

Classification of Emissions at Regulator Stations

Description: A project to assess sources of emissions at LDC-owned Regulator Stations and to develop and validate a framework for classifying and then mitigating those emissions

Status: Following data collection from participating members and site visitation, the classification scheme was established and an emissions ranking tool completed. A holistic measurement approach is being defined to validate the emissions ranking process.

BENEFITS

A method to consistently assess and standardize the prioritization and measurement of emissions can increase safety by enabling a practical approach for identifying even small methane emissions. The process could also identify large emitters. Reducing emissions improves the environment and demonstrates to gas customers how even the smallest source of emissions are important to eliminate.

BACKGROUND

Regulators and environmental organizations do not always agree with industry metrics on the magnitude of methane emissions from the transmission and distribution sectors despite extensive collaborative work to define ‘emission factors’. It is generally agreed that for the distribution sector, while our emissions are a much smaller percentage than other sources, one of the biggest contributors comes from occasional venting and leaking at regulator stations.

With the current emission factor measurement methodology, it has been noted by those who have studied the process that it is difficult to accurately assess regulator stations due to a number of factors. They include: 1) range of sizes, 2) design, 3) geographic location, 4) valve type, 5) changing pressure and flow rates, and 6) procedures for venting.

TECHNICAL APPROACH

The objective is to develop a framework and quantitative methodology for classifying emissions at regulator stations. Our goal is to reduce variability in emissions estimates and /or properly

classify regulators to prioritize for additional work to measure and mitigate emissions.

Three tasks were addressed through two contractors who are experts in gas control equipment and leak measurement. The three tasks that were planned included: 1) Regulator Station Inventory and Classification, 2) Confirmation of Emissions Measurement Technology, and 3) Field Test program.

For this first segment of work, it was agreed that the emissions of interest were those fugitive emissions that come from design or ‘engineered’ emissions during pressure reduction. The classification methodology was found to be difficult to turn into a quantification process and thus, was first evaluated as a way to better bin the equipment and prioritize where to make measurements.

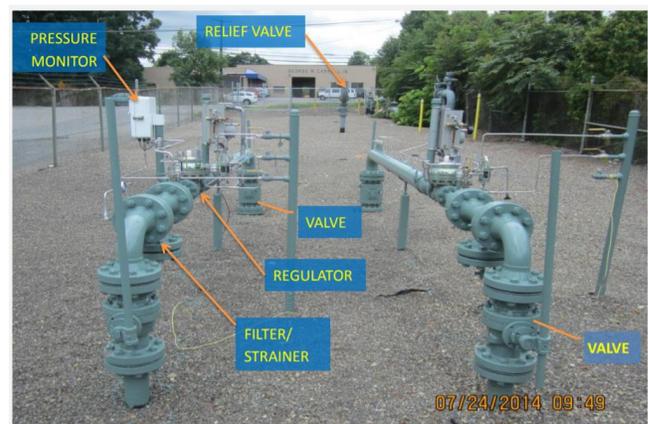


Figure 1: typical station with multiple valves and pressure reduction equipment

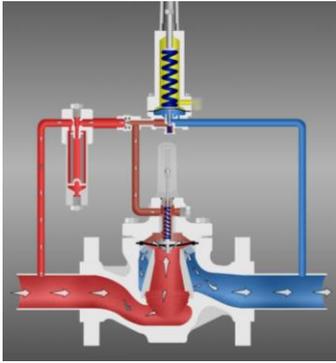


Figure 2: sample regulator design with pilot valve

PROGRAM STATUS

Following significant exchange with funders and Subject Matter Experts (SMEs), the classification framework was completed. For the very few sources of emissions under very specific conditions, the pilot-controlled valves that have intermittent or continuous bleed, had three factors that were analyzed: 1) volume of gas in the valve chamber, 2) valve travel and, 3) frequency of valve movement. Numerous factors were found to potential play a small part in emissions estimates. They included: hardware, system operation, control, seasonal/environmental influences and whether or not the station handled industrial/power applications.

Four categories were defined: 1) Category A – no bleed to the atmosphere and extremely minimal risk of component leakage, 2) Category B – low pressure system application; minor releases of pilot control releases of gas associated with remote control or SCADA/RTUs, 3) Category C – intermittent moderate emissions that are associated with high pressure systems, and 4) Category D – continuous large emissions from high pressure systems. Emissions that were found for Class A and B were very minor and based on emissions from abnormal operating conditions such as leaking connections or failed components.

The contractors also delivered a qualitative ranking tool (spreadsheet) that they designed based on generic families of equipment where there were variables of interest based on the factors listed above. Using extensive control/pressure reduction experience and review of

data from numerous sites supplied by NYSEARCH funders, the consultant developed the relative weighting ranking tool. The tool provides a relative number that combines assessments of several contributing factors to emissions. In addition, five sites that were assessed as potentially fitting into Categories C and D were visited to run through the classification process and to determine if quantitative emissions measurements could be made. Only some of those sites were expected to provide conditions adequate to measure emissions over the long term. [Many emissions are small and in a dynamic or fleeting state.]

For some of the components that were found to be emitting gas, further work is necessary. Attaching different types of measurement devices to regulator station over a period of time requires participation and approval of personnel related to station design and maintenance.

NYSEARCH funders are considering a holistic measurement process to quantify emissions using the framework that resulted from this project. Multiple technologies may be used and funders have paused the project to evaluate what contractors, member support and expertise are needed to get a representative means for standardizing those measurements.

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Highlights

- Focused on very small sources of emissions from pressure reduction conditions
- Found very few sources of emissions and focused on those from high pressure systems with intermittent or continuous bleed
- Delivered to funders a relative ranking tool and several examples based on site verification
- Need to determine holistic method for quantitative measurement to validate classification scheme