



# Recover Gas from Pipeline Pigging Operations



## Technology/Practice Overview

### Description

Gases rich in recoverable hydrocarbons tend to condense liquids in gathering systems upstream of gas gathering and processing plants. These systems are frequently pigged with spherical or bullet-shaped pigs to remove accumulated liquids and reduce the gathering system pressure drop. This improves gas flow and pipeline efficiency. The pigged liquids are separated from the gas ahead of the processing plant compressors, stored temporarily at gathering system pressure, and then sent to a low pressure storage tank. The liquids, recovered at pipeline pressure, flash and vent light hydrocarbon gases from the storage tanks.

Much of the gas that is vented can be recovered by installing a dedicated vapor recovery system. Recovering the flash gas resulting from the pressure drop between the pressurized liquid storage tanks and the atmospheric storage tanks can reduce emissions and add more gas to the sales line.

### Operating Requirements

The required equipment to be installed includes an electric or a gas engine driven vapor recovery compressor. A liquid/vapor flash vessel and low pressure liquid pump may also be required depending on system design and/or ambient temperature and pressure. It is assumed that a pig launcher and receiver on gathering lines, vapor/liquid separation and pressurized liquid storage vessels, and low pressure liquid storage tanks would already be

- Compressors/Engines
- Dehydrators
- Directed Inspection & Maintenance
- Pipelines
- Pneumatics/Controls
- Tanks
- Valves
- Wells
- Other

### Applicable Sector(s)

- Production
- Processing
- Transmission
- Distribution

### Other Related PROs:

Use Inert Gases and Pigs to Perform Pipeline Purges, PRO No. 403

## Economic and Environmental Benefits

### Methane Savings

Estimated annual methane emission reductions 21,400 Mcf per year

### Economic Evaluation

Estimated Gas Price	Annual Methane Savings	Value of Annual Gas Savings*	Estimated Implementation Cost	Incremental Operating Cost	Payback (months)
\$7.00/Mcf	21,400 Mcf	\$159,400	\$24,000	\$1,000	2 Month
\$5.00/Mcf	21,400 Mcf	\$113,800	\$24,000	\$1,000	3 Month
\$3.00/Mcf	21,400 Mcf	\$68,300	\$24,000	\$1,000	5 Months

\* Whole gas savings are calculated using a conversion factor of 94% methane in pipeline quality natural gas.

### Additional Benefits

- Addition of gas to the sales line (or plant fuel system)
- Recovery of valuable hydrocarbon liquids
- Safer operations

# Recover Gas from Pipeline Pigging Operations (Cont'd)

present on site. Vapor recovery compressor sizing is affected by the variance of pigging operations; colder temperatures in the winter can require extra capacity that is not necessary in the summer months. This is because colder temperatures result in more condensation at constant pressure. Pipelines would therefore have to be pigged more often. In general, gathering lines that must be pigged frequently and recover a large volume of liquid at moderate to high pressure (150 to 300 psig or greater) are best suited for vapor recovery.

### Applicability

Gas and condensate recovery is possible at any gas gathering station and processing plant that frequently must remove condensed liquids from its upstream gathering lines.

### Methane Emissions

The methane emission savings are based on the design flow rate and operating time of a single vapor recovery compressor dedicated to the compression of the flash vapor from the pigged liquid (pressurized) storage tanks.

### Economic Analysis

#### Basis for Costs and Emissions Savings

For example reported savings are based on a gathering system at 200-300 psig (pounds per square-inch, gage) that is pigged 30-40 times per year and collects approximately 3,000 barrels of condensate per year. A small vapor recovery system was installed with an electric compressor for \$24,000 and has an annual operating and maintenance cost in excess of \$1,000 per year.

#### Discussion

Gathering system pigging frequency depends on the gas composition as well as the ambient temperature conditions, and can vary greatly from one location to another and from season to season. The economics of recovering gas from pigging operations are dependent upon the methane through butane composition of the hydrocarbon liquid, which directly impact the energy content and value of the gas, and the amount of liquid collected.

### Methane Content of Natural Gas

*The average methane content of natural gas varies by natural gas industry sector. The Natural Gas STAR Program assumes the following methane content of natural gas when estimating methane savings for Partner Reported Opportunities.*

<b>Production</b>	79 %
<b>Processing</b>	87 %
<b>Transmission and Distribution</b>	94 %

EPA provides the suggested methane emissions estimating methods contained in this document as a tool to develop basic methane emissions estimates only. As regulatory reporting demands a higher-level of accuracy, the methane emission estimating methods and terminology contained in this document may not conform to the Greenhouse Gas Reporting Rule, 40 CFR Part 98, Subpart W methods or those in other EPA regulations.