Pumps

The 7,000 ft Challenge for Submersible Pumps

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Written by Lisa Poole, Quadna, Inc.

The Springerville Generating Station, Unit 4, in Springerville, Ariz., uses lined ponds to hold water collected from its cooling towers. With the construction of Unit 4, Salt River Project (SRP), one of Arizona's largest utilities, wanted to increase the capacity of pumps used to move effluent from one pond to another to avoid possible overflow. The lined pond collects effluent water, and the plant's pumping system is used to deliver collected effluent water to one of two evaporation ponds.

SRP asked if it was possible to use a vertical turbine on a floating barge on the pond to solve the problem. It requested one stainless steel pump barge capable of supporting two submersible pumps (including motors) with an associated piping manifold that would extend to the barge's edge. The plan for the ancillary barge equipment included a discharge manifold with flanged connections, check valves, isolation valves and an overhead trolley for servicing the two pumping units. The floating barge would have also housed a 40-ft long floating walkway that would be used to access the shoreline and a duplex pump control panel.

The price for the barge pumping system was more than SRP was willing to spend. This option also posed an additional problem. SRP did not want any tampering of the liner, so the pumps and pipe could not be secured.

There were additional challenges. The generating station is located in an area known as the Gateway to the White Mountains. The project site is remote and, at an elevation of 7,000 ft, the solution had to accommodate occasional sub-zero temperatures and fluctuating pond levels from rainwater and snow run-off.

Other viable options presented to SRP included the use of submersible turbines supported by a pipe at the pond's edge on a 45 deg angle or self-priming pumps situated on the dry bank of the pond.

The second option was the most viable. In the White Mountains of Arizona, temperatures can range from 12 to 94 deg with wind speeds up to 90 miles per hour. The pumps had to be protected from the elements.

Understanding the strict parameters of the project, the design team decided to use two v-belt driven pumps with 10-hp motors. The pumps were chosen for their reliability and limited net positive suction head available (NPSHA).

The team understood that insulating the pumps in a durable structure and equipping it with space heaters and temperature controls was the most cost-effective, dependable solution. With little human supervision, the automated pumps and piping had to be protected, so the enclosure was the ideal solution.

The pumps were enclosed in an 8 x 10-ft house. The fiberglass enclosure featured ventilation for summer and heat for winter to thoroughly protect the pumps, piping, valves, lighting and control panel housed within the building.

The effluent pond leak detection pumps lie on top of the secondary liner and are used only when, and if, the primary pond liner leaks. If a leak occurs, the level floats, and the pumps are activated. Submersible pumps centralized in a pipe with three Teflon® wheels were used for easy installation and servicing.

Lisa Poole is the engineering and sales manager for Quadna, Inc.

Tags: Pumps , Submersible Pumps , Vertical Turbine Pumps , Wastewater Pump , Water and Wastewater