

Methane Emissions from Transmission and Distribution Pipeline Blowdowns



November 10, 2016

Natural Gas STAR Program

- ▶ Started in 1993 to increase awareness of oil and gas methane emission sources and share innovative means of reducing emissions
- ▶ Significant innovation and capacity building achieved over 20+ years
 - ▶ Started with six best management practices
 - ▶ Now promotes over 50 mitigation best practices
- ▶ Partners have collectively achieved over 1.2 trillion cubic feet of methane emission reductions equivalent to over 606 million metric tons of CO₂ equivalent emissions
- ▶ Over 100 partners across the natural gas value chain
- ▶ Key goals of technology transfer, training, and capacity building through technical documents and workshops



Methane Challenge Program Overview

- ▶ Methane Challenge expands the Natural Gas STAR Program
 - ▶ Specific, ambitious commitments
 - ▶ Transparent reporting through Subpart W of the Greenhouse Gas Reporting Program (with supplemental reporting)
 - ▶ Company-level recognition of commitments and progress

- ▶ To enhance flexibility, EPA offers two commitment options:
 - ▶ Best Management Practice (BMP) Commitment
 - ▶ ONE Future Emissions Intensity Commitment

- ▶ The program covers onshore oil production and the entire value chain from onshore production through natural gas distribution

- ▶ Program launched with 41 founding partners on March 30, 2016
 - ▶ Currently has 45 BMP partners and 4 ONE Future partners



BMP Commitment Framework

Onshore Production	Gathering and Boosting	Natural Gas Processing	Transmission and Storage	Distribution
Pneumatic Controllers	Pneumatic Controllers	Reciprocating Compressors - Rod Packing Vent	Reciprocating Compressors - Rod Packing Vent	M&R Stations/City Gates
Equipment Leaks/Fugitive Emissions	Equipment Leaks/Fugitive Emissions	Centrifugal Compressors - Venting	Centrifugal Compressors - Venting	Mains – Cast Iron and Unprotected Steel
Liquids Unloading	Pneumatic Pumps		Equipment Leaks/Fugitive Emissions	Services – Cast Iron and Unprotected Steel
Fixed Roof, Atmospheric Pressure Hydrocarbon Liquid Storage Tanks	Fixed Roof, Atmospheric Pressure Hydrocarbon Liquid Storage Tanks		Pipeline Blowdowns between Compressor Stations	Distribution Pipeline Blowdowns
Pneumatic Pumps	Reciprocating Compressors - Rod Packing Vent		Pneumatic Controllers	Excavation Damages
	Centrifugal Compressors - Venting			



BMP Partner Commitments

- ▶ BMP partners committed to reduce emissions from nine sources
 - ▶ Excavation Damages
 - ▶ Distribution Mains
 - ▶ Distribution Services
 - ▶ **Distribution Blowdowns – 3 Partners**
 - ▶ **Transmission Blowdowns – 4 Partners**
 - ▶ Transmission and Storage Reciprocating Compressors
 - ▶ Transmission and Storage Centrifugal Compressor Venting
 - ▶ Transmission and Storage Pneumatic Controls
 - ▶ Gathering and Boosting Reciprocating Compressors
- ▶ Partners represent three industry segments
 - ▶ Distribution: 41 partners
 - ▶ Transmission and Storage: 9 partners
 - ▶ Gathering and Boosting: 1 partner

ONE Future Commitments

- ▶ ONE Future is an industry-led partnership in which partners commit to segment-specific emissions intensity targets that inform a collective goal of reducing methane emissions associated with the production, processing, transmission and distribution of the U.S. onshore natural gas value chain to 1% or less by 2025

Industry Segment	2020	2025
Gas Production and Gathering	0.46%	0.36%
Gas Processing	0.15%	0.11%
Gas Transmission and Storage	0.37%	0.30%
Gas Distribution	0.24%	0.22%
Total	1.22%	1.00%

- ▶ Partners will report supplemental data to comprehensively track progress towards their commitments, including data that enables Partners to highlight emission reductions achieved through voluntary action



Methane Challenge Annual Reporting

- ▶ EPA will use GHGRP Subpart W data, plus non-confidential supplemental data provided by partners, to track progress in meeting source-specific commitments under the Methane Challenge Program
 - ▶ Data reported at the facility level per Subpart W facility definitions
- ▶ EPA aims to minimize the reporting burden so Partner companies can focus on the implementation of methane-reducing activities
 - ▶ Plan to use streamlined data collection process for reporting
- ▶ Partners start collecting data on designated Start Date (within six months of joining program) and report for first full calendar year in Program
- ▶ Annual reporting systems
 - ▶ BMP partners will test eGGRT system for supplemental data Spring 2017
 - ▶ ONE Future reporting system development in process

Benefits and Considerations

- ▶ Methane Challenge offers the opportunity for partner companies to transparently demonstrate specific commitments and comprehensive action to address methane emissions through a widely recognized Program.
- ▶ Partner companies will adopt cost efficient best management practices and technologies that will reduce product loss and increase safety.
- ▶ Both commitment options will continue to promote and recognize innovative approaches to reducing methane emissions.



Methane Emissions from Pipeline Blowdowns

- ▶ Operators of natural gas pipeline systems routinely reduce line pressure and discharge (“blowdown”) gas from pipeline sections to ensure safe working conditions during maintenance, testing, repair, and replacement activities
- ▶ According to US Inventory*, 2014 pipeline venting accounted for approximately 4.7 million metric tons carbon dioxide equivalent (MtCO₂e) from natural gas transmission and distribution
- ▶ Greenhouse Gas Reporting Program is collecting data on onshore natural gas transmission pipeline blowdowns beginning in reporting year 2016
- ▶ Transmission and distribution segment pipeline blowdowns as key sources in the recently launched Methane Challenge Program

*Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014



Pipeline Blowdowns in Natural Gas STAR

- ▶ Natural Gas STAR partners have achieved over 75 Bcf of methane emission reductions from pipeline blowdowns
 - ▶ Use pipeline pump-down techniques to lower gas line pressure: 60.5 Bcf
 - ▶ Use hot taps for in-service pipeline connections: 9.4 Bcf
 - ▶ Redesign blowdown/alter ESD practices: 2.7 Bcf
 - ▶ Inject blowdown gas into low pressure mains or fuel gas system: 2.1 Bcf
 - ▶ Close/redesign isolation valves to minimize blowdown volumes: 0.27 Bcf

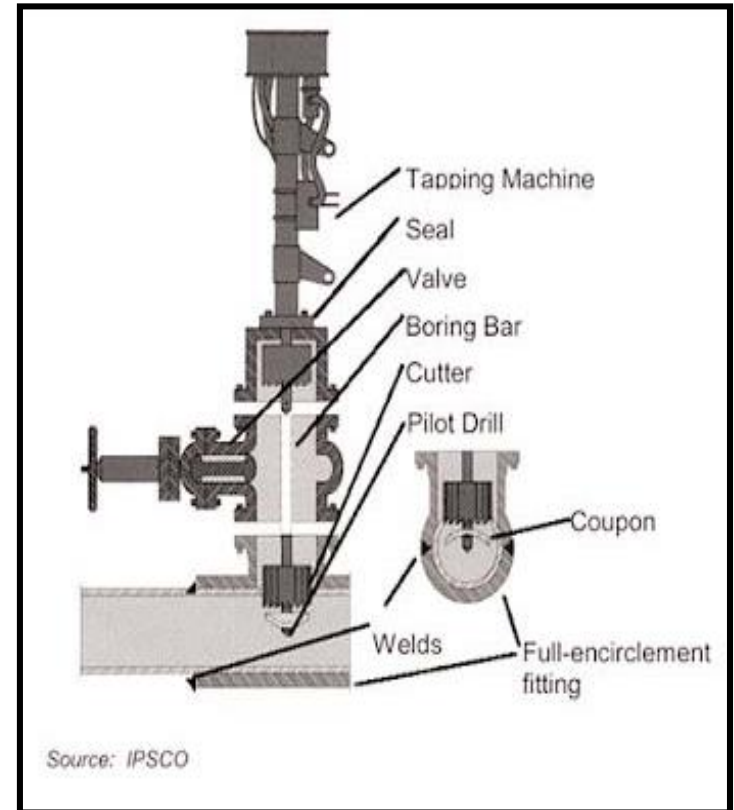
Pipeline Blowdown Mitigation Options

- ▶ EPA has five technical documents covering mitigation options to reduce pipeline blowdown emissions
- ▶ [Using Hot Taps for In Service Pipeline Connections](#)
- ▶ [Using Pipeline Pump-Down Techniques to Lower Gas Line Pressure Before Maintenance](#)
- ▶ [Composite Wrap for Non-Leaking Pipeline Defects](#)
- ▶ [Use Inert Gases and Pigs to Perform Pipeline Purges](#)
- ▶ [Inject Blowdown Gas into Low Pressure Mains or Fuel Gas System](#)



Hot Taps for In Service Pipeline Connections

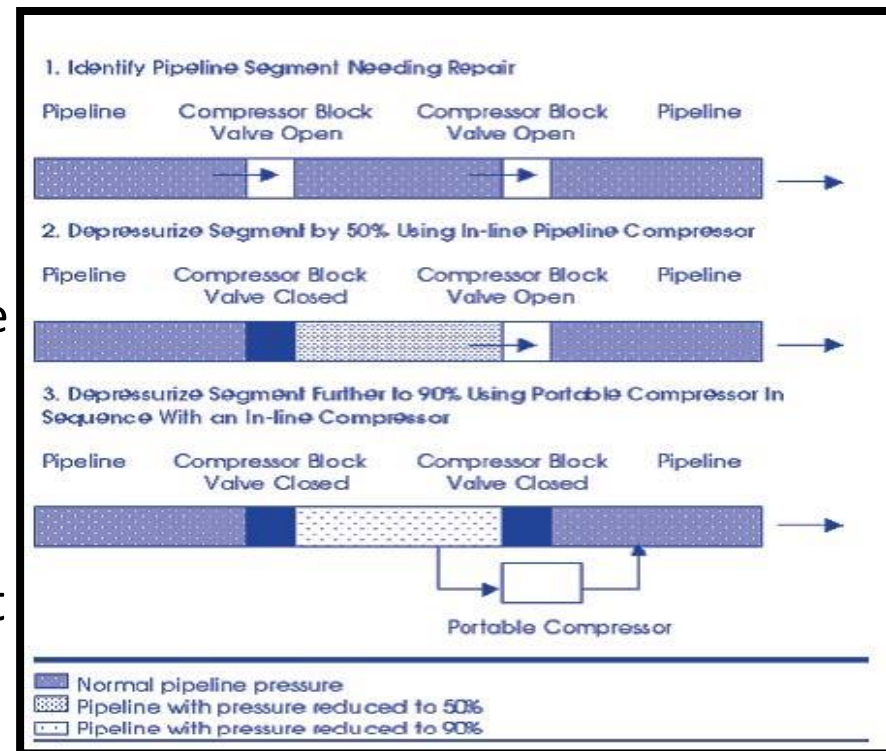
- ▶ New branch connection while the pipeline remains in service
 - ▶ Connect fitting and permanent valve on the existing pipeline
 - ▶ Install hot tapping machine on the valve
 - ▶ Perform hot tap and extract coupon through the valve
 - ▶ Close valve and remove hot tapping machine
 - ▶ Connect branch line
- ▶ Hot tapping can be used to add connections to a wide range of pipelines
 - ▶ Transmission pipelines
 - ▶ Distribution mains



Schematic of Hot Tapping Machine

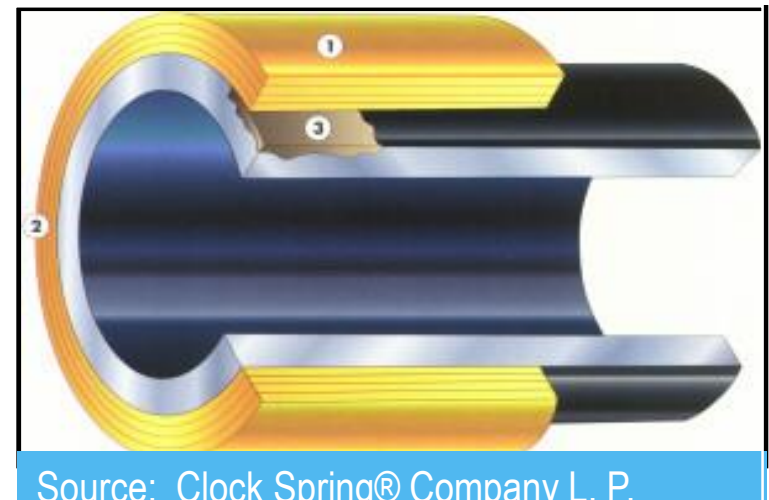
Pipeline Pumpdown Techniques

- ▶ Use In-Line compressors to “pull down” the pressure to minimum suction pressure
 - ▶ Typically 2:1 compression ratio
 - ▶ By blocking upstream valve, the pressure in the pipeline is reduced to safe limits for maintenance
- ▶ Use portable compressor to “pull down” pressure even further
 - ▶ Typically 5:1 compression ratio
 - ▶ Can be used in conjunction with in-line compressors to reduce pressure in pipeline section
- ▶ Most applicable to large pipelines operating at high pressures
- ▶ Gas savings can be significant: about 90% of gas is recoverable



Composite Wrap for Non-Leaking Pipeline Defects

- ▶ Non-leaking pipeline defects can only be fixed in one of three ways, per Department of Transportation (DOT) regulations:
 - ▶ Cut out damaged segment and replace with new pipes
 - ▶ Install full-encirclement steel split sleeve over the damaged area
 - ▶ Install a composite sleeve over the damaged area
- ▶ Composite sleeve consists of high-strength glass fiber composite or laminate, adhesive or resin bonding system, or high-compressive-strength load transfer filler compound
 - ▶ Replaces lost hoop strength
- ▶ Composite Wrap Advantages:
 - ▶ Can be performed without taking pipeline out of service
 - ▶ Repair is quick and less costly than replacement or sleeve options
 - ▶ Eliminates venting





Questions?

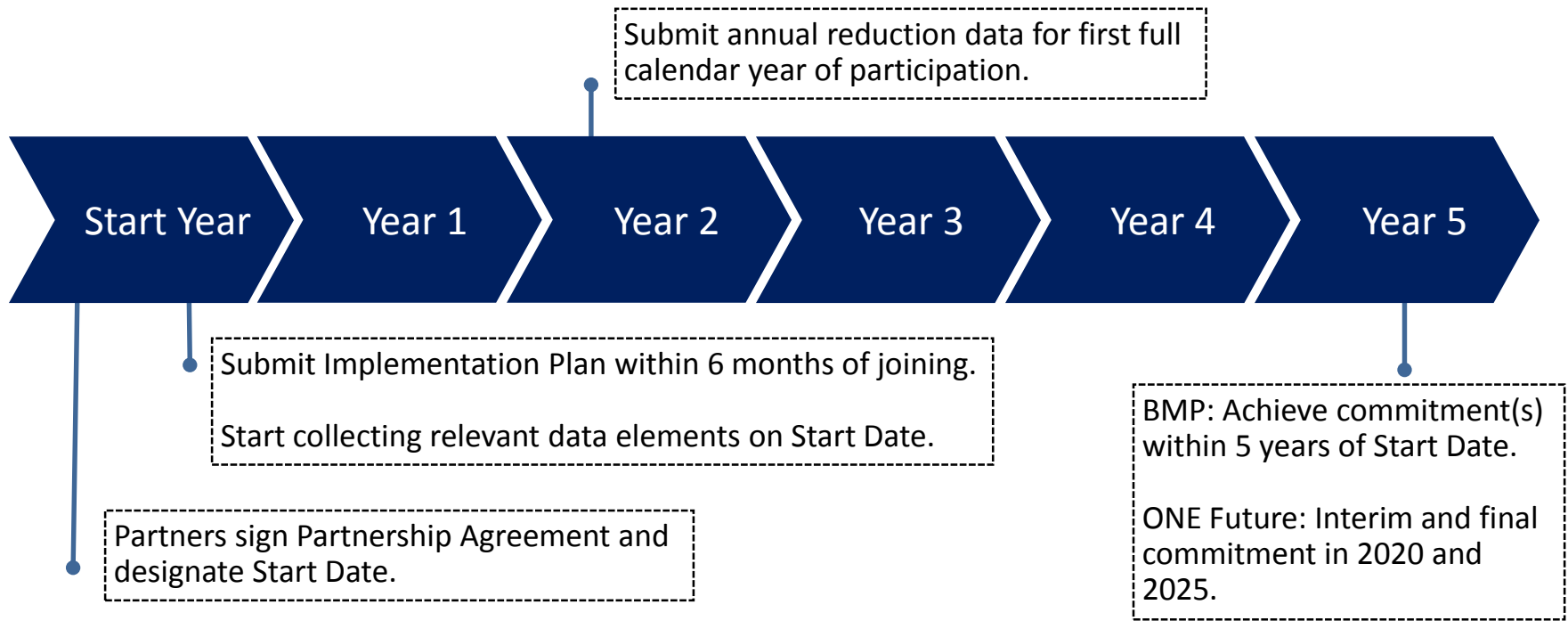
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Information on both programs can be found at
<https://www.epa.gov/natural-gas-star-program>



Methane Challenge Partnership Timeline

Ongoing: Partners create and implement strategies and processes for meeting commitments. As progress is made, evaluate adoption of additional commitments.



Annually: Partners collect and submit emission and reduction data each Spring. EPA posts progress of partner commitment(s) on website each Fall.



Next Steps for New Partners

- ▶ Implementation Plans are due within six months of joining the Program
 - ▶ Implementation Plan Guidelines and Template are on the Program website

- ▶ Start collecting data on designated “Start Date”

- ▶ Create optional Fact Sheet that provides information on historical methane reduction actions taken prior to joining Methane Challenge

- ▶ Participate in technology transfer activities
 - ▶ Transmission and Distribution Pipeline Blowdowns workshop November 10 at Kinder Morgan offices in Houston

- ▶ Partners will report after first full calendar year of participation