



Innovation Drives World Record Natural Gas Main Renewal

Photos by Progressive Pipeline Movement

By **David Wickersham**, President, CEO and Founder, **Progressive Pipeline Management**

Driver along the stretch of Central Avenue crossing the Garden State Parkway (GSP) by the East Orange General Hospital in New Jersey would have noticed the construction crews, excavations, equipment and vehicles in the middle of the street. What he or she would not know is that the project underway was setting a world record.

The 42-inch underground, high-pressure natural gas main rehabilitated in July 2019 was the largest diameter pipeline to be lined in the world.

The cast-iron gas line runs along Central Avenue, traveling 80 feet directly down an embankment and then crosses under the GSP and back up the other side to street level. Central Avenue is 25 feet higher than the GSP. In this dense area there was no viable alternative other than trenchless rehabilitation to renew the gas main.

In many of the urban, historic, newly paved and high traffic areas where Progressive Pipeline Management (PPM) is called in to solve a problem, the cost and disruption would be astronomical to dig up

the old pipe and lay new pipe. To replace this section of pipe conventionally would have cost tens of millions of dollars and created massive disruption.

The gas distribution company Public Service Electric & Gas (PSE&G) made the decision to renew a 42-inch cast iron section, using Starline Cured-in-Place-Lining (CIPL) with PPM. PSE&G has been a strong user of CIPL technology since the early 1990s., and PPM has been the sole contractor in North America with an exclusive license to install Starline CIPL for natural gas pipeline renewal since 2002.

CIPL is especially effective for cast iron, which has been used for more than 100 years throughout North America for gas distribution. Most cast-iron pipelines are in surprisingly good condition, but they contain joints, which can leak over the course of time. That was the case with this section of 42-inch pipe.

Starline was developed by Karl Weiss, a German company with extensive experience in natural gas renewal applications. The technology utilizes a liner that is bonded to the host pipe with a special epoxy.

Technology Innovations

Each lining job requires two excavations or access holes on each side of the pipe segment to be lined. These were dug deep into Central Avenue about 600 feet apart. During the project, the street remained open, with gas being shut off June 26. The actual lining process required about 2.5 weeks for inspecting, cleaning, lining and curing the pipe.

Once PSE&G completed the excavations and shutdown the gas main, PPM began the CIPL renewal process with a pre-cleaning CCTV camera inspection. This was done to determine internal pipe surface conditions, geometry of the seven offset bends and the location of any anomalies or areas of concern.

Next, the surface of the pipe had to be cleaned. CIPL uses a combination of abrasive blasting and a vacuum removal process. The abrasive blasting is needed to achieve a smooth and clean pipe. A black copper grit is used to clean the pipe wall down to white metal, so that when the liner is installed, a tight bond is achieved. The high-velocity air flow from the 64,000-cfm vacuum units provides for the complete removal of all

expended grit and cleaning waste.

Because of the large size of the pipe and the multiple bends, PPM felt the cleaning process may have presented challenges to clean, cleaning effectiveness and grit recovery. The current method for smaller diameter pipes is to pull in a sandblasting cleaning head through the pipe, prior to engaging the grit blast.

Once the head is confirmed at the start location within the pipe, the grit blast is initiated, and the head pulled back at a slow rate. While effective, it takes time to pull the head in via a winch. Saving this step while finding a larger cleaning head for this size of pipe was something that was reviewed for months before the project start. A robotic sandblasting head with an electric motor for internal cleaning of pipelines 36-inch and up, which was manufactured by PRD Company, was eventually chosen after internal testing. Affectionately named the "The Beast." It didn't require staging.

The grit used for cleaning had to be extracted from the pipe to enable the liner to adhere to the host pipe. Testing and reconfiguration of the vacuum equipment was performed to optimize velocities impacting



ABOUT THE PROJECT:

Project Owner: Public Service Electric & Gas (PSE&G)

Contractor: Progressive Pipeline Management (PPM) with Karl Weiss, Germany

Technology: Cured In Place Lining (CIPL) 42-inch

Engineer: George Ragula, PSE&G

Where: East Orange, N.J.

When: July 2019; Lining took 2.5 weeks; Main abandoned in late June

Pigs Unlimited International, Inc.

Making the world a cleaner place...
One pipeline at a time.™

Products

- Foam Pigs
- Steel Pigs
- Urethane Pigs
- Cups and Discs
- Brushes
- Pig Trackers
- Pig Detectors
- Process Pigs
- Pig Valves
- Pig Launchers/Receivers

Tel: **281-351-2749**
 Fax: **281-351-4658**
 Toll Free: **800-578-7436**
 Email: **Sales@pigsunlimited.com**



Services

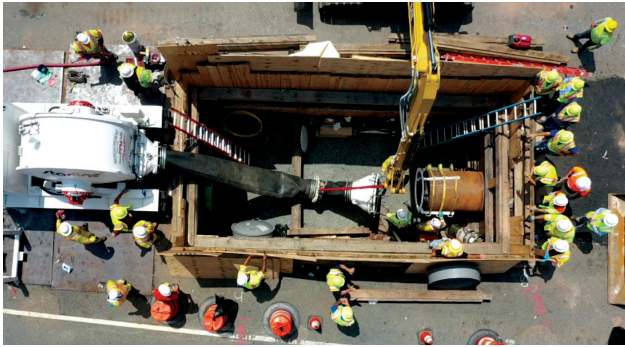
- Interactive Website
- Pigging Resources
- Trouble-Shooting
- Training Seminars
- Pig Design
- Pigging Formulas
- Contract Manufacturing
- Caliper Pig Service

DISTRIBUTORS WANTED



www.pigsunlimited.com





flow rates and to minimize expected extraction difficulties due to the unusual U-tube configuration of the pipeline that went down and back up a steep embankment. Moving to dust collection units with 64,000 cfm air flow was the silver bullet in complete grit recovery – quite a milestone considering the pipe diameter and geometry.

Smooth Lining

“It was a challenge because of the location and U-tube configuration, so we knew all solutions had to be very well thought out,” said George Ragula, Distribution Technology manager for PSE&G. “Tremendous coordination

and careful planning were employed among PPM, Miller Pipeline and the state bridge contractor to ensure a safe and productive work environment.”

The section of pipe to be lined had multiple grade changes, seven offsets and material changes from cast iron to steel. Based on the lessons learned two years earlier

while establishing a world record for a 36-inch gas pipeline renewal in the same area, a special inversion drum was designed and fabricated.

Wetting out the liner involves mixing two-part chemicals. Epoxy resin in pre-determined quantities is mixed based on diameter and length of each segment to be lined. The mixed resin was installed into the open end of the liner and spread out through its full length by rollers while being pulled onto the pipe inversion drum.

The liner acts like a “sock” with epoxy that is inserted into the clean host pipe. It cures, or bonds to the host pipe through an

inversion process. Once cured, the liner is seamless, can handle pressure and actually increases throughput. The liner was inverted through a total of seven bends and a drip pot with a 48-inch gap that was bridged with an internally installed forged steel structural reinforcement sleeve. The day of the inversion had forecast of up to 95 degree F. Concerns about the effect on resin pot life demanded a 4 a.m. starting time.

While the planning and design of the project was very challenging, the execution was smooth. The lining process was planned for a month but completed ahead of schedule. The main was back online in mid-August, 2.5 weeks ahead of the Sept 1 deadline. The final CCTV inspection looked excellent. A full pressure test confirmed the integrity of the line. **P&GJ**

Author: David Wickersham, president, CEO and founder of Progressive Pipeline Management has 20 years of management experience. At major utility and petrochemical companies, he oversaw robotics development and performance as well as pipeline inspection, cleaning and repair.

Horizontal and Vertical Engineered Centrifugal Pump Packages

CRUDE OIL | REFINED PRODUCTS | NGL and LPG

DNOW Process Solutions designs and builds fully integrated, engineered centrifugal pump packages – everything from small ANSI pump skids to complex API 610 turnkey systems for your midstream and terminal projects.

Contact us at pumps@dnw.com

Energy
Delivered.™

DISTRIBUTION

NOW

PROCESS
SOLUTIONS

