



Marcellus Shale Coalition Dissolved Methane Method Study

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Presented by Rock J. Vitale, CEAC

Environmental Standards, Inc.



Agenda

- Study Objectives
- Laboratory Coordination
- Sample Collection
- Results
- Conclusions



The Problem

- Public concern
- Data variability observed by MSC members
- Several published procedures for dissolved light gases
- No US EPA-published method
- Lack of standardization



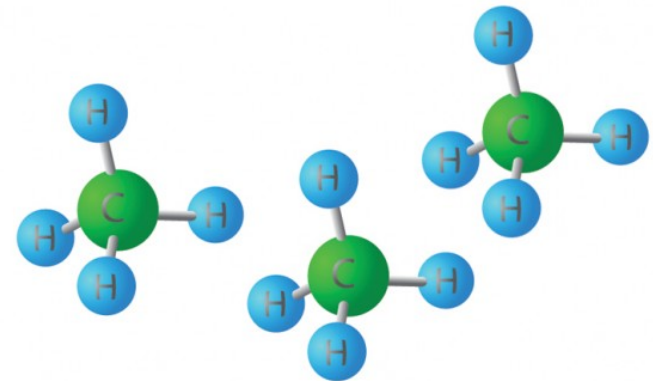
MSC Dissolved Methane Method Workgroup

- Formed to study this issue in early 2013
- Compared notes and reviewed data/information:
 - Dissolved methane split sample data
 - Laboratory analytical protocols
 - Brainstormed as to cause of variability
- Requested funding from the MSC Board for a Round Robin Study
- Competitive RFP issued to MSC members to complete the Study
- MSC engaged Environmental Standards, Inc. to conduct the Study



Study Sponsors, Executor, and Participants

- Select members of the MSC Dissolved Methane Method Work Group
- Environmental Standards, Inc.
- 15 Participating Laboratories (14 commercial, one government)



Study Objectives



- Design and oversee a credible inter-laboratory study that can withstand scientific scrutiny
- Determine the variability across 15 laboratories using controlled samples
- Identify the critical laboratory variables that influence the quantitation of dissolved methane in groundwater
- Recommend Best Practices for the analysis of dissolved methane in groundwater
- Not a sample collection procedure study

Laboratory Coordination

- Laboratory Key Elements Questionnaire
 - 102 questions identifying critical laboratory variables
 - Detailed preparation and analytical procedures
- Standard Operating Procedures
 - Sample receiving
 - Sample and standard storage
 - Dissolved gases sample preparation
 - Dissolved gases analytical methodology
 - Integration of chromatographic peaks



On-Site Sampling



- Two domestic wells, confidential locations
- Vial verification
- Direct fill method employed
- 396 vials collected
- Preserved and unpreserved
- Use of butyl rubber-Teflon faced septa
- Three measured time intervals collected
- Effervescence observed

Laboratory Analysis

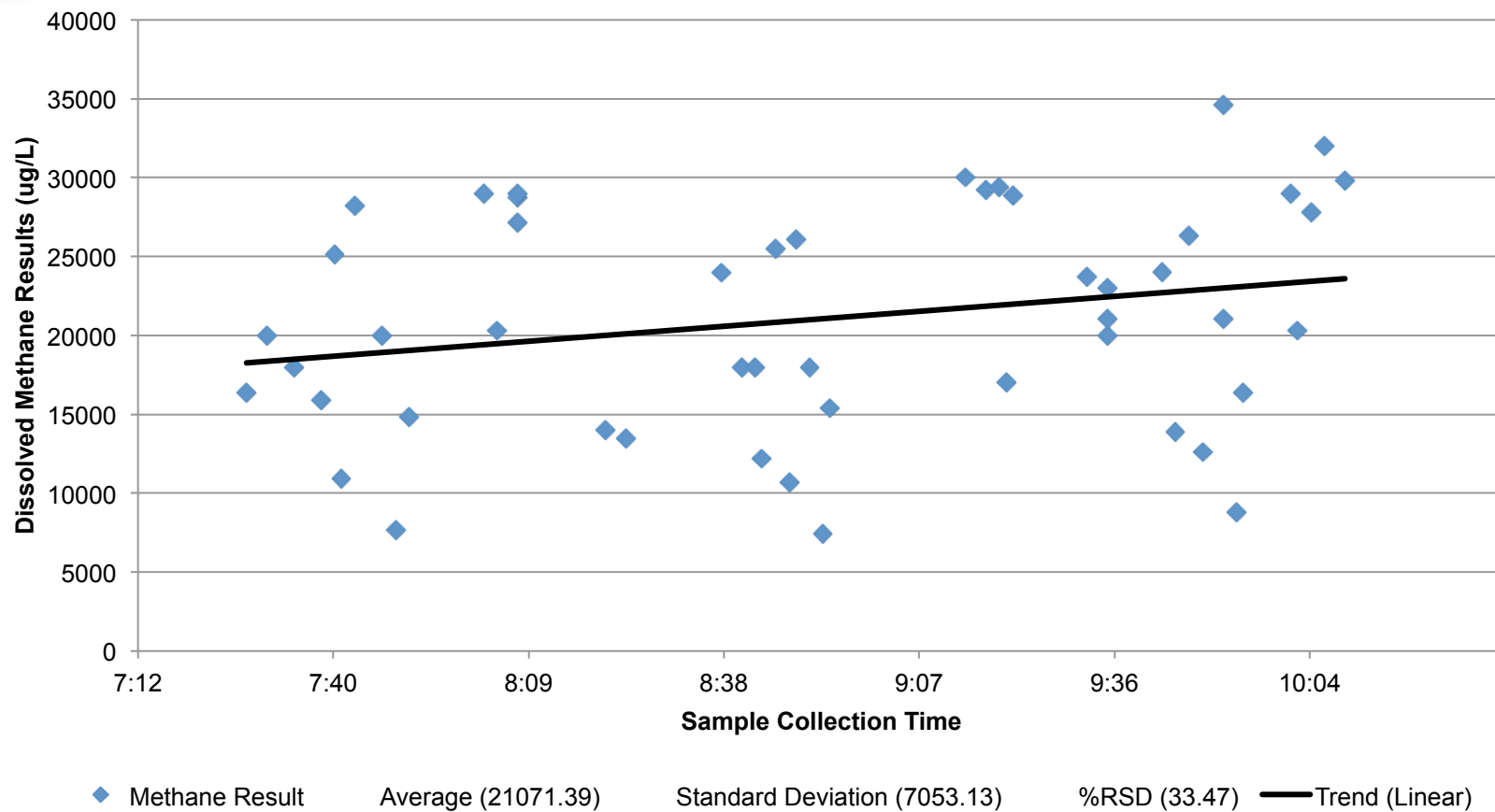
- Each laboratory received 6 samples
 - Three samples per well
 - Nine vials per well per laboratory
- Instructed laboratories to analyze based on their SOP and Questionnaire response
- Each laboratory performed analysis within 48 hours of receipt
- Laboratory deliverables: Certificate of Analysis, EDD, and Level IV data package

Data Analysis

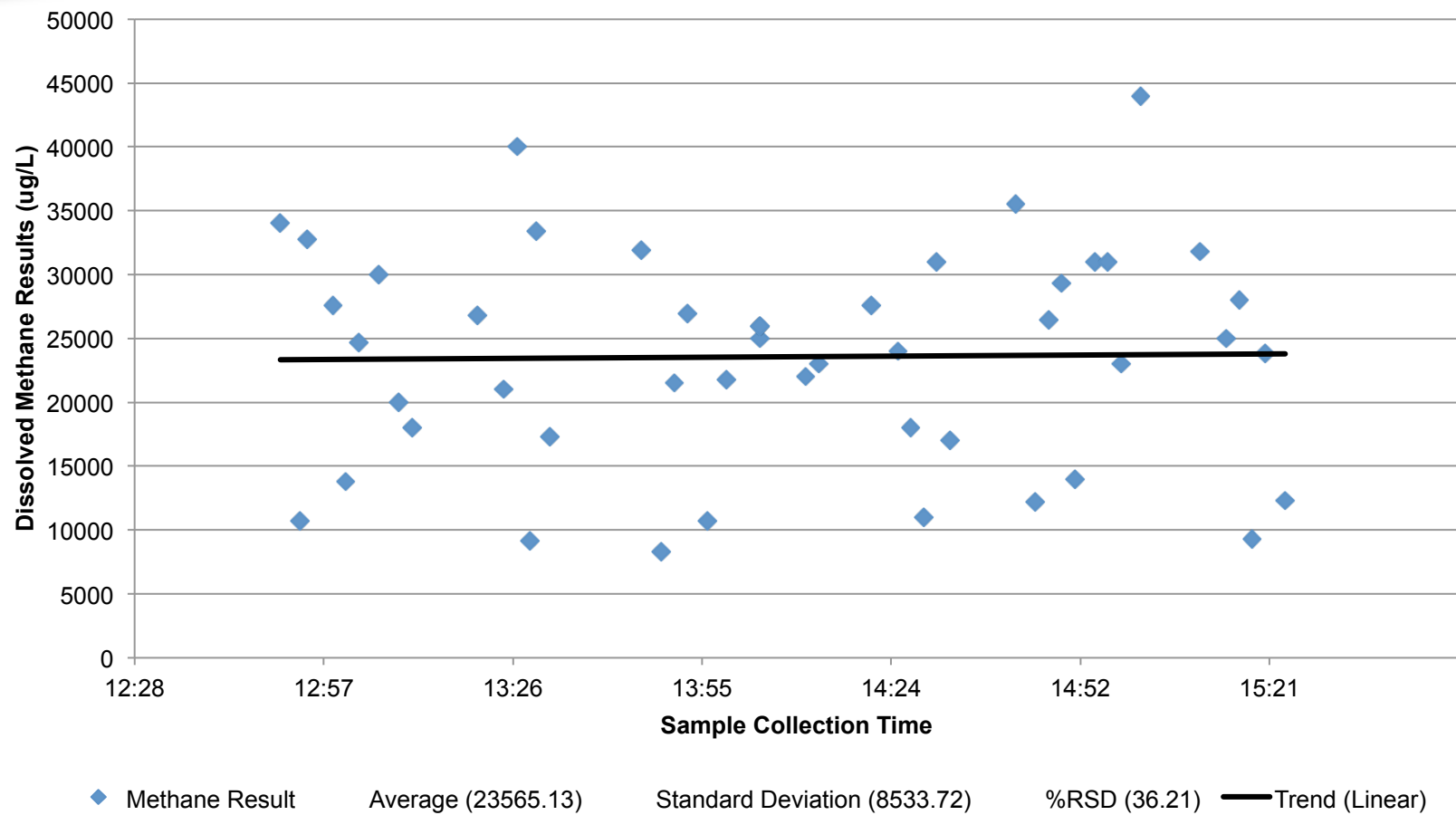


- Compiled analytical data
- Compiled data from key elements questionnaire
- Evaluated SOPs
- Performed exploratory and statistical data analysis to identify “groupings” of data and controlling variables
 - Wilcoxon/Kruskal-Wallis Tests
- Performed data verification of selected labs’ Level IV data package

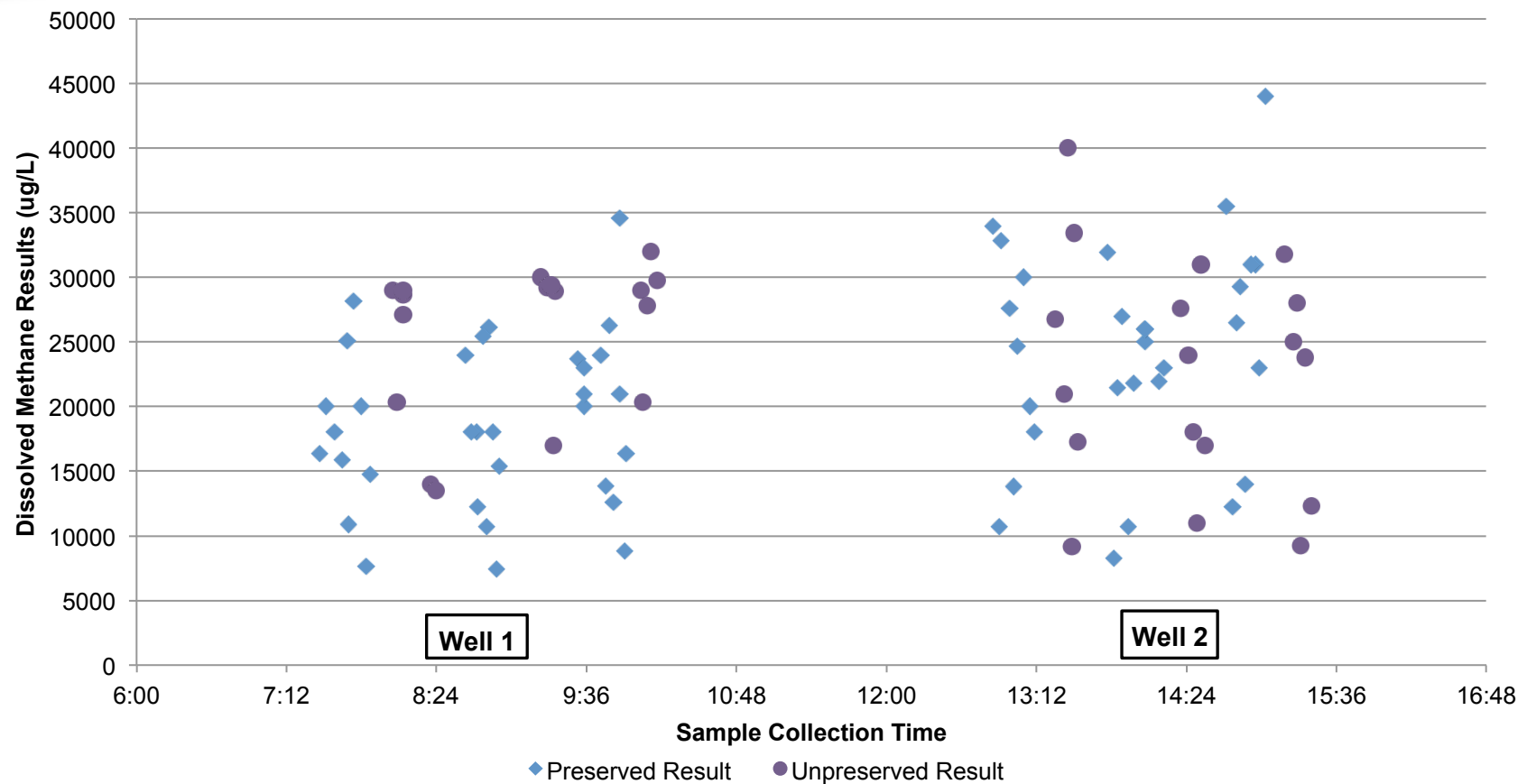
Well 1 - Dissolved Methane Results



Well 2 - Dissolved Methane Results



Preserved vs. Unpreserved



Preliminary Conclusions

- Range of reported concentrations verifies MSC observations
 - Methane variability is a concern when applying regulatory standards to groundwater
- Based upon the 102 process questions and SOPs reviewed, there is a very broad range of laboratory approaches
- No “smoking gun” to explain the variability of reported concentrations

Recommendations

- The study recommendations include procedures specific for instrument calibration, sample handling/preparation, analysis, and calculations.
 - Seek collaboration from MSC laboratory members to develop a consensus procedure.
- Of most importance is development of a certified performance sample that each laboratory can use to gauge their analysis.

A banner image showing a sunset over a body of water with silhouettes of trees and birds in the sky.

Additional Studies Recommended

- Repeat study at lower dissolved methane concentrations
- Sample collection study to determine how varying procedures affect dissolved methane concentrations
- Round robin study using a controlled dissolved gases analytical procedure developed by the MSC

Contact



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