

OGWG MIDTERM UPDATE CALL -- NOTES
10/1/19 -- 12:00 – 1:00 PM MDT

Roll call (agencies/geographic area):

- Bureau of Land Management (BLM) – Denver
- BLM – Wyoming
- Colorado Air Pollution Control Division (APCD)
- Fish and Wildlife Service (FWS)
- Montana Dept. of Environmental Quality (DEQ) – R8
- National Park Service (NPS)
- New Mexico Environment Dept.
- North Dakota DEQ
- Ramboll
- Regional Air Quality Council (RAQC) - Denver
- Southern Ute Indian Tribe – SW Colorado
- U.S. Environmental Protection Agency (EPA) R8
- Utah Dept. of Air Quality (DAQ) – R8
- WESTAR/WRAP
- Wyoming DEQ

OGWG Co-Chair: overview of Western Regional Air Partnership (WRAP) Oil and Gas Work Group (OGWG) and focus of call today. At end of presentation, will take questions.

Slide 1 (OGWG Co-Chair)

- WRAP workplan was to create an OGWG, specifically to promote the understanding of O&G in regional and local AQ plans
- Address on data and analysis
- OGWG formed – members sought out that had expertise and geographic representation
- Nov. 15, 2016 was first call
- Co-chairs
- Lot of work accomplished. Closing in on 3-years of workgroup.

Slide 3 (Ramboll)

- Base inventory (survey) & Future year inventory (forecasts, NEPA consideration, & scenarios)

Slide 4 (Ramboll)

- Baseline inventory scope
 - WRAP region (western states)
 - Highlighted most substantial O&G basins in the west (not all basins included in map, but included in inventory)
 - Consistent with previous WRAP efforts (incl. production & transmission)
 - Drilling, fracing
 - Comp. Stations and gas plants

Slide 5 (Ramboll)

- Temporal Scope
 - 2014 base year
 - Circa-2014 baseline (updated with updated activities and inventories)
 - Being used in WRAP baseline AQM for RH baseline scenarios and 2014-16 collaborative
 - 2023/28 Future Year

- Medium scenario → aka “continuation of historical trends”
 - To be used in WRAP RH modeling & 2014/16 collaborative
- Planning Scenarios
 - Reduced legacy well activity
 - Increased horizontal well act
- RH – dev. Additional foreseeable controls

Slide 6 (Ramboll)

- Baseline EI
 - Many difference sources of data; did lots of outreach to agencies
 - Utah, CO, Southern Ute, Greater San Juan, IWDW 2014 EI, EPA 2014 NElv2, Williston Basin Casinghead Gas

Slide 7 (Ramboll)

- Survey approach was a different way to approach.
 - Previously reached out directly to operators with varying success
 - An agency centric approach was the key here
 - Survey targeted most important factors
 - Developed 2 surveys
 - 1st aimed at gathering full inventories
 - 2nd just focused on controls
 - Sent surveys to agencies to either fill out or distribute to operators
 - Leveraged agencies connections to get data

Slide 8 (Ramboll)

- Survey participation – broad representation across several states (~40+ responses)
- Lots of response from Williston and pleased with low response in Permian basin, so improvement
- Also received several agency submissions with over 300 gas composition files used to update speciation files for AQ modeling

Slide 9 (Ramboll)

- Survey Sample
- Included defaults that were currently being used in EPA OG Tool with states being able to add their own data.
- Spud type was really critical to this effort and not asked for previously; trend towards horizontal and decline of vertical wells

Slide 10 (Ramboll)

- Controls Focused Survey example

Slide 11 (Ramboll)

- EI Changes that resulted from survey-based improvements
- Findings mostly related to Williston and Permian (areas where there is substantial horizontal development)
- Found that hydraulic fracturing pressure was much higher than previous EI; drill rig emissions have gone down as well as tank emissions (primarily due to NSPS OOOO & OOOOa)
- Results: 8% increase in NOX, and 24% reduction in VOC across the region

Slide 12 (Ramboll)

- EI compared 2014 NEI v2, OGWG v1, & OGWG v2
- CDPHE provided EI's which reduced base year EI
- NM also had increases driven by Permian basin updates
- UT/WY, not many changes

Slide 13 (Ramboll)

- ND and MT show changes due to survey updates (fix header --- VOC graph instead of NOx)
- UT/WY pretty constant from v1 to v2 baseline

Pause for Q/A

Q: BLM – confused about 2023 vs 2028 – why are both included and how are they used in forecast?

A: in thinking about future year forecast, how far do we go? 2023 is 5 years out/ 2028 is 10 years out. What are the benefits or disbenefits of 5 vs 10-year forecast? We know the further our you forecast, the hard it is to make it accurate. So, we decided to develop to 2023 and use the 2023 inventory for 2028 due to the uncertainty. 2028 is more uncertain so that's why we picked 2023.

- ... call momentarily interrupted due to “off-mute” conversation ... 😊

Slide 14 (Ramboll)

- OG Activity Forecast
 - Equal importance here and lot of work to develop them
 - Account for activity changes and controls
 - Medium scenarios: on the books and on the way and reasonable scenario
 - Currently determining how on-the-books (OTB) and on-the-way (OTW) controls
 - Guiding principles are to be Basin specific
 - Geography
 - Political climate
 - Equally important to distinguish between legacy and new wells
 - Make intuitive sense
 - First time this has been done on a large scale in the Emissions Inventory (EI) community
 - Do know forecasts are really uncertain, but have to live within the realm of O&G EI work
 - Failure rates: infeasible at time developing to really develop a robust estimate of the effect of failures and in particular tank failures (pretty consistent with 2014 modeling platform); just have to mention because there have been a lot of studies on this in particular basins on measured EI's vs top down EI development
 - Forecast scenarios lists
 - Key to remembers: because basin specific, we focused on the basins with the largest impact on activity and emissions (see activity captured (~98% captured) ... outside of the basins we did assume emissions were unchanged from 2014.

Slide 15 (Ramboll)

- For completeness included the description and equation to forecast activity

Slide 16 (Ramboll)

- Permian Ex:
 - Spud type level of detail; vertical, horizontal, and directional activity
 - Historic (thru 2016) and forecasted (2023) activity

- Horizontal wells (blue) really ramping up around 2010-12 timeframe; assuming increases will persist
- Vertical wells (grey) have begun to decrease slowly but steadily since 2000; assumed unchanged for medium scenario; similar assumptions for gas production.
- Had we not looked at horizontal and vertical components, would have likely been confused and perhaps not chosen the right future year; splitting this way helped us arrive at these trends.
- Spud count shown in blue, change in well count in yellow; these lines correspond relatively well.

Slide 17 (Ramboll)

- Greater San Juan Ex:
 - Really strong legacy production but limited new production; so, forecast is mostly related to the vertical wells declining.
 - Small amount of horizontal well activity, with spike in oil production in 2012-15 and leveling off after.

Slide 18 (Ramboll)

- NEPA and CAA Considerations
 - Did not use NEPA EIs or activities in WRAP forecast based on several key aspects of analysis
 - Wanted forecasts consistent on how they were developed across the region
 - NEPA usually only related to federal lands
 - Considered NEPA vs CAA purpose
 - NEPA – looks at possible alternatives for specific projects
 - CAA – charge is to develop projected level of emissions for future scenario(s) and evaluate the results (AQ concentration and other values relative to standards and design values to set goals and determine progress)
 - NEPA provides a decision matrix, but CAA provides an objective was to evaluation future goals related to AQ

Pause for Q/A

Q: NPS – Permian basin forecast – looking at report – bottom left corner graph → production forecast makes sense... did you base forecast for future well counts ... what time period did you use? Recent forecast through 2014? Looks like overall decrease in new development.

A: Ramboll - spud count graph is interesting one; jumps around from year to year, max in 2013. We tended to use a 5-year average to set future year estimate. The check on that was to say “ok, looking at spud to well count, is the pattern reasonable relative to historic data), and it generally does. In terms of spud count, assuming slight decrease... at 700 per year... we know vertical wells are taken off line as horizontals come on line, so get decrease in well count, but do see horizontal wells being added at a rate of 700 per year

Q: NPS – if you look at more recent 2019 data, new development in the basin is probably back up to where it was in the 2014 time period... so is forecast reasonable based on what we are seeing right now. Looking at well starts over time, we are trending back up and lot of projections for the region say we are going to stay with and increased level of production.

A: Ramboll - would like to see data and look forward to their comments on medium scenario forecast.

Q: WRAP – is the 5-year avg to account for additional infrastructure needs for when new wells need to be drilled? It would take some amount of time to ramp back up after the up and down that has happened in the last 5 years.

A: Ramboll - good point. Chart shows some pretty substantial changes over time and that is the difficulty of making these forecasts and focused on making it consistent across the basins and used IHS data. Limited the data were looking at also has the effect of being able to take a close look at the historical variations used to forecast that future estimate.

WRAP – the other thing we observe in these basins, when you have a big reset like in 2015, there is a lot of buying and selling of companies and that tends to impede the rate of drilling and several states are not in a solid state.

Q: NPS – think having that range in forecast will be very beneficial and think it's helpful for highly uncertain industries like this. Good to be able to bound it with upper and lower bounds based on price. Good planning practice? Do you guys intend to pick just one scenario for modeling?

A: WRAP – medium scenario is what we are going to run in the 2028 OTB and OTW run. Then there is some future OGWG work that John will describe where additional controls will/may be adopted. We don't have plans to model low and high scenarios, but will be impacted by what agencies will be adopting. So will have a 2nd look at the medium scenario. Looking at snapshots for this purpose, but the states are modifying rules on an ongoing basis, so hope to get a 2nd snapshot later in the year when we hear what agencies are doing to control this at the state level. Indirect way of saying no, we are not modeling low and high, only medium.

Slide 19 (Ramboll)

- Additional reasonable controls
 - Will be looking at changes to emissions rates due to additional reasonable controls.
 - Will provide a menu of controls for specific categories that have substantial NOx benefits
 - Agencies will be pick which ones they may implement in their areas and the emissions effects will be applied in smoke to come up with a new emissions control scenario.
 - Permitted sources vs not-point sources
 - Know agency has different levels of control, documentation, understanding relative to nonpoint sources, so there might be more inherent uncertainty implementing a non-point program as opposed to point controls.
 - There are statutory factors that still need to be considered in EI analysis

Slide 20 (Ramboll)

- Agency program review:
 - Trying to describe what is being done at the various agencies to control emissions
 - Already done a lot of work to document OTB and OTW at the federal level
 - Focus here to prepare a lean and to the point write-up as far as what individual agencies are doing and compare across agencies
 - Timing:
 - finalize inventory by oct. 8
 - draft memo/report early Nov.
 - final memo/report Dec.
 - complete by end of 2019

Slide 21/22 (Ramboll)

- Timing and Deliverables

Q/A

Q/Comment: EPA - need to remember there is still a lot of uncertainty in emissions factors, so just to keep in mind. O&G are likely being underestimated, esp. VOC, but don't have a solution yet. And it may be an old problem and not a problem with new equipment. But still need to look at and may need to develop a process to address it.

A: OGWG Co-Chair – anytime you do EI work, even with an industry that has less variability and uncertainty, but every time we do an EI and the benefit we get by leveraging Ramboll experience and past work to make incremental progress. Kudos to those participating in the OGWG and OGWG PMT. Need help honing-in on what we can do with a regional EI. You can't just pick one approach and represent an entire state. Would be inappropriate to use blanket to use 1 approach across a state/region. Benefit of participating in bi-month calls is that all participating agencies have been able to provide feedback and provide targeted information and feedback to steer technical work.

Slide 23 – (OGWG Co-Chair)

- Please engage and think about participating in OGWG to provide feedback in the process. Really leveraging the work of the OGWG for the 2016 work with the MJOs/EPA. Please reach out and contact us. We are not looking to the future to do another one of these. If you are interested in future work, please engage. Next call Oct. 8th – noon MDT.