Water Pipeline Supplies Vast Areas of South Dakota

Murdo, SD – A little more than 100 years ago, Sioux Warriors protected their sacred Black Hills in South Dakota with bow and arrow. Today, the Great Sioux Nation is protecting the same area but their methods are being described as the largest water engineering effort in the United States.

The Mni Wiconi Rural Water Project (Mini Washonee) is the world's largest rural water pipeline and will supply water to the Lower Brule, Pine Ridge, and Rosebud Reservations as well as the West River/Lyman-Jones Rural Water System. West River/Lyman-Jones serves the people located in nine counties outside of the reservations.

The development of this massive water supply project was based on a needs assessment and final engineering report carried out under the supervision of the Federal Government. It was authorized by Congress in 1988 and expanded in 1994 to include the Rosebud and Lower Brule Sioux Tribes.

Over time, the cost has risen to almost $400 million. About 80 percent of the project costs were allocated to the tribal systems as non-reimbursable federal costs. West River/Lyman-Jones pays a cost share on their portion of the project.

What does $400 million buy?

When the project is complete (scheduled for 2008) it will include over 4,300 miles of transmission and distribution pipelines, a water treatment plant, booster stations and numerous reservoirs. Because of the size and cost of the project, construction is being completed in phases.

Phase XII of the Rosebud Sioux Rural Water System is currently under construction and involves significant quantities of high-density polyethylene (HDPE) pipe. Polyethylene is playing a vital role in two river crossings on Phase XII and was also the key factor in the massive Missouri River intake system located in Pierre, SD.

"During the last several years polyethylene has really helped us develop a niche in being able to perform almost any kind of pipeline work," said engineer Mark Morris, Project Manager and prime contractor for Phase XII.

Morris' specialty is highway heavy utility construction, and his roots are in agricultural irrigation systems. He's been involved with the installation of several large irrigation intake systems on the Missouri River utilizing PE pipe, including the design of the Mni Wiconi intake line using PE pipe and a siphon concept.

The siphon line consists of 2,600 feet of 42-inch PE pipe and can handle an estimated 10 million gallons per day. The trench for the pipe was excavated by using an excavator on a barge and the pipe was anchored to the river bottom with anchors that were drilled into the riverbed spaced every fifteen feet.

The original intake design called for ductile iron pipe, along with several large air/vacuum stations, to be installed down the middle of a causeway leading out to a peninsula referred to as "Echo Point."

Rather than excavate through the causeway and risk losing portions of the causeway due to hydraulic pressure, and to keep the environmental impact to an absolute minimum, Morris submitted the siphon system as a value-engineering proposal.

Ultimately, the proposal was accepted and not only allowed for more water, but also saved the owner approximately $200,000.00.

“Once PE is in the riverbed it’s there for good, you don’t ever have to worry about it,” said Morris. “With PE, there is no rusting, no leaks at joints and the pipe won’t freeze and burst.”

Morris points out that the installation is also a big advantage. “All we had to do was excavate the ditch, float the pipe out and sink it. You can’t do that with other kinds of pipe.”

To prevent the freeze and rupture of other piping materials on intake systems in the north, the pipeline must be pulled from the river during the winter months. With PE, the intake can be a permanent structure because a freeze will not cause the pipe to burst.

Perhaps the strongest characteristic of the pipe is the way in which it is joined. The pipe is heat fused together and the joints are as strong as the pipe itself. The pipe becomes a monolithic structure with no connections to become weak over time and leak.

The two river crossings for Phase XII originally called for directional drilling but Morris decided to use open cut methods because the riverbeds consisted of shale and the water depth was only about three feet.

“Since the riverbed was solid shale we were able to save quite a bit of money by doing an open cut,” said Mike Lee, the project superintendent for Phase XII. Lee supervises almost all of Morris’ rural water pipeline projects and is a firm believer in PE.

“The hard material made for slow digging but easily supported the large excavating equipment and the sides of the trench were also stable and did not cave in.”

Concrete anchors weighing 5,500 pounds were attached to the pipe at 15-foot intervals to help sink the pipe into the trench in the river. A scuba diver directed the placement of the huge anchors.

As water shortages continue to rise and polyethylene becomes more recognized, the latter is sure to ease the pain of the former. For now, engineers and environmentalists alike are applauding the Sioux Nation for its pioneering effort.

For more information, contact the Plastics Pipe Institute at 202-462-9607, ext. 13 or online at www.plasticpipe.org.