HDPE Pipe Critical to Nuclear Plant Operations

Some of the nation's nuclear power plants are replacing water lines with high-density polyethylene (HDPE) pipe. The use of HDPE in the nuclear power industry puts a huge spotlight on the unmatched properties of the piping material to provide a safe and cost-effective solution.

A February 2011 article in *Water & Wastes Digest* highlighted the use of HDPE at two different nuclear facilities – Duke Power's Catawba Nuclear Power Station in South Carolina and Ameren Missouri's Callaway Nuclear Plant in Missouri. The article provides an excellent resource if you are advocating for the use of HDPE piping within any industry, are wanting to know the science behind HDPE's capabilities or are interested by this new, emerging use of thermoplastic piping.

It's no surprise the nuclear facilities would turn to HDPE for both non-safety and safety-related applications. Solid-wall HDPE provides a durable, corrosion-free, leak-free pipeline solution.

"For more than 50 years, HDPE pipe has performed under rigorous conditions, such as deep burial, earthquakes and in toxic soil where no other type of pipe could survive," said Tony Radoszewski, executive director of the Plastics Pipe Institute, Inc. (PPI). "Pipe manufacturers and the makers of the resin used for the pipe have traditionally worked together to develop new products. HDPE pipe use in nuclear plants is just a natural progression of that effort."
Frank Schaaf, a nuclear utility consultant, believes HDPE pipe is gaining in popularity because of its favorable purchase and installation costs, which enables a plant to replace their previous stainless steel water lines while creating redundancy lines to increase operational safety.

Schaaf recently completed the development code case for the American Society of Mechanical Engineers (ASME), which has instructions for polyethylene pipe, including how the pipe is to be supplied, design parameters, installation rules, pipe fusion requirements and pressure test criteria.

“Most of the nuclear plants in this country are 30-plus years old,” Schaaf explained. “Stainless steel was the predominant material when these plants were built. It was readily available and the industry had the expertise to weld and install it. They knew and understood that material.”

Like all power generation that uses a steam turbine, nuclear power plants require large amounts of water for cooling. Two-thirds of the energy produced by a power plant is excess heat that is carried away from the plant in the water (which is not contaminated by radioactivity). The water is then sent into cooling towers to be emitted as steam or is discharged into a body of water, such as a dedicated cooling pond, a lake or river, or into an ocean. Systems to carry this water, plus the pipelines for fire suppression systems, were the first to be converted to HDPE piping.

Catawba Nuclear Station was the site of one of the earliest uses of HDPE, nearly a decade ago. A replacement of non-safety piping at the plant was conducted at Catawba’s discretion because the piping didn’t fall under the Nuclear Regulatory Committee’s auspices. From the experience, plant engineers learned a great deal about using HDPE, eventually deciding to replace all safety-related piping starting in 2009.

To get from the starting point a decade ago to replacing the more regulated safety-related pipe in a nuclear plant, many experts within the industry joined with Schaaf to form a team to write a Code Case for ASME.
“This was a true industry initiative,” said Radoszewski. “Experts in pipe, resin, fusion and fittings came together to take proven systems and tailor them to new surroundings. At first, using HDPE pipe in this application raised some eyebrows because many people in the nuclear power industry did not realize the strength, durability and track record of HDPE pipe.”

The first use of polyethylene pipe in a nuclear safety-related application started with the selection of a high-performance PE 4710 resin made by Dow Chemical to make pipe that could replace carbon steel pipe at the Callaway Nuclear Power Plant. The pipe is used for buried portions of the plant's Essential Service Water system. About 1,600 feet of 36-inch HDPE pipe manufactured by WL Plastics was initially used. All of the installation at Callaway happened after the ASME Code Case wavier application was approved in March 2007.

The most popular method for joining HDPE pipe sections and fittings is butt fusion. Officials from McElroy and McElroy distributor, ISCO Industries, helped train contractors and plant engineers on how to operate the fusion equipment.


PROBLEMSOLVER

Fusion for Fission

“One of the advantages of HDPE pipe is the fusion joining that delivers leak-free performance,” said Schaaf. “The nuclear power industry, however, is not generally familiar with the fusion process, at least not before these projects. I think that’s one of the hallmarks of the whole program – this joining operation where we took PPI’s Technical Report TR-33 (the PPI’s Polyethylene Generic Fusion Procedure) and developed a whole joining program around it.”

This move to HDPE piping systems should be a sign for other utilities to join the fold.

“The nuclear energy industry’s realization that HDPE pipe is a smarter and much more cost-effective solution should be a wake-up call for cities looking to replace crumbling and degrading pipe systems,” advises Radoszewski. “HDPE pipe provides an optimum solution in wide-ranging industries for both above and underground applications and in broad-ranging circumstances applicable to the major cities of our nation.”

To dive deeper into the full science behind why the nuclear industry is turning to HDPE, we encourage you to read the entire article “Fusion for Fission” written by Steven C. Cooper. The article, published in the February 2011 issue of Water & Wastes Digest is available to read online by clicking here.

Congratulations to our Winners

Last month, we asked for your opinion on the Connections newsletter. We promised five winners would get a t-shirt and hat. While the contest to win prizes is over, you can still offer your opinion by completing the survey.

Our five winners are:
Tom Morley, New England Utilities Constructors, Inc.
Emanuel Clementelli, National Grid
Dan Martinez, Xcel Energy
David Teeau, AFD Inc.
Jared Edgar, SCS Field Services

P.S. – Do you have an interesting jobsite that you would like to share? McElroy is always looking for fusion jobsites where HDPE is being used and fused to solve an infrastructure problem. Contact Tyler Henning, public relations specialist at (918) 831-9286 or by email at thenning@mcelroy.com

PRODUCT SPOTLIGHT

PolyHorse™

The McElroy PolyHorse™ is a pipe-handling system that consists of a series of adjustable racks to store and help install pipe on the jobsite. For use with polyethylene pipe sizes from 3" to 20", the PolyHorse can reduce labor expenses by providing an efficient, less hazardous work environment for handling pipe bundles and enhance jobsite productivity.

Pipe is off-loaded from the delivery truck directly onto the PolyHorse, off the ground and out of the way until needed. In use, the operator rolls the pipe down the rack and onto the integral pipe rollers where it is easily loaded into a McElroy fusion machine. This eliminates the costs for additional lifting equipment and manpower on site.

For even more productivity, the PolyHorse can be ordered with the special PowerAssist attachment. The PolyHorse with PowerAssist features a hydraulically powered roller placed closest to the fusion machine that helps load pipe up, down and into the fusion machine.

The PolyHorse can be used with McElroy 14, 26, 28, 250, 412, 618 and 500 fusion machines for more productive jobsites.

Features

- Reduces manpower and additional heavy equipment
- Enhances productivity
- Standard 3-truss setup has 36,000 lbs. total capacity *(add 12,000 lbs. for each additional truss used)*
- Modular design
- Patents pending

Stay tuned next month as we unveil a new introduction the PolyHorse family of products.

NEWS AND EVENTS

Free Webinar Highlights HDPE Pipe as the Sustainable Solution for Potable Water

On Thursday, May 19th, *Trenchless Technology* magazine will hold a one-hour webinar beginning at 11 a.m. EST. The webinar will discuss the continuing evolution in polymer technology and how this has enhanced high-density polyethylene pipe performance. The webinar will conclude with a presentation on the City of Palo Alto's accelerated infrastructure replacement program.

To register for this webinar, click here.

McElroy to Exhibit at the American Gas Association's Operations Conference & Biennial Exhibition

McElroy will in Nashville, Tennessee from May 24-27 for the annual AGA Operations Conference. The conference is the natural gas industry's premier gathering of natural gas utility and transmission company operations management from across North America and the world. At the conference, professionals can share technical knowledge, ideas and practices to promote the safe, reliable and cost-effective delivery of natural gas to the end user.

McElroy will be just one of more than 150 vendors at the event. For more information, click here.

McElroy's AWWA Annual Conference to Feature Pit Bull® 26 and In Field™ Tensile Tester

On June 12 through 16, McElroy personnel will be at the American Water Works Association's Annual Conference and Exposition 2011 (ACE11). At Booth #1113, McElroy will have a Pit Bull® 26, In Field™ Tensile Tester, TracStar® 412 and 1LC fusion machine on hand for demonstrations.

The 130th annual AWWA ACE11 Show is the water community's forum for tackling a growing number of challenges – from infrastructure management to water resource protection. McElroy personnel will be available to answer questions on how to get more reliable infrastructure piping into the ground.

For more information, visit the AWWA ACE11 page.

McELROY AROUND THE WORLD

Our first picture this month comes from Ryan Ethier from A.H. McElroy in Canada. A.H. McElroy is a McElroy distributor with locations in Edmonton, AB; Brampton, ON; Dartmouth, NS; Mission, BC; and Saskatoon, SK.

While the TracStar® 28 is in the foreground, it's the wildlife on the hill that's intriguing. Ryan captured this picture with his mobile phone after noticing a big horn sheep in the background. This picture was taken near Radium Hot Springs, British Columbia, Canada.

The second photo is from McElroy Headquarters in Tulsa, Oklahoma. McElroy has been under construction, installing a new geothermal HVAC system in one of the manufacturing facilities. This gave a local contractor the opportunity to use the full range of small diameter McElroy products, including these three Sidewinders™.

If you have photos from a jobsite, we'd love to see them! Yours may be chosen for the next issue of McElroy Connections. Simply email your photos to Tyler Henning, at thenning@mcelroy.com.

RECENT POSTS

McElroy T500 Tracstar Repair HDPE Fusion www.youtube.com
May 13th

ASME Conference June 20-23 to highlight use of #HDPE in Power Plant Piping Systems. Click here to register. http://ow.ly/4QoYf
May 9th

#HDPE helps out in Lynnwood, Washington Sanitary Sewer project.http://ow.ly/4JcUt
Apr 28th

We just released a new version of the McCalc Fusion Pressure Calculator for iTunes-based Apps. Make sure to update to version 1.0.2 or get your app for free today!
Apr 20th

IMPORTANT LINKS

- Alliance for PE Pipe
- WaterWorld
- Water Tech Online
- North American Society of Trenchless Technology
- Plastics Pipe Institute

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