

Biomethane Data Collection Study

Description: Project to collect data and analyze impact of processed Biomethane at varying levels of blending with traditional gas on LDC's infrastructure.

Status: Pipeline components from the Biomethane plant at Hamilton, ON have been characterized. Gas composition testing ongoing.

BENEFITS

Union Gas is collaborating with NYSEARCH members by offering their Hamilton, ON facility to study the impact of processed biogas on LDC infrastructure. As an additional benefit, such data could inform discussion and decisions on gas supply tariffs and specifications. Members are eager to understand the range of Renewable Natural Gas (RNG) impacts to their systems and, thus, would benefit from the opportunity to test infrastructure in a system that has been operating with RNG for close to five years.

The relationship of gas processing technology, monitoring instrumentation and effects on downstream piping systems will be explored to help fill knowledge gaps. This integrated operations approach to assessing impacts on infrastructure exposed to RNG over the years, coupled with the gas quality analysis, will help develop a long-term strategy for gas operators to embrace this renewable energy resource.

BACKGROUND

The gas industry and several NYSEARCH members are investigating the business of using renewable natural gas (RNG) in their gas distribution system. While there is no standard specification for biomethane quality gas for the distribution system, there are R & D efforts that are working towards this goal. In addition, in 2016, NYSEARCH

members decided that there is also a need for data that comes from actual operation of the biomethane plant. Specific concerns of LDCs include impact to materials in the distribution system and any changes to gas quality.

Union Gas has several renewable natural gas plants sites planned and one that has been in operation. They have been taking renewable natural gas from a wastewater treatment plant in Hamilton, Ontario (refer Figure 1) since 2012. To kick-start a broad program and quickly take advantage of data that is already available and of use to Union Gas and other NYSEARCH members, Union provided samples, information and data from their active site and planned/future sites.



Figure 1: Hamilton Bio-gas Plant site

TECHNICAL APPROACH

The objective of the project is to collect and share data with the NYSEARCH funding consortium about the impact of processed biomethane from RNG sources: a) at the point of custody transfer, b) on piping components and materials that are part of the downstream system (between custody transfer and end use meter).

At the Hamilton location, Union Gas continuously measures the following constituents: major hydrocarbons, N₂, CO₂, CO, O₂, H₂, H₂S, and moisture. NYSEARCH with assistance of Eta Partners will review current measurement practices and then identify any additional species or classes of species to be measured in this project. In addition, approaches for measuring the unprocessed biogas, RNG, and blends of RNG with natural gas are being identified.

To characterize the effects of biomethane on pipeline components, NYSEARCH conducted a trial where common pipeline components were subjected to RNG service over a prolonged period. Pipeline components from this trial were then submitted to Steel Image, a materials corrosion analysis laboratory for evaluation and characterization of any damage sustained from RNG service.

Figure 2 displays the schematic and photos of the pipeline set-up. The investigation included dis-assembly and visual examination of the submitted pipeline components. Features of interests then underwent destructive laboratory analysis.

PROGRAM STATUS

Union Gas enabled extraction and replacement of parts from their RNG system including plug valves, relief valves, check valves, ball valves, spool pieces of pipe, rotary flow meter and regulator. Steel image, an independent metallurgical lab hired to review these components, concluded in their Final report that the RNG pipeline components are in good condition. No indications of corrosion, microbially induced damage or any other degradation from RNG service at this site; were observed. Components such as the #1 Ball Valve,

#3 Pressure Regulator, #4 Plug Valve, #5 Ball Valve, #7 Pressure Relief Valves and the numerous flanges had suffered no corrosion (Refer Fig. 2). The machined surfaces of these components appeared as-new and had not even suffered discoloration during service. This indicated that the RNG product had been benign to the carbon steel components.

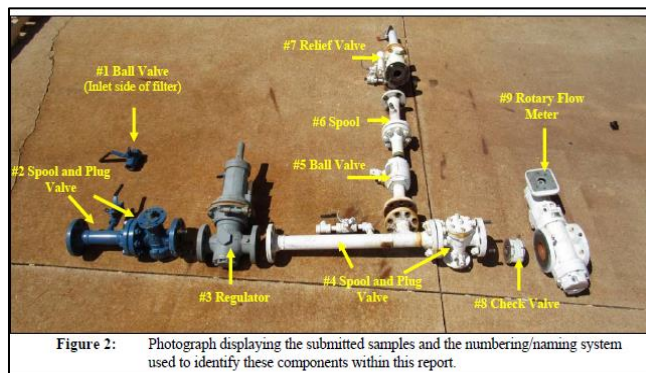


Figure 2: Photograph displaying the submitted samples and the numbering/naming system used to identify these components within this report.

The project team is working with the Waste water treatment plant (WWTP) operator to understand pre-processed gas conditions, cleanup process and other historic information.

Highlights

- “Umbrella project” – other sites to be added as they become interesting and/or available.
- Co-relation of RNG composition and its effect of pipeline components

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