Use Inert Gases and Pigs to Perform Pipeline Purges

**Technology/ Practice Overview**

**Description**
When pipeline segments are taken out of service for operational or maintenance purposes, it is common practice to depressurize the pipeline and vent the natural gas to the atmosphere. To prevent these emissions, Partners reported using pigs and inert gas to purge pipelines.

In implementing this practice, a pig is inserted into the isolated section of pipeline. Inert gas is then pumped in behind the pig, which pushes natural gas through to the product line. At the appropriate shutoff point, the pig is caught in a pig trap and the pipeline blocked off. Once the pipeline is “gas-free” the inert gas is vented to the atmosphere.

**Operating Requirements**
Requires existing pig-launch and pig trap facilities and a mobile nitrogen supply.

**Applicability**
This practice applies to all pipeline segments that are being taken out of service for operational or maintenance purposes.

**Methane Emissions**
The amount of avoided methane emissions is a function of the pipeline diameter, length, and pressure. Based on the *Pipeline Rules of Thumb Handbook*, Fourth Edition, (p. 270), the amount of gas saved by the unit of application is 90 Mcf per year per two miles of 10-inch diameter pipeline. One Partner reported avoiding 538 Mcf of methane for 6 purges by using pigs and inert gas.

**Economic and Environmental Benefits**

<table>
<thead>
<tr>
<th>Methane Savings</th>
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<tbody>
<tr>
<td>Estimated annual methane emission reductions</td>
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</tbody>
</table>

**Economic Evaluation**

<table>
<thead>
<tr>
<th>Estimated Gas Price</th>
<th>Annual Methane Savings</th>
<th>Value of Annual Gas Savings*</th>
<th>Estimated Implementation Cost</th>
<th>Incremental Operating Cost</th>
<th>Payback (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$7.00/ Mcf</td>
<td>90 Mcf</td>
<td>$670</td>
<td>$0</td>
<td>$500</td>
<td>9 Months</td>
</tr>
<tr>
<td>$5.00/ Mcf</td>
<td>90 Mcf</td>
<td>$480</td>
<td>$0</td>
<td>$500</td>
<td>13 Months</td>
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<tr>
<td>$3.00/ Mcf</td>
<td>90 Mcf</td>
<td>$290</td>
<td>$0</td>
<td>$500</td>
<td>21 Months</td>
</tr>
</tbody>
</table>

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

**Additional Benefits**
- Safety of pipeline system and operators
Economic Analysis

Basis for Costs and Emissions Savings
Methane emissions reductions of 90 Mcf per year apply to purging 2 miles of 10-inch diameter pipeline with nitrogen at 280-psi pressure, once per year.

The economics of this PRO are based on nitrogen at $5 per Mcf up to 50 miles from the source to the pipeline location and 2 operators working 8 hours each (labor rate of $25 per hour). There is no capital equipment required.

Discussion
This practice employs inert gases in combination with a pig to prevent venting of a valuable product when taking a pipeline segment off-line for operational or maintenance purposes. Though it can be cost-effective, safety, not methane savings, is the primary reason for using pigs and inert gas to purge pipelines.

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 emissions 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.