

CARBON FOOTPRINT

Keyhole Coring and Reinstatement: An Upstream Green Technology for the Gas Industry

In addition to Downstream Green Technology, there is also a huge environmentally positive impact on Operations to be derived from using environmentally friendly operations and maintenance methods. These methods can significantly reduce the carbon foot print of gas maintenance and reduce atmospheric emissions of green house gases by shortening up the maintenance and repair process and reducing the consumption of millions of tons of asphalt and other paving materials as well as the disposal of millions of cubic feet of asphalt spoil every year in utility cut repairs.

Gas utilities need to lead with their own behavior if they are going to be able to persuade their customers to use more energy efficient appliances. To do so, utilities need to reduce their own carbon footprint in delivering that energy to the customer. A case in point is keyhole coring and reinstatement that is proven to *reduce the carbon footprint of typical utility cut repairs by up to 85 per cent.*

The Times are Changing

The utilization of traditional open-cut methods for the installation or repair of underground utilities has been common practice in the gas industry for many years. Today, natural gas operators are being tasked with the requirement of selecting a suitable construction method that not only offers the most economical solution, but also minimizes impact to the environment and reduces the upstream carbon footprint of gas operations.

Keyhole coring and reinstatement

Keyhole coring and reinstatement methods offer such a solution for installing and connecting new gas utilities and rehabilitating existing infrastructure. The use of several different types of construction equipment including jackhammers, concrete saws, backhoes, dump trucks, vacuum excavators, asphalt and cement delivery vehicles and pavement compactors, during open-cut construction and repair and the need for at least two road closings, invariably results in considerably more noxious emissions into the atmosphere compared with keyhole methods, which have minimal on-site equipment requirements -- a coring unit, a vacuum excavator and a hand-held pogo tamper compaction device -- and only require a single road closing to effect a permanent repair.



OPEN CUT

365
lbs



SECOND CLOSING - PERMANENT REPAIR



CORING 60
lbs



Cement (left) and Asphalt (right) production are the largest sources of industrial process-related CO₂ emissions in the United States. In 2007 U.S. cement plants produced more than 41 million metric tonnes of CO₂ emissions. Cement manufacture causes environmental impacts at all stages of the process. These include emissions of airborne pollution in the form of dust, greenhouse gases, noise and vibration when operating machinery and during blasting in quarries, and damage to countryside from quarrying.

Not only does keyhole coring and reinstatement use fewer pieces of equipment than conventional excavation and restoration, but, because it reuses the same core of pavement to permanently repair the roadway after the underground work has been performed, there is no spoil to be disposed of and no need for additional paving materials. It is the production of these paving materials – concrete and asphalt – that is the largest source of U.S. carbon dioxide emissions, second only to fossil fuel consumption.

Moreover, because the keyhole core reinstatement is a permanent repair, there is no need to subsequently close the road again to remove and replace a temporary asphalt pavement patch with a permanent repair, thereby avoiding the emission into the atmosphere of additional volatile organic compounds from new asphalt pavement.

Smaller is Better

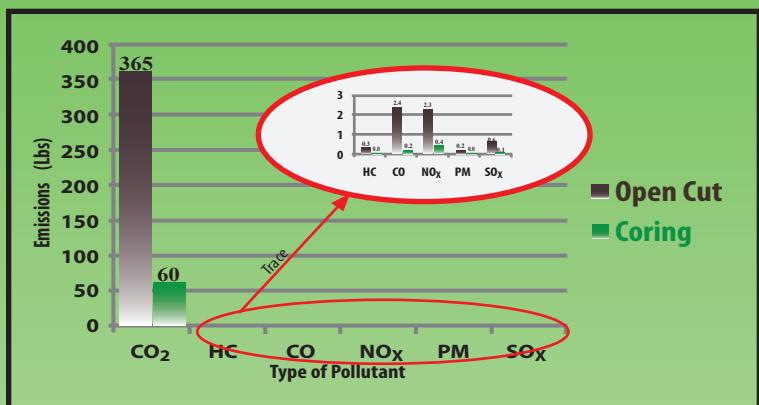
Last year in the U.S., more than 3.6 million pavement cut permits were issued nationwide for different sized utility cuts ranging from a 2 x 4 utility cut to a huge trench excavation for sewer work. It is estimated that 20-25% of those permits, or 800,000, were for utility cut excavations for work that could have been performed through an 18-inch or 24-inch diameter cored keyhole.

If the keyhole coring and reinstatement process had been used in the more than 800,000 small hole utility cuts made every year in our nation's roads, it would have saved more than 2 million tons of asphalt concrete -- that's enough asphalt to pave 20,000 miles of 4-lane highway and would have eliminated the need to dispose of 27 million cubic feet of pavement debris or spoil – that's enough debris to fill 200,000 dump trucks.

Used nationwide, it would also have eliminated 2.8 million hours of work zone traffic delay and saved more than 1.9 million gallons of otherwise wasted fuel.

Carbon Footprint

The following chart, using the standard methodology for calculating carbon footprint and *eCalc*, the emissions calculator developed by Dr. Sam Ariaratnam and Vermeer Manufacturing*, which tracks engine emissions (CO₂, CO, NO_x, VOC, SO_x) only -- shows that the Carbon Footprint from conventional open cut procedures is **SIX TIMES GREATER** than one produced by the coring and reinstatement option.



*Ariaratnam, Samuel T. Ph.D., P.E., Del E. Webb School of Construction, Arizona State University, Tempe, AZ; and Savage, Ed., Vermeer Manufacturing Company, Pella, IA, "Methodology For Calculating The Carbon Footprint Of Underground Utility Projects", Proceedings of the North American Society (NASTT) and the International Society for Trenchless Technology (ISTT)International No-Dig Show, Toronto, Ontario Canada March 29 – April 3, 2009

Coring and Reinstatement Benefits

Southwest Gas Corporation uses the keyhole coring and reinstatement process throughout its operating areas in Arizona, California and Nevada. According to Byron Elkins, Manager of Operations Planning & Analysis:

"The keyhole process is cost-effective, results in a better pavement repair, is safer for the employees because they do not have to go down into the excavation, and is environmentally friendly."

For us at Southwest Gas there are four key environmental benefits to the Utilicor keyhole coring and reinstatement process. The first is that it eliminates the massive amounts of energy that are normally required to produce, heat and transport new asphalt to the worksite. Second, because the process actually reuses the existing material to repair the road, it also eliminates the need to dispose of any pavement debris. Third, it prevents the release of toxic emissions that would otherwise occur during the drying process. And fourth, it reduces our carbon footprint."

Keyhole coring and reinstatement is a technology whose time has come for the gas industry and for our Planet.