrosion problems are manageable with proper equipment and material selection, operation and maintenance. Air in control rooms and electrical switchgear must be filtered to remove any H_2S and H_2SO_4 from the atmosphere to protect copper wiring.

Problem: Corrosion rates are rapid in high humidity environments.

Solution: A desiccant dehumidification system was installed to dehumidify to low moisture levels (40% RH). Processing airflows at 500 CFM, the unit was manufactured of fully welded, strain hardened aluminum to ensure zero air leakage. An activated carbon pressurization unit was installed to provide clean air. Combined both equipment eliminated moisture and humidity, preventing moisture damage and corrosion.

Mitigation Strategy: CFE's Los Azufres Geothermal facility required all electrical control systems to meet UL and NEC standards.

The geothermal installed capacity in Mexico is 1,017 MWe (839 MWe) running distributed into four geothermal fields in operation (Cerro Prieto 720 MWe, Los Humeros 94 MWe, Los Azufres 194 MWe and Las Tres Virgenes 10 MWe), owned and operated by the state utility CFE (Comisión Federal de Electricidad). There are high expectations on geothermal energy, due to Mexico's regulatory framework and the foundation of the national geothermal innovation center.

Moisture-induced corrosion significantly degrades sensitive electronic components and equipment. It increases life cycle and maintenance costs, reducing productivity and potentially causing equipment failure, which can affect people and the environment.