

COAL ASH STORAGE FACILITY - A 30 YEAR FORENSIC STUDY

[DURABILITY RUNS DEEP]

Tampa, Florida

Replacement of old lining system offers an opportunity to study the performance of geosynthetic containment materials.

Material Supply:

Schlegel Lining Technology,
now GSE Environmental

Contractor:

Comanco Environmental,
Plant City, FL



Technical Description:

Product: GSE HDPE Geomembrane

Description: 2.0 mm (80 mil)
Smooth

Case Study

Background

In the absence of regulations, some coal burning power generation companies have voluntarily chosen, over the years, to use geosynthetic materials to solve the containment problems associated with coal ash storage. One such facility was constructed in Hillsborough County near the city of Tampa, Florida. Construction began in the fall of 1981, and upon completion in early 1982, the facility was 22 acres (5.25 hectares) and has operated successfully since, storing approximately 650,000 tons (5.7 x 10⁸ kilograms) of coal combustions residuals. The primary barrier system consisted of a 2.0 mm (80 mil) High Density Polyethylene Liner (HDPE) which was manufactured by SLT (Schlegel Lining Technology), now GSE Environmental. After thirty years of service, the decision was made to remove the geomembrane materials and replace them with a new product. This decision was based on the aging of the lining system, the current legal and economic environment, and the significant costs associated with a potential leak or other containment failure. Some seam failures of exposed sections of the 30-year-old geomembrane indicated the need for improvement and rehabilitation of the barrier system. This event offered a rare opportunity to obtain forensic samples for testing and evaluation, and to document the performance of these materials subjected to real-world aging and exposure conditions.

Sampling and Results

Samples were obtained from the bottom (floor) of the structure, along the side walls/slopes, and at the freeboard level. Additional samples were taken from the upper sections of the side slopes, which have experienced continuous UV exposure, and from the upper anchor trenches where the material has been exposed only to soil and not to UV radiation or the stored ash materials.

Clearly the geomembrane had aged and suffered chemical oxidation and degradation. However, the material's physical properties were still good even

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when compared to current standards. Based on the oxidative induction time (OIT) results, stabilizers were still present in the aged material, and the performance of the geomembrane was in agreement with the scheme described in Geosynthetic Institute Report #16: “Long Term Durability of HDPE Geomembrane.” The NCTL (Notched Constant Tensile Load) or stress crack properties were lower than currently available materials, but were consistent with the performance of geomembranes from that time period.

The Result

Placing this material into proper context is important. In 1982, the USA was still fighting the cold war, the Bell System provided telephone service, England and Argentina were at war over the Falkland Islands, and the Dow Jones Industrial Average was just over 800. Geomembranes manufactured at that time were approximately three generations earlier than current expectations of performance and durability. Multiple advances in machinery, process controls, and polymer characterization have rendered the exhumed geomembranes “ancient” in their overall composition and quality. Nevertheless, the exhumed materials have done an excellent job of providing containment and protecting the environment.

This is an important lesson on the capability of geosynthetic materials to contain waste and provide an effective barrier to protect groundwater. Demonstrating the capability of geosynthetics to eliminate industrial contamination vs. the expense of remediation and poor corporate image that would result from spills and contamination is a valuable tool. GSE Environmental has developed new materials, such as the Coal Ash Barrier System and Leak Location Liner, to make the task of containment straightforward and demonstrably effective.

References:

“Long Term Durability of HDPE Geomembranes”

GRI report #16 Geosynthetic Institute, Folsom, Pennsylvania, USA

“Storage of Coal Combustion Residuals With A Geosynthetic Liner

A 30 Year Forensic Study”, authors: B. Ramsey, B Betke; GSE Environmental LLC, Houston, Texas, USA, I. Peggs, I-CORP INTERNATIONAL, Inc., proceedings of Geosynthetics 2013, Long Beach, CA (April 2013)



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GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.



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