

TermoEmcali Plant

# Physical improvements to the sulfuric-acid installation to enhance personnel safety

## TermoEmcali Plant

235-MW, gas-fired combined cycle located in Cali, Colombia

**Plant manager:** Fabio Ruiz

**Plant owner:** Emcali

**Operator:** North American Energy Services

**Key project participants:** TermoEmcali staff

safety, and to improve environmental protection. The operations and maintenance departments developed a series of physical improvement projects that significantly reduced the potential for injury caused by an accidental acid spill or leak. These projects focused on improving physical installations at the lowest possible cost—about \$2000 in this case. Note that the projects comple-

**Challenge.** Sulfuric acid may be a real danger when not properly used. The potential for injury from the failure of a pipe, flange, pump, or valve, is very high, severely affecting people's health and/or the environment.

**Solution:** Sulfuric acid is used in our plant for three purposes:

- Regeneration of mixed-bed ion exchangers.
- Neutralization of water at the water treatment plant.
- pH control of reverse-osmosis unit influent.

Plant management challenged the staff to be creative in identifying innovative methods to enhance safety, stimulate continuous focus on

ment and do not substitute for normally required prudent operating procedures and the use of personal protective equipment required for safe operation. Four specific modifications to the sulfuric acid system are these.

1. An 8-ft-high wall of 0.25-in.-thick clear acrylic panels was installed around the acid injection skid and its four pumps. The acrylic is supported by aluminum frames. The two access doors, the wall's top and bottom edges and the height-of-eye of an average worker are marked with yellow tape. This prevents accidents caused by forgetting that the acrylic panels are installed, a more likely problem when workers are wearing eye goggles or full face shields. The perimeter wall effectively isolates workers from potential acid spray or spills, permitting safe passage while also enabling any leak to be seen.

2. A location with high potential for an acid leak is the acid mixer where 98% sulfuric acid is mixed with water. A spray shield in the form of a 0.25-in.-thick acrylic box (without a top or bottom) was hung around the mixer. This shield protects workers from acid spray and limits the dispersion of sulfuric acid in event of a leak. Leak containment also reduces the amount of floor area to be cleaned.

3. Flexible rubber hose was installed over the existing sulfuric acid piping from the injection skid to the mixture point. This hose protects personnel if a leak develops anywhere in the line, routes any leaked acid to a collection point, and makes visual detection of a leak during routine operator rounds easier.

4. The original material for the acid/water mixer was Type-316 stainless steel. The reaction at the point of mixing is exothermic and experience has shown that stainless steel is not the best material for this application. A better material of reasonable cost is polyvinylidene fluoride (PVDF). The mixer has been replaced with PVDF which has provided excellent service, and reduced the potential for acid leaks.

**Results.** Sulfuric acid has been safely handled at the station without accidents or incidents.

