AEP PIONEERS NEW **OIL-CONTAINMENT SYSTEM**

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AEP and Strongwell Corp. configure, test and install a composite-panel system for substation spill prevention control.

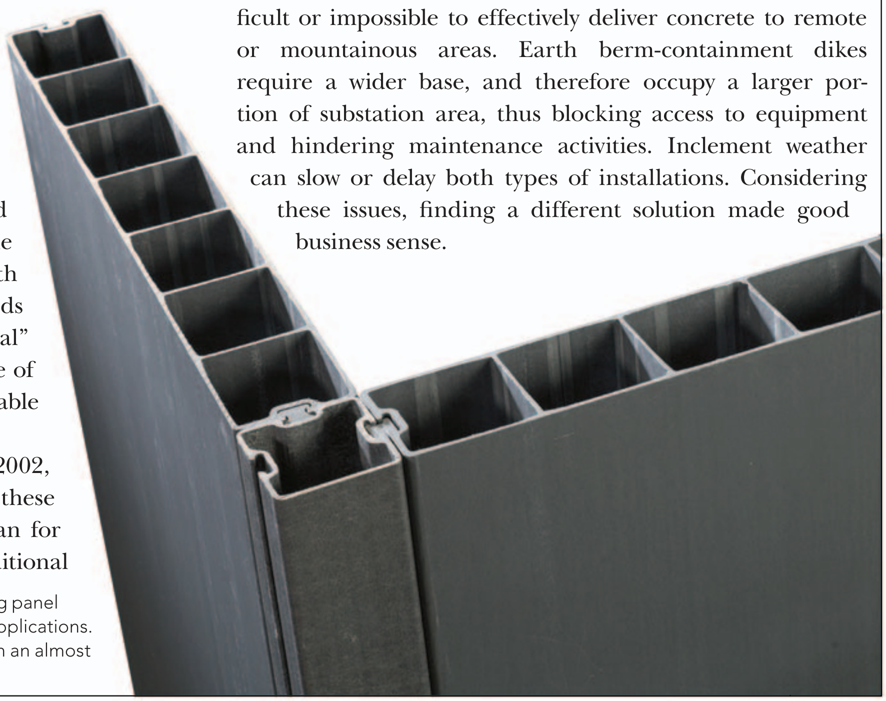
IN A DAY AND AGE OF INCREASING EMPHASIS ON ENVIRONMENTAL COMPLIANCE, finding safe, cost-effective designs are critical to streamlining large projects. For example, could a fiberglass panel system used in one application as a roofing system also be used as an oil-containment dike around substation equipment, while also meeting the Environmental Protection Agency (EPA) requirements? This is the innovative endeavor that American Electric Power (AEP; Columbus, Ohio, U.S.) undertook with the assistance of Strongwell Corp. (Bristol, Virginia, U.S.).

SPILL PREVENTION CONTROL AND COUNTERMEASURE

Like other utilities, AEP is responsible for protecting both the environment and the public from potential oil spills. Specifically, according to an EPA mandate, a Spill Prevention Control and Countermeasure (SPCC) plan is required for each substation where the sum of the capacities of all oil-filled containers with a volume of 55 gallons or greater exceeds 1320 gallons, and a "reasonable potential" exists for oil discharged from at least one of the oil-filled containers to reach navigable water.

Since these rules were revised in 2002, AEP has been working to comply with these amendments by reviewing the SPCC plan for each substation and determining if additional oil containment is necessary. AEP has 4800 substations, of which nearly 2900 substations have more than 1320 gallons of oil, and approximately 40% of those facilities have equipment with a "reasonable potential."

With the SPCC compliance deadlines quickly approaching in February and August 2006, and the high projected costs of compliance in both money and resources, the wheels began turning to find an alternative containment system. Until now, AEP has used concrete or earth-berm containment dikes around its oil-filled substation equipment. However, while effective, the installation of concrete systems can be expensive and labor intensive. It is sometimes difficult or impossible to effectively deliver concrete to remote or mountainous areas. Earth berm-containment dikes require a wider base, and therefore occupy a larger portion of substation area, thus blocking access to equipment and hindering maintenance activities. Inclement weather can slow or delay both types of installations. Considering these issues, finding a different solution made good business sense.



COMPOSOLITE is an advanced composite-building panel system suitable for major load-bearing structural applications. The system combines manufacturing simplicity with an almost unlimited number of configurations.

Composite-panel system installed for oil containment around an AEP substation transformer.

A traditional concrete oil-containment system used around one of AEP's substations.

THE COMPOSOLITE SYSTEM

It was a plant tour at Strongwell that sparked the idea of using its COMPOSOLITE system to build oil-containment dikes. After the tour, AEP contacted Strongwell about modifying the product to fit its oil-containment needs. While Strongwell had not used its system in this fashion before, the company was receptive and saw this as an ideal application to develop.

The COMPOSOLITE system was originally developed in Europe for use as a bridge enclosure system. Today, it serves as a structural panel system and has a wide variety of uses in numerous markets. The main component of the containment system is a 3-inch-wide by 24-inch-deep (6.6-cm by 61-cm) open-ribbed pultruded fiberglass panel. This panel forms the containment wall. A three-way and 45-degree connector allows the panel to turn corners and facilitate the joining of walls. Toggles lock the panels and connectors together securely. For added flexibility, the system also includes a hanger and an end cap. A system of interlocking components makes it possible to design fiberglass structures for a broad range of construction applications and configurations.

PROTOTYPE TESTING

Using this technology, Strongwell took the lead in building a prototype. Once the prototype was constructed, field tests were performed. To test for leaks, the prototype containment dike was first tested without a liner. It was filled with water and left to sit for more than three weeks. No leaks were observed. Next, a geosynthetic liner was installed in the bottom of the containment dike and the same leak test was conducted. Again, no leaks were detected. Finally, a drainpipe was installed in the wall of the containment dike and then retested with no leaks observed.

INSTALLATION

After these promising test results, two pilot projects were planned to determine the ease of installation in actual field conditions. The projects would be closely time-studied to determine the total installed cost of the new system. The COMPOSOLITE system was custom designed for these two substations and would be delivered to the site as a a pre-cut kit and ready for installation. The first of these installations would be constructed using an AEP substation construction crew; a contract construction crew would construct the other.

The AEP company crew completed the first installation in just four days. The study indicated that field drilling of all the panels and supports was labor intensive and should be reviewed before the second installation.

After the leak test and the first installation proved successful, AEP decided to conduct a burn test to verify its resistance to fire. The test emulated exact field conditions and featured a containment dike with a liner, overlain with four inches of crushed limestone, 6 inches (15 cm) of water and 55 gallons

As part of the prototype testing, a burn test was conducted on the COMPOSOLITE oil-containment system. The containment system successfully retained all the oil under the heated conditions.

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of transformer oil. The oil was then ignited and allowed to burn for 30 minutes. Although the containment walls buckled slightly under the heat, the containment system successfully retained all of the oil.

Since the second location required two similar-sized oil-containment systems, AEP decided to install one concrete-containment system and one COMPOSOLITE-containment system for further cost and time studies. In an attempt to save additional time and labor, the components of the second containment dike were pre-drilled at the factory. The same contractor would install both systems to ensure more accurate cost data.

POSITIVE RESULTS

As expected, from a financial and resource savings standpoint, positive results were found. The pilots illustrated that the containment system required approximately one-half of the resource hours needed to install the concrete system, resulting in an approximate 10% dollar savings overall. This study shows that a construction crew can install roughly twice as many systems for every concrete system. Following these successful pilots, AEP has installed another 21 oil-containment systems, with more on the horizon.

For AEP, the biggest benefits of using the COMPOSOLITE system as an oil-containment dike are the installation time and cost savings realized when compared to the cast-in-place concrete alternative. The system is durable, UV resistant, lightweight, low in thermal and electrical conductivity, maintenance-free and easily removable if necessary to replace the equipment it surrounds.

Overall, this project flowed smoothly and produced better-than-expected results. The outcomes of this endeavor show great promise for widespread use in the utility industry. This is a flexible, efficient oil-containment system that can provide substantial time and cost savings over other alternatives. TDW

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