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Derek McCormack, Head, Regulatory Implementation
Electricity and Combustion Division
Environment and Climate Change Canada 351, boul. Saint-Joseph, 12th Floor, Office 12042
Gatineau, Quebec K1A 0H3

RE: Alberta Natural Gas Methane Content Variability

Dear Mr. McCormack

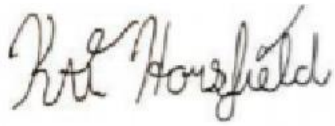
The Canadian Energy Pipeline Association and its members appreciate Environment and Climate Change Canada's efforts to engage the transmission pipeline industry in discussions regarding the Multi-Sector Air Pollutants Regulations (MSAPR). As per our discussion on June 11, 2021, attached is a memo which provides data and other information pertaining to the methane content in Alberta's natural gas pipeline system for the 2017 and 2018 calendar years. This data is meant to establish whether natural gas in Alberta's transmission pipeline system experiences occurrences molar percentage below 90% methane and if so, the frequency of these occurrences.

This data is provided with the understanding that the upstream sector has expressed concern with respect to some design aspects of the MSAPR. It is worth noting that the impact associated with the deviation from the 90% methane content threshold for pipeline grade natural gas received from CEPA member companies would differ from that of upstream deviations. As such, any future considerations associated with this requirement should account for this difference.

Notwithstanding the above, CEPA supports the recommendations articulated by the Canadian Association of Petroleum Producers in their letter dated April 6, 2021. Of particular note are the aspects of MSPAR which trigger non-compliance either due to timing or safety issues.

Thank you again for taking the time to meet with CEPA and its members. If you have any questions or concerns regarding the attached memo, please contact the undersigned.

Yours sincerely,



Kai Horsfield
Manager, Regulatory and Policy

Cc: Amanda L Stevado - Program Engineer
Joffre Bourgeois - Head, Industrial Combustion Unit
Marc Lachance - Senior Program Engineer
Assaad Zaghrini - Junior Project Engineer

To: Jasmine Urisk, Canadian Energy Partnership for Environmental Innovation

From: Chad Edwards, CAE Climate Consulting Inc.

Re: Alberta Natural Gas Methane Content Variability

Introduction

In conducting a project for Environment and Climate Change Canada (ECCC), CAE Climate Consulting Inc. (CAE) has acquired extensive natural gas composition data from Canadian Energy Partnership for Environmental Innovation (CEPEI) member companies. This data was used to assess the 2017 and 2018 Alberta calendar years methane content in natural gas in order to establish whether the gas experiences occurrences molar percentage below 90% methane and if so, the frequency of these occurrences.

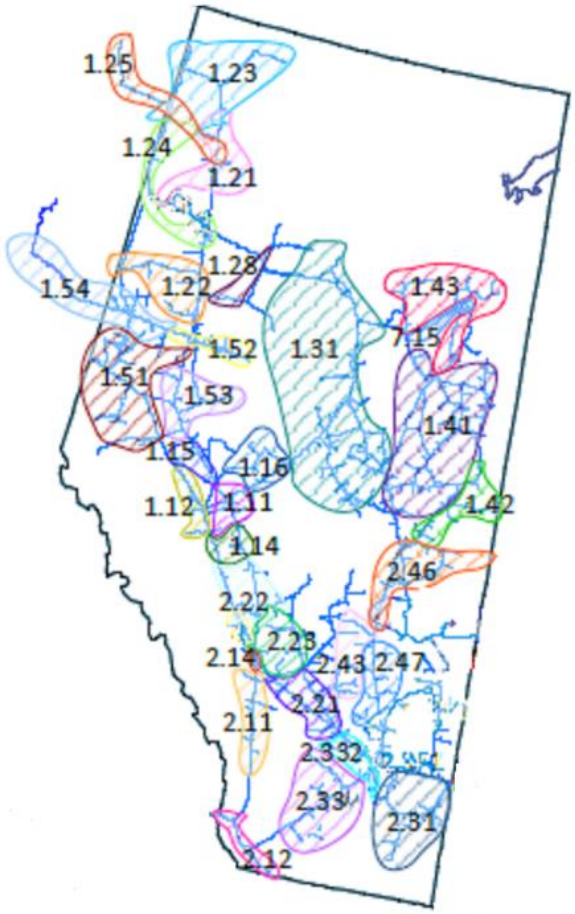
Data and Uncertainty

Natural gas composition data provided by participating CEPEI member companies was based on the best data readily available and in regards to the 2017 and 2018 calendar year data, interviews with the participating companies confirmed that the data is complete. Additionally, an analysis was conducted to determine if the data provided was reasonable. This reasonability test used the ratio of two gas composition components (for example, C_1 and HHV) to determine if the variability observed was outside a percentage based on the statistical mean and standard deviation of the two years of data. Any "outliers" discovered were communicated to the participating companies for explanation. The responses from the participating companies identified that there could be a number of reasons for what was observed, but unfortunately, they were unable to provide a reason that was granular enough to influence either the use or exclusion of the data. Their reasons fell into two primary categories, Prior Period Adjustments (PPAs) or Economics of Heavier Component Removal.

Zones of Unique Carbon Composition

The gas composition data provided by member companies was on the basis of representing zones of unique carbon composition. These zones were intended to encompass key inputs to transmission lines, interprovincial transfer points, storage points, import points, export points and/or

key distribution points for consumption, and were those at which volumetric flow and composition could be measured. It should be noted that the zones illustrated on the Alberta provincial map below does not specify absolute boundaries, but rather serves as a visual representation of the zones.



Gas Composition

Gas composition is determined from a gas sample using three different methods, proportional sampling, on-site gas chromatographs or through associated sampling.

Proportional sampling utilizes on-site sample cylinders that take gas samples over a period of time, typically monthly. Each sample cylinder is sent to a laboratory and analyzed through a gas chromatograph to measure the quality of natural gas. Gas chromatography is a technique used to separate the components of a gas sample for analysis. After separation, the quantity, or mole percentage, of each component is accurately measured. Once the gas composition has been determined, the heating value, relative density, and other characteristics of the sample are calculated. The proportional sampling gas data is then downloaded, automatically or manually, into a field flow computer. Based on the participating CEPEI companies, this is the method most commonly employed.

Certain facilities may be equipped with on-site gas chromatographs. For these facilities a gas sample is automatically taken and analyzed approximately every ten minutes, with the gas data being automatically downloaded into the field flow computer.

Associated sampling occurs when certain delivery locations, referred to as “child” sites, are deemed to have the same gas composition as another, usually upstream, associated location, referred to as “parent” sites. This method is typically only applied when there are limited receipts or a single receipt of gas for a child site. These locations download the average daily gas composition from the parent site.

In regards to the ECCC project, a daily frequency of data was determined by the member companies to be consistently the most granular frequency able to be provided. This was because gas composition is predominantly collected by proportional sampling for most zones at a less frequent time period, typically monthly.

Molar vs Volume Percentage

Under the ideal gas law, the molar percentage is equivalent to the methane by volume (i.e., volume percentage), however not all gases are ideal as the volume and density of a gas deviates from the ideal based on the actual pressure and temperature. To look at it another way, the molar percentage is based on the weight of each of the gas component per volume and the volume percentage is based on the volume of each of the gas components. The difference between the molar percentage and the volume percentage under real conditions should be immaterial for the purposes on this assessment and any differences should be immaterial compared to the equipment accuracy of the gas chromatograph used (i.e., they are all certified by Measurement Canada which requires that the energy density error shall not exceed ± 0.1 MJ/m^3, and the relative density error shall not exceed ± 0.5%).

Results

Seventeen zones in total experienced occurrences where the molar percentage either crossed the 90 percent threshold or was consistently below the 90 percent threshold. These are found in the table below. Prior to the gas leaving Alberta at the Saskatchewan border, it is known that extensive gas processing facilities are present to remove heavier hydrocarbons (propane and butane for example) which was assessed and has resulted in the gas flowing eastwards to Ontario and Quebec being composed of methane consistently above 90%. An assessment of the gas processing facilities in respects to the Alberta gas quality zones indicated below was not undertaken and therefore interpretation of the gas quality in these Alberta zones would be purely speculative and has not occurred.

	Threshold	
Zone	**Crossed**	**Consistently Below**
1.11	Yes	
1.14	Yes	
1.15		Yes
1.16	Yes	
1.24		Yes
1.28	Yes	
1.31	Yes	
1.41	Yes	
1.43	Yes	
1.51	Yes	
1.52	Yes	
1.53		Yes
1.54	Yes	
2.11	Yes	
2.22	Yes	
2.23	Yes	
7.15	Yes	

The following graphs illustrate the molar percentage and provide a representative sample of the variability of the results, from consistently crossing (1.11), rare or single occurrence crossing (1.52), consistently below (1.53), or consistently above (2.31).