

MEMORANDUM

Date: **November 24, 2020**

To: **Tom Moore, WESTAR-WRAP**

From: **John Grant and Amnon Bar-Ilan**

Subject: **Gas Composition Profiles Developed by the Western Regional Air Partnership Oil and Gas Working Group and Potential Data Sources Available to Develop Additional Gas Composition Profiles**

This memorandum describes the basis of recent and potential updates to gas composition profiles applied in emission inventory development and emission processing speciation profiles. In collaboration with state agencies and oil and gas operators, Ramboll developed several gas composition updates for the Western Regional Air Partnership (WRAP) Oil and Gas Work Group (OGWG)¹. In collaboration with the Bureau of Land Management (BLM), Ramboll identified several additional gas composition data sources that could be leveraged to enhance venting emission estimates and speciation profiles applied during emission processing for air quality modeling.

WRAP OGWG Gas Composition Profiles

As part of survey efforts to develop the WRAP OGWG baseline emission inventory, over 300 gas composition profiles were collected from oil and gas operators. Ramboll reviewed, compiled, and analyzed the gas composition data to develop representative gas composition profiles for the basins, well types, and emission streams below¹.

- Flash gas from oil wells in the Williston Basin (North Dakota)
- Flash gas from oil wells in the Williston Basin (Montana)
- Produced gas from oil wells in the Williston Basin (North Dakota)
- Produced gas from oil wells in the Williston Basin (Montana)
- Produced gas from oil wells in the Central Montana Uplift Basin (Montana)

Ramboll developed Sparse Matrix Operator Kernel Emissions (SMOKE) speciation profiles and cross-references for the above gas compositions and incorporated these into the WRAP Regional Haze Modeling Platform.

¹ Grant et al. (2019). Memorandum: Gas Composition Profile Results from the WRAP OGWG Survey.
https://www.wrapair2.org/pdf/WRAP_OGWG_GasComp_18Jul2019.pdf

Additional Gas Composition Data Sources

In collaboration with WESTAR-WRAP and the Bureau of Land Management (BLM), additional data available to develop improved gas composition profiles were identified as indicated below.

- Lyman et al. (2019)²: Uinta Basin flash and raw gas composition profiles.
- Lyman et al. (2018)³: Evaporation Pond Speciation Profile

A potential additional source of gas composition data is Matichuk et al. (2016)⁴; however, Matichuk et al. (2016) notes explicitly that data collected was not of sufficient quality to develop representative speciation profiles.

Analysis of Lyman et al. (2018; 2019) is required to determine whether the data is sufficient to develop SMOKE speciation profiles, perform statistical analysis to compile the profiles, develop SMOKE format files and cross-references, and document methods and results.

To ensure that work is not duplicated, prior to analysis of the above data sources, State Air Quality Agency and/or US Environmental Protection Agency staff should be contacted to confirm whether there has been any work done to develop SMOKE format speciation profiles based on data from the above references.

² Lyman et al. (2019). Annual Report, Uinta Basin Air Quality Research. <https://usu.app.box.com/s/co626elackqkw9ead14wkma14jjv9eng>

³ Lyman et al. (2019). Emissions of organic compounds from produced water ponds I: Characteristics and speciation. <https://usu.box.com/s/91395ko15a5lh2dmuj80d43kcjr4xem>

⁴ Matichuk et al. (2016). Advancing Understanding of Emissions from Oil and Natural Gas Production Operations to Support EPA's Air Quality Modeling of Ozone Non-Attainment Areas: Final Summary Report. https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=335190&Lab=NRMRL&subject=Air%20Research&showCriteria=0&searchAll=Climate%20and%20Nitrogen&actType=Product&TIMSType=PUBLISHED+REPORT&sortBy=revisionDate