

*EPA Stakeholder Workshop*  
GHG Data on Petroleum and Natural  
Gas Systems  
19 November 2015  
Pittsburgh, PA



## Observations on Select Emission Factors for Onshore Natural Gas Processing

# Goals of Presentation

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- I. Provide a limited comparison of CH<sub>4</sub> emission factors derived from data reported to the Greenhouse Gas Reporting Program (GHGRP) to those used for the national GHG Inventory (GHGI)
  
- II. Propose approaches to enhance utilization of GHGRP based information in order to improve the derivation of national CH<sub>4</sub> emissions from natural gas systems



## *Natural Gas Processing Segment*

# Equipment Leaks

# Methane Emissions Comparison

Processing Sector Sources	2013 National GHGI (tonnes CH <sub>4</sub> )	2013 Mandatory GHGRP (tonnes CH <sub>4</sub> )	2014 Mandatory GHGRP (tonnes CH <sub>4</sub> )
Pneumatic Devices	1,812	Not included	Not included
Dehydrators (includes pumps)	9,167	14,474	11,887
Acid Gas Removal	12,379	CH <sub>4</sub> not included	CH <sub>4</sub> not included
Flare Stacks	Not included	11,785	11,317
Equipment Leaks	673,457	93,846	89,112
Engine Exhaust	165,028	Subpart C	Subpart C
Blowdowns	44,663	25,904	24,889
<b>TOTAL</b>	<b>906,507</b> (net emissions)	<b>146,008</b>	<b>137,206</b>

# Comparison of Methane Emissions from Natural Gas Processing

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- CH<sub>4</sub> emissions from Equipment Leaks from the Natural Gas processing segment are shown to be six times **larger** in the GHGI when compared to those reported under the GHGRP
- The number of gas plants reporting to the GHGRP are different from the number included in the GHGI
  - ***The difference in the number of plants does not fully account for the emission differences***

# Equipment Leaks Data Comparison for Natural Gas Processing Plants

- The table below compares the emission factors (Tonnes CH<sub>4</sub>/Plant) from national GHGI and as reported under the GHGRP
- The GHGRP data are based on survey results to determine the number of leakers and applying the corresponding emission factor
- The GHGI data are based on a plant-wide emission factor from the 1996 EPA/GRI Study

Reporting Year	GHGI (Plant Potential Emissions)			GHGRP (Plant survey data)		
	# Plants	Tonnes CH <sub>4</sub>	Tonnes CH <sub>4</sub> /Plant	# of plants	Tonnes CH <sub>4</sub>	Tonnes CH <sub>4</sub> /plant
<b>2014</b>	Not Available			410	16,986	41.4
<b>2013</b>	650	36,126	55.6	389	13,997	36.0
<b>2012</b>	606	33,685	55.6	357	11,238	31.5

# Equipment Leaks Emissions

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- Natural gas plant equipment leaks emission estimates for the GHGRP rely on facility surveys
- The EF used for estimating plant equipment leaks in the 2013 GHGI is ~50% higher than the EF one derives based on plant screening and applying the “leaker” emission factor specified in the reporting rule
  - GHGRP derivation provides a more representative estimate than the GHGI EF approach
- This may partially account for the 6-fold difference between the emissions reported under the two programs

# Processing Reciprocating Compressors

- Data below compares equipment leaks emission factors associated with compressor components in natural gas processing plants
- Data does NOT include emissions due to venting or blowdown events

	GHGRP (leak survey)		GHGI (potential to emit)	
<b>Reciprocating Compressors (<i>associated components no vents</i>)</b>				
	# of Compressors	CH <sub>4</sub> scfd/compressor	# of Compressors	CH <sub>4</sub> scfd/compressor
<b>2014</b>	2,635	2,819	Not available	Not available
<b>2013</b>	2,514	3,341	5,679	9,741
<b>2012</b>	2,197	2,662	5,624	9,741



# Processing Centrifugal Compressors

- Data below compares equipment leaks emission factors associated with compressor components in natural gas processing plants
- Data does NOT include emissions due to venting or blowdown events

	GHGRP (survey)		GHGI (potential to emit)	
<b>Centrifugal Compressors (<i>associated components no vents</i>)</b>				
	# of Compressors	CH <sub>4</sub> scfd/ compressor	# of Compressors	CH <sub>4</sub> scfd/ compressor
<b>2014</b> (Wet Seal)	275	9,943	Not available	Not available
<b>2014</b> (Dry Seal)	186	679	Not available	Not available
<b>2013</b> (Wet Seal)	277	9,288	659	44,692
<b>2013</b> (Dry Seal)	183	1,914	256	21,914
<b>2012</b> (Wet Seal)	275	11,737	658	44,692
<b>2012</b> (Dry Seal)	158	1,252	248	21,914

# Conclusions and Recommendations

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- Data from GHGRP provide a better basis for emission estimates than the GHGI EF approach
- A thorough examination of available GHGRP data is needed to update data for the GHGI that is decades old
- Emerging research may provide new emission factors and independent evaluations of assumptions made for many key GHG sources

# Thank you for your attention

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