HDPE Water Pipe Ideal for Challenging Delaware Terrain

Leak-free System and Corrosion Resistance Critical to Project

July, 2003 – In the late 1980s and early 1990s, southern Delaware gained popularity for its proximity to the beach and accessibility to city life. However, this area also had an untapped potential. Many of the existing homes were supplied by numerous underground reservoirs that often produced substandard well water for homeowners' day-to-day water needs.

In 1992, as a response to increased development and lack of a structured water system, Delaware-based Artesian Water Company began to investigate service opportunities in the southern sections of the state, particularly in the resort areas of Sussex County. This area includes South Bethany, Fenwick Island and West along Route 54 (a location that was viewed prime for residential development).

Since 1998, with the assistance of four contractors, 34.5 miles of high-density polyethylene (HDPE) pipe and thousands of connections have been installed in the coastal portion of Sussex County. In the fall of 2003, an additional two miles of 4-inch to 16-inch water main will be installed to serve resort developments along the Route 54 corridor.

Finding a Suitable Material

Artesian Water Company engineers found challenging terrain in Sussex County, including many untouched natural areas and ground movement. Studies showed some highly corrosive soil chemistry and poor-quality well water, according to Jim Straight, manager of System Planning and Design at Artesian Water Company.

"We needed a pipe material that would not corrode or lose integrity due to the soil chemistry," said Straight. "In most areas the salt-water intrusion from the ocean appeared in the water table at usual pipe-laying depth. The water system material needed to be suitable for directional drilling in preservation areas."

Delaware water companies and municipalities historically relied on PVC pipe or ductile iron pipes for similar projects throughout the state. However, soil tests conducted by Artesian suggested that if metal pipe were installed it could corrode in as little as 20 years, depending upon the area.

As the planning and design team at Artesian began to research pipe materials, they were impressed by HDPE pipe's success in the gas industry. It has been used for about 95 percent of the fuel gas distribution piping in the United States because of its reliability, leak-free performance and resistance to corrosion.

Straight and his team also received information on HDPE pipe from a Plastics Pipe Institute (PPI) member company. HDPE pipe provides a leak-free system through its joining process – heat fusion – that produces strong, totally sealed connections. Further, polyethylene is a dielectric material and is frequently used as an insulating material for electrical conductors. Because it is a non-conductor, polyethylene is simply not subject to corrosion.

"Many water companies, like Artesian in Delaware, are using HDPE pipe to construct a leak-free and corrosion-resistant water distribution system to deliver water to their

residents," said PPI Executive Director Rich Gottwald. "As a result, they're avoiding the problems and maintenance costs associated with leaky systems."

"We were really impressed by the leak-free system, cost effective materials and corrosion resistance," said Straight. "And we knew that HDPE pipe would withstand the harsh environmental conditions that we were up against."

Challenging Terrain and the HDPE Pipe Solution

The Sussex County landscape includes preserved wetlands, beachfront, one major waterway and several streams. Installers were faced with challenges, such as:

Installing pipe near the oceanfront
Ground conditions dictated substantial dewatering, including well-point dewatering to stabilize the trench excavation in the predominantly running sand environment. This made pouring concrete thrust blocks for the beds and fittings (as done with gasketed or mechanical joint pipe) almost impossible, as the concrete would eventually migrate downward due to the lack of solid virgin ground. The fused joints of HDPE pipe are self-restraining and do not require thrust blocks, making it ideal for the area.

Considering the high organic and sulfide count in the soil composition
Much of Sussex County's soil includes a moderate to high corrosion potential that could reduce the life span of metal pipe. Artesian knew that HDPE systems resist the effects of corrosive soil encountered in water and sewer applications.

Preserving protected areas
Sussex County has many natural areas such as wetlands that are environmentally sensitive and are protected by environmental agencies. In order to avoid any disturbance to the land, contractors used a directional boring machine to install HDPE pipe in these areas, as well as 1,800 feet of pipe over a major waterway crossing. Trenchless technology and the unique features of HDPE pipe helped preserve the environmentally sensitive areas.

Allowing for ground movement
HDPE pipe's flexibility allows it to resist the effects of ground movement better than more rigid materials. Additionally, HDPE pipe has a high strain allowance, which reduces the chance of breaking pipes due to water hammer effect.

"With HDPE pipe and properly heat fused joints, there's nothing to break apart." Gottwald said. "The joint is as strong or stronger than the pipe itself."

"We found HDPE pipe met all of our needs in these areas and we look forward to installing more of it as residential areas continue to be developed in coastal Sussex County," stated Straight.

About Artesian Water Company and the Plastics Pipe Institute
Artesian Water Company is a 100-year old investor-owned Delaware-based water company with over 950 miles of pipe and 68,000 service connections. In 1992, the company expanded its market to include the southern counties in Delaware.

The PPI is the major trade association representing all segments of the plastics piping industry. Member companies share a common interest in educating interested parties on

the benefits of plastic pipe and in broadening market opportunities that make effective use of plastics piping for various applications, including: water and gas distribution, sewer and wastewater, oil and gas production, industrial and mining uses, power and communications duct and irrigation. For more information, log on to www.plasticpipe.org or call 1-888-314-6774.

The Municipal and Industrial Division of PPI is the information resource on high-density polyethylene pipe – including key issues related to water distribution and wastewater collection.

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