

CASE STUDY 4

PARAISO HYDROELECTRIC POWER PLANT

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PURAFIL PREVENTS CORROSION AND MONITORS THE ENVIRONMENT

4 PARAISO HYDROELECTRIC POWER PLANT



PRODUCT APPLICATION AT A MOBIL OIL REFINERY

Paraiso Hydroelectric Power Plant is one of many plants owned by Empresa de Energia Electrica de Bogota. The plant supplies electricity to the residents of Bogota, the capital city of Colombia, South America. The mountainous landscape of Bogota, combined with a centrally located water supply (the Bogota River), makes this area highly conducive to hydroelectric power generation.

PRODUCT APPLICATION

High levels of corrosive, hydrogen sulfide gas (H₂S) are pervasive at hydroelectric power generation facilities, particularly surrounding settling ponds. The Paraiso Plant is one of many power generation facilities that provides electricity to the residents of Bogota, Colombia. Paraiso uses the following Purafil systems to protect distributed control systems from corrosion due to hydrogen sulfide gas:

- Deep Bed Scrubber
- Side Access System
- Corrosive-Aire System

Purafil's OnGuard 2000 Atmospheric Corrosion Monitors are also used for continuous monitoring of environmental corrosion levels in the plant's rack and control rooms.

THE PROBLEM

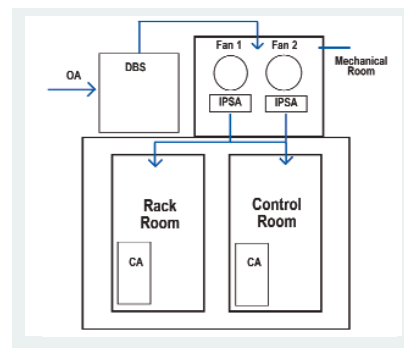
Hydropower converts kinetic energy from falling water into electricity. As an environmental benefit, the generation of hydropower produces no greenhouse gases or other waste pollutants, nor does it generate any waste product which requires special handling or disposal. However, the "falling of water" itself results in the release of hydrogen sulfide, a highly odorous gas which can be corrosive to metals in high concentrations. Concentrations of hydrogen sulfide are so high at Paraiso, that employees working near the settling ponds are required to wear gas masks to prevent toxic gas poisoning. Also affected are the concrete walkways surrounding the settling ponds, which are deteriorating as a direct result of the corrosive gas. When it was decided that the plant would undergo a modernization, the potential threat hydrogen sulfide posed to new distributed control systems was not taken into consideration. Within three days of installation, all systems failed due to corrosion.

PURAFIL PROVIDES THE SOLUTION

In need of a quick solution, Paraiso's head engineer, Mario Carvajal, contacted Purafil's representative in Colombia. The building housing Paraiso's rack and control rooms was located within close proximity to the settling ponds. The mechanical room, located on the roof of the facility, houses two large fans, responsible for reducing concentrations of indoor contaminants by "flushing" the environment with outdoor ventilation air.

To solve Paraiso's corrosion problems, Purafil installed a Deep Bed Scrubber adjacent to the mechanical room. The scrubber, housing two stages of Puracarb Media and one stage of Purafil Chemisorbant Media, filters hydrogen sulfide gas from outside ventilation air. To further purify intake air, Purafil installed Side Access Systems, also containing Puracarb Media, downstream of each of the two fans. As a final precaution, Corrosive-Aire Units were installed in the plant's rack and control rooms to maintain low gas levels and provide recirculation air.

Schematic of Mechanical Room, Control Room, and Rack Room at Paraiso Power Plant:

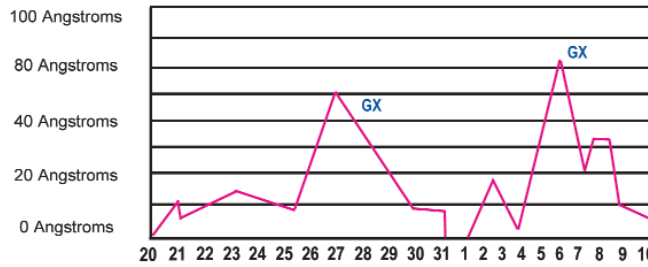


In addition to installing Purafil gas-phase air filtration systems, Paraiso also installed two of Purafil's OnGuard 2000 Atmospheric Corrosion Monitors, one in the rack room and one in the control room. The monitors would continuously measure the total corrosion level in each room and correlate the resulting measurements to a G1, G2, G3 or GX ISA severity level.

Twice during the initial 30-day monitoring period, OnGuard alarm indicators warned of a hazardous GX environment. Because Purafil's gas-phase air filtration systems were functioning efficiently, Ing. Mario Carvajal referred to maintenance logs for clues as to what could have caused the problem. The logs revealed that both fans, located in the mechanical room, had been shut down for repair on two separate occasions. For a total of seven days, Purafil's PSAs were unable to prevent corrosive gases from entering the rack and control rooms. Once the fans were repaired, corrosion levels returned to a normal G1 environment.



OnGuard Readings at Paraiso Hydroelectric Power Plant, May 20 - June 10, 1997:



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