Oil and Gas Production Segments in the 2016 GHGI

Overview of Methodology Updates Under Consideration

November 19, 2015
Oil and Gas Production Segments in 2015 GHGI

- 71 MMT CO$_2$e
- 39% of total natural gas and petroleum systems CH$_4$ emissions

2013 Production Segment Emissions

- Pneumatic Controllers
- Tanks
- Equipment Leaks
- Liquids unloading
- Kimray Pumps
- Offshore Platforms
Production Segment Emission Sources

• Fugitives
  • Wellheads
  • Separators
  • Heaters
  • Dehydrators

• Vented and combusted
  – Pneumatic controllers
  – Well drilling, completions, workovers
  – Pneumatic pumps
  – Dehydrator vents
  – Condensate and oil storage tanks

• Meters/piping
• Compressors
• Heaters/treaters
• Others
  – Gas engines
  – Liquids unloading
  – Flares
  – Blowdowns
  – Upsets
  – Others
Pneumatic Controller Activity Data: Current Inventory Method

• Natural Gas Systems

• Petroleum Systems
  – Segregated by bleed rate (high versus low).
  – Industry Review Panel established estimate of four devices per heater-treater and three devices per battery without a heater treater; 35% of devices being high bleed.
Fugitives Activity Data: Current Inventory Method

- **Natural Gas Systems**
  - Non-associated gas wellhead counts calculated from DrillingInfo DI Desktop® for all years
  - Other major equipment (separators, heaters, dehydrators, meters/piping, compressors) counts are driven from EPA/GRI (1996) study estimate based on well counts in a given year relative to 1992 base year.
  - Major equipment activity factors (equipment per well) are segregated by NEMS region (NE, MC, GC, SW, RM, WC).

- **Petroleum Systems**
  - Wellheads and header counts are calculated based on oil well counts from DrillingInfo DI Desktop®, stripper well counts, and activity factors from EPA/Radian (1999) study.
  - Other major equipment (separators and heater-treaters) counts are driven from EPA/Radian study estimate based on production and well counts in a given year relative to 1993 base year.
  - Major equipment activity factors are segregated by production type (heavy versus light crude).
Subpart W Production Segment Activity Data

- Subpart W collects data from onshore production facilities that meet the 25,000 MT CO$_2$e reporting threshold.
  - *Facility* definition: On or associated with a single well pad
  - Reporters represent ~500 facilities
  - Reporters (in 2013) represent 425,125 out of estimated 1.3 million active O&G wells

- Pneumatic controller counts are available from all reporters, segregated by bleed rate (high, low, intermittent)

- Subpart W provides data on major equipment counts (used to calculate equipment leak emissions)
Subpart W Production Segment Activity Data Scale-up Considerations

- Portion of the national population not meeting reporting threshold
  - Assess year to year variation

- Allocation to natural gas and petroleum systems
  - EPA is considering using reported number of sub-basins of each production type to allocate wellhead, pneumatic controller, and other equipment counts accordingly

- Example: A simplistic approach to scale-up. Assume that since the subpart W data set represents X% of active wells, then subpart W represents the same proportion of other national equipment counts (i.e., that the ratio of each type of equipment-per-wellhead is the same for non-reporting wells as it is for reporting wells).
Example: Simple Scale-Up Using 2013 GHGRP Data

- Use of well count coverage in 2013 data
- Assume that subpart W equipment per well is representative of equipment per well for non-reporters
- Does not make distinction between natural gas and petroleum
- Other approaches could lead to higher or lower results

<table>
<thead>
<tr>
<th>Equipment</th>
<th>2015 Inventory</th>
<th>Subpart W (Reported)</th>
<th>Subpart W Scaled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total: Pneumatic Controllers</td>
<td>911,474</td>
<td>707,974</td>
<td>2,190,237</td>
</tr>
<tr>
<td>Total: Wellheads</td>
<td>1,315,196</td>
<td>425,125</td>
<td>1,315,196</td>
</tr>
<tr>
<td>Total: Separators</td>
<td>388,222</td>
<td>243,531</td>
<td>753,404</td>
</tr>
<tr>
<td>NG: Heaters</td>
<td>107,735</td>
<td>49,319</td>
<td>152,577</td>
</tr>
<tr>
<td>NG: Dehydrators</td>
<td>62,919</td>
<td>7,974</td>
<td>24,669</td>
</tr>
<tr>
<td>NG: Meters/piping</td>
<td>390,586</td>
<td>222,802</td>
<td>689,276</td>
</tr>
<tr>
<td>NG: Compressors</td>
<td>35,354</td>
<td>21,318</td>
<td>65,951</td>
</tr>
<tr>
<td>Petro: Heater-treaters</td>
<td>84,262</td>
<td>26,350</td>
<td>81,518</td>
</tr>
<tr>
<td>Petro: Headers</td>
<td>92,395</td>
<td>32,559</td>
<td>100,727</td>
</tr>
</tbody>
</table>
Requests for Stakeholder Feedback: Subpart W Production Segment AD Scale-up

- What other approaches are available for scaling up subpart W data for use in the Inventory?
- Are there specific subpopulations for which subpart W average information should not be used or should be modified?
  - E.g. smaller well sites, stripper wells
- Are data sources available that could be used to determine key characteristics of the non-reporting population?
- Are there other approaches available for allocating subpart W activity factors (e.g., counts per well) between oil and gas?
- How should EPA account for geographic variation in subpart W data (by AAPG basin, by NEMS region, etc.)?
- How should EPA account for year-to-year variation in subpart W data?
Requests for Stakeholder Feedback: Other Revisions Under Consideration

- HF oil well completions and workovers
  - “Potential” emission factor calculated in 2015 NSPS OOOO proposal
  - AD from DI Desktop
- Emission Factors
  - Pneumatic controllers
    - GHGRP allows for categorization of activity data and emission calculations into three bleed rate categories
    - Could use GHGRP split and apply GHGRP emission factors
  - Other sources
    - GHGRP factors
    - Factors from new study data
- Abandoned wells
  - Review of available activity and emissions data
- Super-emitters