Heartland

Case Study

Heartland Helps Steam Electric Power Plant Achieve Zero Liquid Discharge

Location

Coal Power Plant in US

Key Takeaways

- Successful treatment of Flue Gas Desulfurization (FGD) Blowdown
- Uptime improvement over traditional Brine Concentrators
- Flexibility in treating variation in water chemistry
- Operational flexibility as independent unit operation

Background

For a coal power plant in the USA, Heartland was asked to provide a wastewater treatment system to evaporate Flue Gas Desulfurization (FGD) purge water at a Steam Electric Power Plant using Coal as the fuel source. The primary project goal was to demonstrate reliable operation over a six-month period and achieve Zero Liquid Discharge (ZLD).

At A Glance

- Reduction in time-consuming and costly cleaning efforts
- Over 90% uptime as a temporary installation
- Processes a variety of water types in daily use and routine maintenance
- Adjustable operations based on plant demand and requirements

Figure 1. Heartland Concentrator

info@heartlandtech.com (800) 759-1758 www.heartlandtech.com

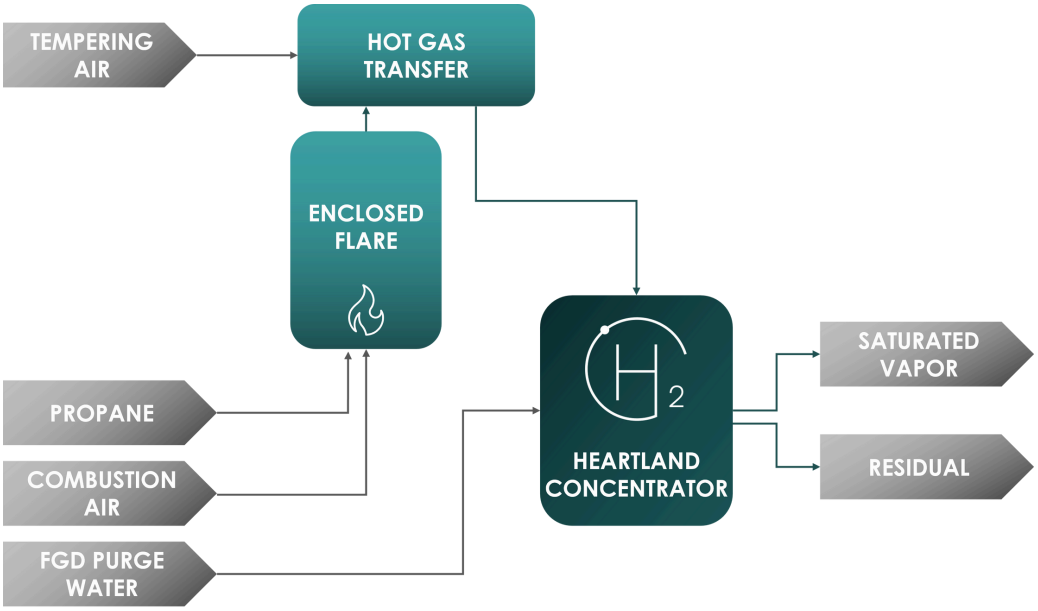

Figure 2. Simplified process flow schematic of the concentrator at Power Plant.

Challenge

Several power plants in the US had implemented a traditional brine concentrator solution using a falling film evaporator for the FGD purge water. The technology demonstrated low availability due to severe scaling of the evaporator from precipitated solids from various sulfate and double salts. Cleaning these solids from a falling film evaporator is time consuming and expensive.

Solution

The final process design was a collaborative effort between the site, Heartland, and two consulting engineering firms. The treatment process centered on Heartland, Inc.'s LM-HT® Concentrator.

Key Components Included

- Hot Gas Supply System to provide thermal energy for evaporative treatment. Since the system is independent of unit operations and natural gas is not available on site, a propane burner was used.
- Heartland 's LM-HT® Concentrator
- Residuals storage and handling system to transfer solids for disposal.
- A simplified process flow diagram for this installation is shown in Figure 2.

Figure 3. A side view of the Heartland Concentrator at Power Plant.

Results

The project was successful. One month after beginning the trial, the Heartland Concentrator™ was changed to continuous operation, processing all of the Unit's FGD Purge Water. Other important results were:

- The project was extended two years past the original 6-month trial.
- System availability was greater than 90%. This is an especially impressive achievement given that the system was fabricated and installed as a temporary fixture. Many aspects of the design would have been designed differently if intended as a permanent installation
- Water characteristics were typically: saturated in calcium; >50,000 mg/l TDS; nominally 5,000 mg/l chloride and 25,000 mg/l sulfate. The concentrator could process this water, as well as highly variable water occurring during startup, usage, flushing and other routine operations.
- Concentrator operations were adjusted based on plant demand and a requirement to minimize propane consumption, demonstrating significant turndown and flexibility
- The effluent total solids concentration averaged more than 60% which was an impressive 10% above the initial target.

The Heartland Concentrator™ proved to be a strong option to treat FGD wastewater for ZLD. Simply stated, Heartland played a crucial role in supporting the plant's ZLD compliance.