New PE Tapping System Exceeds Expectations

By Ray A. Ward, Gas Systems Engineer, Memphis Light, Gas and Water Division

In late 2003, Memphis Light, Gas and Water Division (MLGW) needed to supply natural gas to a new subdivision in the Memphis, TN area via a 4-inch polyethylene (PE) branch pipeline. MLGW is the largest three-service municipal utility in the nation, supplying more than 400,000 customers in the Memphis and Shelby County area with electricity, natural gas and water.

The existing 8-inch gas line was buried approximately 10 feet deep, running down the center of a four lane, traffic congested road. The 8-inch PE line, with an operating pressure of 99 psi, required the reduction to 4-inch PE pipe using an 8-inch by 4-inch tapping saddle with a full port ball valve.

Under normal circumstances, MLGW would squeeze the PE line, cut the line and fuse an inline tee with reducers in the line to create the tie-in and branch connection. However, the company preferred not to take the risk of stress cracking on the 8-inch PE pipe by squeezing and needed another alternative.

After talking with T.D. Williamson, Inc.’s local representative, the utility decided to try a viable, cost-effective option that wouldn’t require shutting down the line to existing customers while maintaining the valuable revenue stream during a peak season and avoiding the costs and disruption of re-lighting individual pilot lights along the shutdown pipeline.

TDW’s SHORTSTOPP® PE System, recently introduced to the U.S. market, is built on proven, patented, pressure control technology that TDW has used in its European market for years. With this system, MLGW needed a smaller excavation area than required with other options. An area approximately 5 feet wide by 10 feet long by 10 feet deep was dug in the road. In comparison, an excavation area of three larger holes would be required for squeezing the line due to MLGW’s standard operating procedures of not allowing workers to work in holes with blowing gas from PE pipe.

Once the hole was dug, workers installed trenching and shoring equipment for cave-in protection. An operator-qualified technician started the process of scraping the 8-inch PE line and preparing it for electrofusion equipment to be installed. Once scraping of the PE pipe was complete, a 4-inch PE ball valve with an 8-inch by 4-inch electrofusion saddle was secured against the 8-inch PE pipe horizontally, using a temporary nylon support strap.

A level was used to ensure that the valve was perfectly horizontal for the tie-in and then the saddle with the ball valve attached was fused onto the 8-inch PE pipe. Within a matter of minutes, the saddle was firmly fused to the pipeline. The fitting temperature was monitored for approximately 45 minutes with a laser temperature gun while the saddle cooled to the temperature of the pipeline, about 65 degrees F. The electrofusion fitting was then pressure tested. The ball valve and saddle fitting was pressure tested for approximately one hour at 160 psi with no leaks.

Once the pressure test was complete, the hot tap was performed by TDW’s Darrel Trout using their PS2000 XL drilling machine, which took less than 10 minutes. The ball valve was then closed, the tapping machine and coupon removed and MLGW installed a temporary completion cap. The next day, MLGW personnel performed a butt fusion on the line, joining the new 4-inch PE pipe with the existing 8-inch PE section supplying gas to the new subdivision.

Choosing the SHORTSTOPP PE System for this connection benefited MLGW with installation costs and time savings. Overall, the company saved approximately $2,000 in installation and material costs on this one hot tap compared to the normal cost of a job that required squeezing to install a branch line due to multiple holes, larger excavation and restoration costs, labor and other additional fees.

November in Memphis could mean temperatures in the 30s and 40s. If squeezing the line was required, this job would have to wait until spring when temperatures were higher since it is MLGW’s policy not to cut off customers during cold weather unless it is an emergency. With the system, a broader temperature range allows the job to be completed in any season and customers not being cut off. This means the scheduling of planning for tie-ins and connections is easier.

Safety issues when working with the system are minimal. Due to the longer duration of traditional tie-in applications, the excavation of the street would require overnight barricading of the holes to ensure drivers and walkers in the area were aware of the holes.

The drilling machine worked very well. The fixed feed and rapid advance movement meant the tap was completed effortlessly, efficiently and quickly. The cutter used on the machine didn’t leave chips in the line, which meant no sweeping of the line was required. Nothing remained in the line that would clog regulators further down the pipeline.

Whether it’s a new construction scenario like this or upgrades to an older system, the equipment is ideal for tie-ins and connections. Once the gas is flowing, it’s obviously very difficult to take the line out of service when customers depend on that gas. It was a solid alternative for MLGW to use in connecting an existing pipeline to a new subdivision or development. Following the success of the November project, TDW technicians returned to the Memphis area in December for additional system work. Recommendations by the Gas Engineering area at MLGW have been made to purchase the PE tapping equipment and not to squeeze PE pipe 4-inch and larger.