

Client:

Arizona Public Service
Company

Location:

La Paz County, AZ

Services Provided:

- Recommendations for overall structure stability
- Root cause analysis to identify initial membrane failure

Value Provided:

- A cost-effective solution that balanced risk, cost, and schedule

Background & Project Challenges

The Palo Verde Nuclear Generating Facility is the largest nuclear plant in the U.S. In 1991, rehabilitation was conducted to repair the damaged geomembrane liner of the existing 80-acre reservoir which stores emergency cooling water for the nuclear power facility. At least half of the reservoir volume had to be maintained at all times. The project team was considering an inflated membrane structure to work as a coffer dam over part of the reservoir. This would allow dewatering of part of the reservoir so that the existing liner could be replaced. The inflated membrane structure would be reused on other parts of the reservoir to replace the entire liner.



Geocomp Role & Accomplishments

Geocomp evaluated the internal stability of the proposed inflated structure as well as the overall stability of the structure and its foundation. The existing bottom liner used a rubberized asphalt layer. Geocomp found that this material creeps at a high rate under relatively low shear rates. A detailed numerical analysis showed that the inflated structure would not be stable for the required loading conditions. While an appealing solution from cost and operational perspectives, this option would have failed during construction.

Geocomp worked with the project team to develop alternatives, including a sheetpile cofferdam instead of the inflatable barrier, an underground seepage cutoff wall constructed of soil and bentonite around the perimeter of the reservoir to stop lateral seepage, and construction of additional reservoir capacity to serve as backup while the existing reservoir was taken out of service and relined.

After weighing risk, cost and schedule constraints, the project team opted for a solution recommended by Geocomp.

Geocomp also performed a root cause analysis to define what mechanisms had contributed to the initial failure of the geomembrane liner and recommend changes to avoid similar failures in the future. That evaluation required close examination of the geomembrane materials, the underlying soils, the operational modes of the reservoir, and the interaction of water, geomembrane and soil as waves strike the side slopes.