



# Preliminary API Comments on Updates to the GHG Inventory

EPA Stakeholders Workshop  
June 22, 2017

# Overview

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- Data Quality Issues and Recommendations
- Regional and Temporal Differences
- Extrapolation of GHGRP Data to Small Facilities
- API's Planned Analysis and Data Collection Activities

# Data Quality – Identification of Outliers

➤ GHGRP data should be carefully reviewed and screened to identify and exclude data outliers

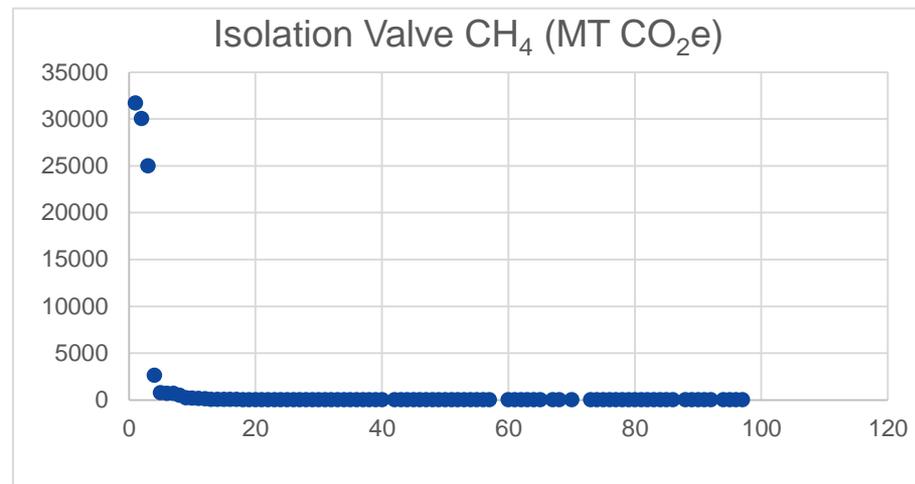
■ **For Example:**

- Per EIA, the annual national gas processing volume in 2014 was 19,754,802 MMscf and 17,884,427 MMscf in 2013
- Processing segment dehydrator data for years 2013-2014 includes individual dehydrators with throughputs greater than the annual national gas processing volume

Facility ID	Dehydrator ID	Reporting Year	Gas Throughput MMscfy
1002298	20056134	2013	24,199,500,000
1002298	20056133	2014	23,652,000,000
1002414	TEG 1	2013	10,336,800,000
1002414	TEG 1	2014	652,269,600

# Data Quality – Outliers Impact

- Scatter plot of 2014 measured data points for centrifugal compressors isolation valves identifies three potential outliers



- Removing these three data points significantly changes the 2014 GHGRP analysis results for Isolation Valves



	Including Outliers	With Outliers Removed
# centrifugal compressors with measured isolation valve emissions $\geq 0$	90	87
Total annual CH <sub>4</sub> emissions for centrifugal compressor isolation valves, tonnes CH <sub>4</sub>	3,716	247
Tonnes CH <sub>4</sub> /compressor	41.29	2.84
Mscfy CH <sub>4</sub> /compressor	2,150	147.8

# Data Quality – Screening for Outliers

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- Recommended steps for identifying high outliers
  - Construct scatter plots to identify potential outliers
  - Compare data to known values
    - Throughputs/rates cannot exceed national values
    - Total operating hours should not exceed 8760/8784
  - Evaluate emission ratios relative to a reported parameter
  - Pay particular attention to reported data where unit errors are easily made by reporters – such as volume of gas per unit of time
- More difficult to identify low outliers
  - Are reported zeros real or representative of no data?
- EPA should identify outliers and remove data points from the analysis until corrected values are reported

# Data Quality for Early Reporting Years

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- Exercise caution in using GHGRP data for early reporting years
  - Learning curve for reporters
  - Use of BMM may skew data results
- For Production sources
  - 2011-2012 data may not be representative
  - Oil well completion data for 2016 may not be representative
- For Gathering and Boosting
  - 2016 GHGRP data may include data errors and BMM due to first year of reporting, particularly for blowdowns

# Regional and Temporal Data Differences

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- Data for some emission sources are highly variable by region
  - Liquids Unloading
  - Associated gas venting and flaring
- Some emission source change over time
  - Gas handling infrastructure availability in new rapidly developing areas impacts associated gas venting and flaring emissions
  - Requirements for reduced emission completions
  - Reduced use of high bleed pneumatics
- API to examine liquids unloading and associated gas data on a regional basis for improving national extrapolation

# Small Facilities

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- GHGRP data represents facilities with emissions >25,000 tonnes CO<sub>2</sub>e
  - Extrapolating GHGRP data to a national level likely overestimates emissions for small facilities that do not meet the reporting threshold
- For Production
  - API well numbers can be reviewed against DI Desktop to determine the fraction of wells and production represented by GHGRP data for each basin

# Small Facilities, continued

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## ➤ For Gas Processing

- EIA data should be used over Oil and Gas Journal survey to represent national plant count and processing throughput
  - EIA survey is mandatory every 3 years
  - Emissions for interim years can be scaled by changes in processing throughput which EIA reports annually
- EPA should make public the total gas processing volume represented by the GHGRP data
  - Aggregate volume should not be CBI and could be included in the overview data published by EPA
- GHGRP data could be scaled by gas processing throughput to represent small gas plants not reporting to the GHGRP

# API's Planned Activities

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- Review regional differences in associated gas emissions and liquids unloading emissions to extrapolate to national emissions on a regional basis
- Examine GHGRP data for:
  - A more accurate representation of small production and small processing facilities
  - Analysis of data for liquid storage tanks
  - Evaluation of data for Gathering & Boosting when available for the first time this fall
- Provide comments on improving Envirofacts data tables



***API Field Study:***  
**Quantification of Methane  
Emissions from Process  
Equipment Leaks and Pneumatic  
Controllers from U .S. Onshore Oil  
and Natural Gas Operations**



# Study Objectives

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- Major Equipment and Component Inventories
  - Component counts, such as valves, associated with each type of major equipment at each study site
  - Inventory of the number and type of pneumatic controllers by major equipment type
  
- Intercomparison of Leak Detection methods
  - Effectiveness of OGI versus RM- 21 for identifying both the number and volume of gas from equipment leaks
  
- Leak Measurements and Emission Factors
  
- Pneumatic Controller Emission Measurements
  - Updated emission factors for each controller type

# Study Design

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## ➤ Study Locations

- Sites in four basins: Anadarko (# 360), San Juan (# 580), Gulf Coast (# 220) and Permian (# 430)
- Include conventional and unconventional formation types
- Diversity of formations: high permeability natural gas, shale gas, tight-sand gas, coal-bed methane, and oil (light and heavy) with associated gas

## ➤ Study Scope

- Testing was conducted at a variety of site types and configurations that are relevant to the production and gathering/boosting segments
- Testing performed at a total of 72 sites operated by 8 companies in the four basins above

# Site Measurements

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## ➤ Leak Screening:

- OGI survey with FLIR Model GF-320 infrared camera
- RM-21 screening with Thermo TVA-1000B

## ➤ Emissions Quantification

- Bacharach Corporation Hi-Flow<sup>®</sup> sampler with daily calibrations and augmented protocol to validate measurements
- Using a recording high volume sampler with a data logger to record sample flow and gas concentration at approximately 1Hz
- Gas composition for the sites was provided by the host companies

## ➤ Pneumatic controllers

- Each controller sampled continuously for at least 15 minutes using the recording hi flow sampler
- Extensive recordkeeping of model, type and service

# Way Forward

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- Study team compiling field measurements and meta data in database
- Analyzing data for component counts per major pieces of equipment at the different site categories
- Developing updated 'population average' and 'leakers' emission factors for equipment leaks
- Evaluating pneumatic controllers data to distinguish properly functioning vs. malfunctioning controllers
- Developing new classification scheme for pneumatic controllers