

## **PVC geomembrane used to cap waste residue at Colorado power plant**

(PVC Geomembrane Institute (PGI), St. Paul, Minn. – March 12, 2007) Known for its high winds, severe storms and intense summer heat, eastern Colorado presented some challenges for the project of capping waste residue from coal slurry ponds at Pawnee Power Station, a power plant located in Brush, Colo.

Climate challenges and site-specific requirements made it necessary for Utility Engineering, the selected engineering company for the project, to carefully consider lining companies for the job. Utility Engineering considered three bidders for the low-bid project. Because it had the most responsive proposal and has been involved in the construction and maintenance program at Pawnee Power Station for over 15 years, Colorado Lining International (CLI) was selected for the project.

“We were involved in the design phase and were the only lining company at the pre-bid, and therefore we understood the project well enough to assist the dirt contractors in the timing and sequencing of the project during the bid phase,” Pat Elliott, CLI, said. “We also had strong relationships with the dirt contractors from previous projects at Pawnee and other sites as well.”

Confident and experienced after completing several other large caps using LLDPE and GCL, CLI worked closely with Utility Engineering to determine materials for the project. Proper execution of this multiphase and multi-year project required sludge removal from three storage ponds into a double lined HDPE cell, and the re-lining of the original three ponds.

Upon review of the site specific requirements with CLI, Utility Engineering concluded that a PVC geomembrane was the best option for the new cap. The deciding factors included:

1. The three dimensional elongation characteristics of PVC provided excellent physical properties to cope with the differential settlement that will occur in the cap section.
2. CLI’s ability to fabricate panels built to size for the footprint of the cap. This sped up the installation process and reduced field seams by over 80 percent.
3. The use of dual track fusion welds and subsequent air pressure testing allowed for the testing of long length field seams with non-destructive means. The flexibility of the PVC also allowed the installer and engineer to verify peel strength along the full length of seam – not just in a 3’ section every 500’ as with other capping materials.

CLI began fabrication of the new PVC liner in mid-June 2006. Eight CLI employees worked on the project from start to finish, and some large production days on-site required the help of four additional local workers.

The liner was shipped to the power plant for installation at the end of June. CLI's experience with eastern Colorado's high winds and summer afternoon storms greatly aided the discussion on whether to use PVC over a PE in regard to the tricky weather conditions.

"We have completed several projects at the same location using HDPE, which was a challenge when experiencing severe winds recorded up to 92 mph," Elliott said. "With PVC's flexibility, it is much easier to deploy on high wind days and the large fabricated panels allowed us to complete large areas quickly to avoid damage to the sub-grade by rain."

The project progressed during the heat of summer, and several days were over 100 degrees. CLI was careful to prevent safety hazards for the crew such as heat exhaustion and dehydration. CLI also had to monitor welding temperatures and speed in the extreme heat in order to maintain high quality QA standards.

One difficulty encountered during installation involved the cap cross section. This part of the liner had a difficult edge tie that included a GCL and a perimeter ditch. CLI had to cut the double lined HDPE pond liner out of the anchor trench and fold it back onto the cap in order to line over it with the PVC to get drainage outside of the containment.

"Most of the construction was similar to current PVC construction plans," Elliott said. "The use of the dual track fusion weld made the QA QC effort much easier and definitely more comprehensive. The unique tie in procedure was difficult but manageable."

Because Elliott feels they are superior and allow for more comprehensive QC, wedge welded seams were used instead of an adhesive weld on this project. "The engineer was skeptical of PVC adhesive welds because he was the most familiar with HDPE," Elliott added. "The wedge welding and air pressure testing gave him the confidence in the PVC and its installation methods to be comparable if not superior."

The project was completed ahead of schedule on July 28, 2006, and was under budget.

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