

**Note: this is only a sample PDF of the first few pages of the Summer 2009 Partner Update.**

## Partner Profile

### Chesapeake Energy Shares Implementation Experiences

Partner company Chesapeake Energy has closely integrated its Natural Gas STAR participation with its core business activities and as a result has realized significant efficiency improvements, methane emissions reductions, and corresponding increases in sales.

Chesapeake is comprised of three operating divisions spanning 17 U.S. states from the east coast to the mid continent. It is the top producer of U.S. natural gas, with an estimated 2009 net production of 2.4 billion cubic feet (Bcf) per day and is the most active U.S. driller with 94 rigs operating as of mid- June, 2009.

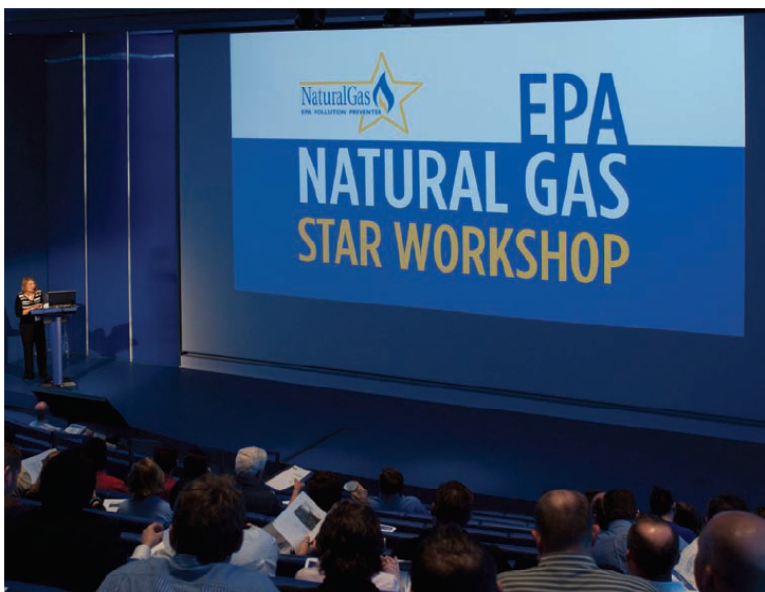
Chesapeake co-sponsored the May 14, 2009, technology transfer workshop in Oklahoma City and hosted the event at its headquarters. At the workshop, Chesapeake explained its integrated approach to Natural Gas STAR. Chesapeake has formed a strong and cross-functional implementation team, and this structure has realized a number of successful

project types, including a leak inspection and repair program and development of lean burn gas dehydrators.

### Approach to Natural Gas STAR

May 14, 2009 technology transfer workshop in Oklahoma City, sponsored by Chesapeake Energy and Devon Energy

Chesapeake joined the Natural Gas STAR Program and formed an



May 14, 2009 technology transfer workshop in Oklahoma City, sponsored by Chesapeake Energy and Devon Energy

operations driven implementation team in October, 2007. The team consists of an engineer from each operating district as well as representatives from purchasing and its environment, health, and safety department. The implementation team initially reviewed current and past activities applicable to Natural Gas STAR, identified new project ideas, educated field personnel, and set district-specific goals in an effort to establish a highly successful program.

Chesapeake's implementation team drew from the resources and case studies available on the Natural Gas STAR website. Following careful review of this information, the team identified 21 Best Management Practices (BMPs) currently in use, with many methane-saving activities dating back to 2001. Organizing information on these historical activities for its Natural Gas STAR annual report helped Chesapeake identify ways to expand this work as well as identify new BMPs. Chesapeake's implementation has also benefited from buy-in at the individual level, where team members have provided initiative and insight while upholding day-to-day obligations.

### **Use of Apogee Leak Detection System (LDS) for Pipeline Fugitives**

Through its involvement with Natural Gas STAR, Chesapeake has seen the benefits of methane leak detection and repair and employs a number of methods to detect fugitives. Chesapeake's Eastern Division has successfully used the Apogee LDS to survey gathering lines in several operating areas within the Appalachian Basin.

The Apogee LDS unit can be mounted in various vehicle types, including helicopter, pickup, or all-terrain vehicle. It measures gas concentrations by continuously capturing samples of ambient air using a blower. The sample is analyzed with a series of mirrors and lasers to detect any appreciable hydrocarbon gases. Concentration measurements occur approximately 20 times per second with methane, total hydrocarbon, and carbon dioxide measured separately.



*Helicopter mounted Apogee LDS*

Concentration data is relayed to a connected laptop running Apogee developed software that records and graphs the results according to global positioning system (GPS) location. Some of Chesapeake's lines are in close proximity to other emissions such as coal bed methane releases, and comparison of survey data to other concentration signatures can rule out pipeline leaks. The software's point of interest function allows tracking of other infrastructure issues such as slips, encroachments, and exposed lines in streams,

maximizing the efficiency of each survey and helping Chesapeake eliminate line damage on a more proactive basis.

Chesapeake's decision to use Apogee LDS was based on a demonstration in December, 2007, and subsequent cost/ benefit analysis for surveying forested and mountainous terrain such as in the Appalachia Basin. Chesapeake purchased a unit for use in the operating districts of its Eastern Division, contracted a flight service company experienced in using the unit, and prioritized pipeline segments to survey.

Chesapeake has thousands of miles of gathering lines in the Appalachian Basin, and segments can be as old as 100 years. Traditional means of inspection and maintenance have been employed successfully within this old gathering system, but these methods are not nearly as efficient as the Apogee LDS proved to be in this forested and mountainous environment.

One Apogee LDS flight in its Southeast District covered 616 miles in 64 hours, while a comparable ground patrol would require 3200 staff hours plus vehicles and fuel. This time savings also expedites leak repair and increases gas savings.

As of May, 2009, Chesapeake estimates a line loss recovery and leak repair of nearly 1500 thousand cubic feet (Mcf) of natural gas per day. At a value of \$4 per Mcf, this equates to a gross annual savings approximating \$2.2 million. Costs for the survey and repair work include purchasing an Apogee LDS, helicopter rates (approximately \$750 per hour), and the leak repair itself.

The next step for Chesapeake is to add gyro stabilized high definition video for leak survey documentation and to verify leak location. Video can also assist in identifying areas to target with additional walking surveys using instruments such as Chesapeake's FLIR infrared camera.

### **Employing Lean Burn Glycol Dehydrators**

Chesapeake has also examined glycol dehydration from an air emissions standpoint and developed a comprehensive solution. The lean burn system, designed and implemented by Chesapeake, has the combined effect of reducing methane emissions as well as other air emissions such as VOCs and BTEX. It consists of a flash tank separator, 12-volt solar thermostat, low pressure and low temperature burner, Natco oversized still condenser, shortened stack to draw in less air, and the Patton Burner Management System (PBMS). The primary aim of the lean burn system is to minimize air pollutants throughout the glycol dehydration process, and the methane savings are realized in several ways:

- capture of flash gas as fuel,
- reduced fuel gas consumption,
- reduced methane in the combustion exhaust through burner management, and
- use of electronic thermostat in place of the typical continuous bleed gas pneumatic device.

The lean burn system was initially piloted at Chesapeake's Kovar facility near Marlow, Oklahoma. Based on the successful pilot, Chesapeake has been employing this technology in existing units on a case-by-case basis and as resources allow. All new and planned units are equipped with this technology upon startup.

Capture of flash gas into the fuel system results in a fuel gas savings of approximately 5 standard cubic feet (scf) gas per gallon of glycol circulated for Kimray pumps, or 1 scf per gallon circulated via electric pumps. This typically equates to a range between 14,000 and 166,000 scf per day depending on reboiler size. Reduced fuel gas consumption is also realized with an oversized still condenser and a continuously operating (rather than intermittent) burner that provides VOC and BTEX abatement and heat energy to the fire tube. Thus total external fuel gas needs are reduced by approximately 36,000 scf per day (with typical incinerator usage). For a new burner installation, incremental costs are \$100 to \$500 excluding the PBMS. The cost to upgrade/retrofit an existing burner is \$500 to \$1,200. The PBMS costs \$7,500 installed. Payout will vary by project and is calculated for each unit under study.



Additional benefits of the Chesapeake lean burn dehydrator are: continuous destruction of VOC and BTEX, less thermal stress on the system due to lower burner temperatures, lower noise (40 to 60 decibels), eliminating the need for purchased electricity through use of 12 volt solar power, and convenient telemetry management through PBMS.

## Conclusion

Chesapeake's structured approach to methane emissions reductions has resulted in a number of cost-effective innovations, including aerial leak detection and glycol dehydrator optimization.

## Prospective Projects Spotlight

### Capture Additional Sources with Storage Tank Vapor Recovery Unit

Oil and natural gas facilities, both upstream and downstream, share similar types of methane emissions sources such as vents and blowdowns. These releases may individually go unnoticed but collectively represent a significant product loss and often offer an economic capture opportunity. Emissions from tanks can be captured with a vapor recovery unit. This article describes a project concept that extends vapor recovery duty solely from tanks to these other methane emissions sources.

Operators have explored capture projects for discrete sources ranging from open-ended lines to compressor blowdowns; this project concept explores the versatility of vapor recovery units to accommodate the combination of such emissions that may be present at a typical facility. The potential savings from capturing source types that may be present at any type of facility is estimated to be a minimum of about 4400 Mcf/year, an amount sufficient to accommodate a vapor recovery unit or spare capacity of existing units