

SALT GRADIENT SOLAR POND CONTAINMENT LINER INSTALLATION FOR DISTILLING LARGE PONDS OF BRINE WATER TO FRESH POTABLE WATER.

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PROJECT OVERVIEW

Fresh water supplies are a world-wide issue for many areas in relation to access and availability. Geosynthetics have long been a significant factor in environmental water containment solutions. Solar Power&Water® pond systems are designed and marketed to address fresh water shortages, agricultural drainage cleanup, and the need for low cost renewable energy. The project scope included a salt gradient solar pond containing a flexible geosynthetic liner system, and with the help of a prime mover (engine), was designed to extract power directly from the pond's hot brine. The hot brine and project geographical location in Wellton, AZ both were considerations that had to be addressed in the initial planning phase to develop a liner solution able to meet and perform to the project parameters. The objective of pond performance was to distill brine water into fresh potable water and energy. Their innovative system provided a renewal water source for water that originated from agricultural wastewater, brackish/saline water (or ocean water) and sunshine. This project and its design remain significant, as a portable technology that may offer a catalyst for the systematic transformation of massive amounts of available brine water into renewable energy and fresh potable water.

PROJECT SOLUTION

The flexible reinforced polypropylene (RPP) chosen for this project was based on the following factors: high temp resistance, excellent dimensional stability, and ease of handling and sealing in both factory and field allowing for efficient use of large factory fabricated panels to increase production rates. A total of 130 prefabricated factory RPP panels measuring 220' x 95.94' and 540 ballast tubes were designed and built in at the manufacturer's quality-controlled location and delivered to the project site in Arizona. Construction installation crews completed the project in an impressive 28 days total; well ahead of the 35 days originally projected and budgeted. This saved the client significant days on site, labor and cost, along with any unnecessary weather risks.

Effective communication/planning between Raven and Solar Power&Water® additionally attributes to the timely project completion. The project installation was completed, the lake filled to operating capacity, and the project then finished up construction work for the infrastructure. During the project analysis, we seen a significant gain with the engineered use of modular construction prefabricated factory panels. We were able to reduce field seams by over 50% when compared to competitive field installed sheet membranes. In the end, the project was

designed, fabricated, installed and completed with high-quality performance and an optimal success rate for the customer.

PROJECT CHALLENGES

- **Sandy soil sub-grade** required daily wetting and rolling - The project location and terrain in this part of Yuma County meant sub-grade was a sand type soil; this required the area to be wet and rolled daily to maintain compaction and stability. The geotextile provided added stability on the side slopes to prevent scouring and movement of berms.
- **High temperatures** - Temperatures in the region during June can reach 115° Fahrenheit, which required install crews to alternately work night schedules. Crews worked from 10 PM to 8 AM schedules to avoid heat on both the field personnel and to keep the welding temperatures manageable.
- **High winds** – Crews had to immediately secure each RPP panel with sandbags following deployment and installment to ensure intense winds would not hamper production and delivery of the finished pond.
- **Hot Liquid Containment** – The hot brine water in the pond being distilled was another factor in the design discussion to find a suitable flexible liner for the containment.

PROJECT DETAILS

- 45 Mil Dura-Skrim® Reinforced Polypropylene (RPP) – 2,750,000 Sq. Ft.
- Manufactured By: Raven Engineered Films – Prefabricated factory panels custom built to the project design in 220' x 95.94', delivered and installed by Raven CLI Construction.
- 8 oz Nonwoven Geotextile material for slope underlayment – 360,000 Sq. Ft., delivered and installed.
- 540 Fabricated 36 Mil RPP Ballast Tubes for bench area, delivered and installed.



RPP Geomembrane panels secured in perimeter anchor trench.



Anchor trench preparation and fill work to secure the RPP liner.



Evening installation of RPP Geomembrane prefabricated panels.



Positioning ballast immediately following each RPP panel deployment due to high wind conditions.



Site sub-grade had to be wet and rolled daily due to hot, dry, and windy conditions.