Case Study

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TOUGH THERMOPLASTIC PIPELINE NOW MOVING CRUDE OIL

Hundred Mile "Downunder' Project Honored by Plastics Pipe Institute

IRVING, Texas.- Instead of trucking light crude oil on a hundred miles of dirt roads in a remote area of Australia, it is now being conveyed underground using a thermoplastic, flexible composite pipe. This undertaking was awarded the Project of the Year by the Plastics Pipe Institute, Inc. (PPI) for its Energy Piping Systems Division (EPSD).

The project was selected for the honor due to the advanced technical composition of the pipe, the elimination of the environmental impact of heavy truck traffic, plus the extreme logistics that were successfully met. PPI is the major North American trade association representing all segments of the plastic pipe industry.

The 105.6 mile (170 km) reinforced thermoplastic pipe (RTP) was installed in 2013 to transport light crude oil from Queensland to a processing facility in South Australia. The four-inch diameter line had to meet the design pressure of 1500 psi and a design temperature of 180 F (82 C). The RTP line provided a 50 percent savings compared to steel pipe and was easy and fast to install and also meet the technical requirements of Australia's pipeline standard AS 2885.1 'Pipelines – Gas and Liquid Petroleum'.

"Aside from being able to convey hot crude oil in an austere area of Australia, the pipe had to withstand chemicals, high heat, rough soil conditions and even termites," observed Tony Radoszewski, president of PPI. "HDPE pipe is always a top consideration for the tough jobs, but I think this is the first time I have ever seen an RFQ stating that a pipeline had to be termite proof." He presented the award to PPI member company and manufacturer of the pipe, Flexpipe Systems, Inc. (Calgary, Alberta), a division of ShawCor Ltd., during the association's annual meeting held in May 2014 in Palm Springs, California.

The Flexpipe Systems FP601 HT RTP has an outer jacket and an inner liner of HDPE-RT (Raised Temperature Resistance) and two layers of wound fiberglass. Manufactured at the Flexpipe plant in Calgary, the 100 miles of pipe journeyed 10,500-plus miles (17,000 km) across the ocean then more than 900 miles (1,500 km) inland to the site.

The reel-less, coiled pipe was installed by plowing at a depth of two and a half feet (0.75 m) to 6.5 feet (2 m) at major roads, dunes, and major creek crossings. The average rate of plowing achieved was 2.42 miles (3.9 km) a day and, at peak times, as high as 5.5 miles (9 km) a day. Because RTP could be plowed into the ground, the time and cost of installation were drastically reduced. Other types of pipe such as glass reinforced epoxy (GRE) or steel were unable to meet all the criteria of capability, ease of installation, time to install, ongoing maintenance and environmental

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impact. There was a capital cost reduction of nearly 50 percent compared to a steel pipeline.

"The RTP was a high-temperature variant to withstand the high inlet temperatures of the transported fluids," explained Randy Knapp, director of engineering for the Energy Piping Systems Division of PPI. "The pipe also had to withstand high levels of aromatic hydrocarbons present in the flow. The construction of RTP isolates aromatic fluids from the reinforcement layer which provides the pressure containment for the pipe. This allowed continuous aromatic content up to 25 percent by volume in the pipeline at the required inlet temperature of 158 F (70 C). Also, the corrosion resistance of HDPE coupled with the pressure capability of RTP made it the best option for the project."

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The fittings used in this RTP system are nickel coated to protect from internal corrosion and have sacrificial anodes and tape wrap to protect against external corrosion.

The Flexpipe RTP passed a very thorough compliance assessment as well as a risk assessment to cover any sections that were not addressed by AS2885.1 due to the material type. A detailed technical assessment of the design basis and qualification process of the pipe and jointing system was done based on API RP 15S "Recommended Practice for the Qualification of Spoolable Reinforced Plastic Line Pipe," and included a comprehensive set of short and long term tests to validate RTP resistance to the anticipated service conditions of the pipeline. The testing included a long term pressure capability test as per ASTM D2992 and conducted for 14 months at the pipe rated temperature, in addition to chemical resistance testing, temperature cycling testing, elevated temperature testing, and external loading capability.

"This PPI Project of the Year was successful in its design, installation, and operation, providing a flexible pipeline solution for the transport of liquid hydrocarbons through the Australian outback," Radoszewski commented. "The RTP provided distinct advantages when compared with rigid, fixed-length traditional pipe. Installing more than 100 miles of the pipe using low-impact plowing took just 95 days with a small crew and protected sensitive environmental areas. Plus the costs as well as ongoing maintenance were greatly reduced by choosing this type of composite pipe.

"Now instead of trucks making somewhat dangerous 14-hour round trips," he offered, "there is a cost-effective pipeline that also solves production shutdowns that frequently occurred due to wet weather closing the clay and dirt roads."

For more information, visit the Plastics Pipe Institute website: www.plasticpipe.org.

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About PPI:

The Plastics Pipe Institute Inc. (PPI) is the major trade association representing all segments of the plastic pipe industry and is dedicated to promoting plastics as the material of choice for pipe applications. PPI is the premier technical, engineering and industry knowledge resource publishing data for use in development and design of plastic pipe systems. Additionally, PPI collaborates with industry organizations that set standards for manufacturing practices and installation methods.