

ISCO Industries' HDPE Pipe Contributes to "Green" Irrigation Solution

Three Sisters Irrigation District (TSID) Main Canal Project, Oregon

Whychus Creek is a major west side tributary of the Deschutes River. It flows for 40 miles through Deschutes National Forest, the City of Sisters and the sagebrush steppe of the Crooked River National Grasslands before joining the Deschutes River just above Lake Billy Chinook. The creek is fed primarily by runoff from snow, glaciers and rain, though it is supplemented by springs at several locations below the town of Sisters.

Since 1888, the creek supplied water for irrigation purposes in Central Oregon. However, the arid conditions and highly permeable soils and rock in the region caused traditional methods of irrigation, a system of open ditches and canals, to lose considerable amounts of water. The open canal was also susceptible to water contamination.

The Three Sisters Irrigation District (TSID), the oldest irrigation district in Oregon duly organized and operated under Oregon law governing irrigation and other special districts, needed to find a solution to the leaky irrigation canal while also contributing to local environmental efforts to restore fish migration to the creek.

TSID decided that the best and most environmentally sustainable way to prevent future irrigation leaks and any potential water contamination was to enclose the canals and ditches using a high-density polyethylene (HDPE) piping system. By enclosing the canal with HDPE pipe, TSID will eliminate any conveyance losses and reduce the amount of water needed for irrigation.

The TSID main canal project is also part of a wider three-phase Whychus Creek rehabilitation project that has been partially funded by a 2009 American Recovery and Reinvestment Act (ARRA) grant given to the Deschutes River Conservancy (DRC) to improve water quality and fish habitats in the Deschutes River system.

"This project will have a huge impact on the communities, fish and wildlife in Central Oregon," said Marc Thalacker, TSID manager. "The energy and water conservation this investment will bring are invaluable."



Two 54-inch HDPE pipelines will be buried to convey water from Whychus Creek to a reservoir.

With the funding, TSID purchased 30,000 feet of 54-inch HDPE from ISCO Industries, a total piping solutions provider, for the first two phases of the project. The 3.77 mile pipeline project features dual 54-inch lines that will be buried, conveying water from Whychus Creek to an 80-acre Watson Reservoir, eliminating any open ditches or canals.

ISCO's HDPE piping irrigation solution was chosen for the project because of HDPE's characteristics. The pipe is flexible, able to curve around different terrains while maintaining a leak-free system, and resistant to freezing, corrosion and cracking. In addition, ISCO supplied HDPE pipe is non-toxic and chemical resistant.

The HDPE pipe includes four different wall thicknesses. The pipelines will stair-step upwards in wall thickness where the flow and pressure within the pipe are expected to grow. The project consists of 50-foot sticks of pipe delivered to a staging area. The pipe is

butt fused together one at a time, using a McElroy four jaw 1600 fusion machine, which creates a continuous and leak-free pipeline. Typically, HDPE pipe and joints have a lifespan of more than 100 years.

TSID also used a geographical information system (GIS) to map out their District. GIS gave TSID the ability to identify water conservation opportunities. TSID partnered with Geo-Spatial Solutions, Inc. to develop the GIS database for the project. The GIS portion of the project was funded by a System Optimization Review (SOR) grant from the Bureau of Reclamation, minimizing costs.

"We chose GIS because it would help us identify conservation opportunities," said Thalacker. "GIS allows us to quickly respond to impending threats to our water supply. It also is an impartial tool that has the capabilities to support management efficiencies well into the future."

As a primary objective of the project, DRC set an in-stream minimum flow target of 20 cubic feet per second (cfs) to be helped by the new pipeline adding six of those cfs to raise the flow above the minimum target. In addition, there will be more water available to farmers for irrigation. When the 54-inch pipeline, as well as a concurrent HDPE project that will create a 36-inch irrigation line, come online, some farmers will have an opportunity to remove their pumps and conserve energy. The TSID Main Canal Piping Project will



The piping of the irrigation canal will prevent water evaporation and contamination from porous soils, allowing less water to be used for irrigation.



The pipe is fused together to create a leak-free system.

also restore a more natural hydrograph to the creek, according to the DRC.

Secondly, the pipe creates a penstock to supply up to two Francis turbines that will produce electrical power. It is possible to attach a turbine to each pipeline, which will allow the electricity to head toward the city of Sisters via electric transmission lines installed recently by Central Electric Cooperative, Inc.

The final goal of the project is to boost the population of steelhead salmon in efforts to get the species removed from the Endangered Species Act list. To keep the fish out of the pipelines, a fish screen will be constructed. The screen will allow water to continue down the pipeline for farmers and hydroelectric power, while keeping the fish in the creek. This would be much harder to do if the irrigation canal were left open instead of being enclosed by pipe.

Overall, the project is planned to last until 2012, with the fish screen installation completed as part of phase two in 2011. The final phase consists of putting in the twin Francis turbines and creating renewable energy.