Alarming Differences in Commercial Data: Two Studies Illustrating the Challenges in Using Methane Data for Regulatory Reporting

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Background. The analysis of groundwater for dissolved light gases, including methane, is a required or recommended practice for establishing baseline and post well completion conditions in the vicinity of unconventional shale gas production. Historically, data collected by members of the Marcellus Shale Coalition (MSC) have been of concern due to disparate dissolved methane results in domestic groundwater wells, and its member companies have identified large variations in the reported concentrations between laboratories from split samples. The MSC established a Workgroup that identified the need for round-robin laboratory studies to fully understand the magnitude of the problem and to guide further work aimed at removing the dissolved gas concentration variances.

Approach/Activities. The MSC commissioned two round-robin studies for the analysis of dissolved light gases. The first study was commissioned in 2014-2015 and consisted of 14 commercial laboratories and one government laboratory. Each laboratory analyzed replicate blind groundwater samples that had been collected at two separate well locations. In 2016, the MSC commissioned a second study, again using 15 laboratories, which analyzed four reference standards that were submitted as blind samples. The results of this second study will be presented along with summary data from Phase 1. The study design, reference standard preparation, data analysis, and the conclusions from both studies will be presented.

Lessons Learned. The first study identified significant variation among the results, with dissolved methane values that varied from 7,440 to 34,600 µg/L for a single sample location. The second study also showed considerable variability, with a number of results 40-60% low, relative to the prepared standards, and led to an understanding of the major source of variability and bias. The study designs, reference standard preparation, data analysis, and the conclusions from both studies will be presented. Techniques within the calibration process will be discussed relative to the primary source of error for analysis of dissolved methane.