Review of Compressor Station Measurements

EPA Emissions Inventory Conference
Greenhouse Gases Session
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URS

Preliminary Results, Phase 1

Fugitive Emission Measurements of Selected Components at Natural Gas Compressor Stations

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Project Management

- Dr. David Allen, UT Project Manager
- Lisa Hanle, EPA Project Manager
- Matt Harrison, URS Corp Team

  (former project manager for GRI/EPA project)

Overall Project Goals
(from initial project report in 2008)

- Update emission factors for
  - **Production**: Well clean-ups, completion flaring, well workovers, pipelines leaks
  - **Processing**: fugitive emissions from reciprocating and centrifugal compressors
  - **Transmission and Storage**: *fugitive emissions from reciprocating and centrifugal compressors*, pneumatic devices, and M&R stations
  - **Distribution**: Residential customer meters, plastic mains and services *(Note: GTI is doing some of these)*

Stations Visited To Date

Ownership	Date Visited	Description	IR screening?	Hi Flow on component leaks	Vent Pipes Measured
Co #1	11/3/09 TX	6 Recips (1965)	√	√	√
Co #1	11/4/09 TX	5 Recips (‘92 – ‘09)	√	√	√
Co #1	11/3/09 TX	3 Centrif (1982)	√	√	√
Co #2	2/23/10 W. TX	15 Recips (1950’s)	√	√	√
Co #2	2/24/10 NM	8 Recips (1950’s)	√	√	√

Compressor Blowdown OEL's

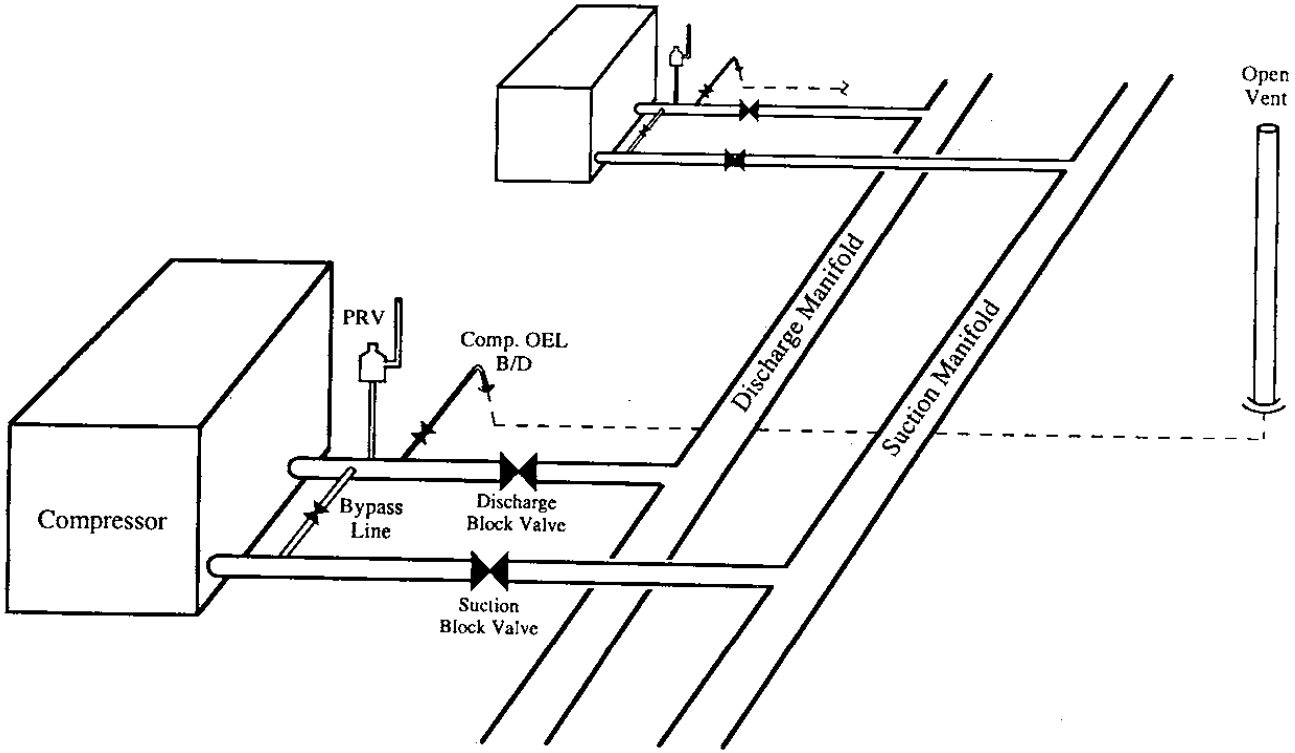

Figure 4-1. Illustration of Compressor Blowdown Valve Arrangement

Results
(vent measurements, 2 stations)

		Mscfy	GRI/EPA Mscfy per compr.
Average BD vent for IDLE (recip)		14347	3683
Avg BD vent for RUNNING (recip)		8807	
Avg Packing Vent RUNNING		13798	396

Results

(vent measurements, last 3 stations)

		Mscfy	GRI/EPA Mscfy per compr.
Average BD vent for IDLE, recip		699	3683
Avg BD vent for IDLE+RUN, centrif		15787	
Avg Packing Vent IDLE		8379	396

Compressor Miscellaneous Fugitives

(valves, flanges, etc; all stations)

	Mscfy per compr.	GRI/EPA Mscfy per compr.
Pressurized idle	60	
Operating	48	
Average	52	180

GRI/EPA Study

- Operation Info
  - Recip Compressors were Pressurized 79.1% of time
  - Centrifugal Compressor were Pressurized 24.2% of time
  - Based on FERC, GRI TRANSDAT, Field data from one large transmission company, and practices observed during GRI/EPA campaign

- Measurement Basis:
  - 6 Storage stations (5 national storage companies)
  - 15 transmission stations

Comments

Comparison to GRI/EPA Data

- Comparison Basis: The GRI/EPA data is from Table 4-15 of "Methane Emissions from the Natural Gas Industry: Volume 8".

- REDUCES the EF for **packing vents for recips**
  - Co #1 = 8739, lower than Co #2's 13798 Mscf/yr. Both are larger than the previous GRI/EPA study of 396 Mscf/yr.
  - Note: Co #1 keeps idle compressors pressurized.

Comments (cont'd)
Comparison to GRI/EPA Data

- RAISES EF for **BD vents** (Recips IDLE and RUNNING)
  - IDLE: Co #1 avg 699 Mscfy vs 14347 for Co #2 and vs combined 3683 for GRI/EPA.
  - This company differences are expected, as Co #1 keeps compressors pressurized (the only possible leak is the 2" BD valve, rather than the big suction and discharge valves)
  - RUNNING: Only Co #2 data: 8807 vs 3683 for GRI/EPA
  - GRI/EPA PRV's at 372 Mscf/compr/yr may need to be added to the GRI/EPA value for comparison (Co #2 sites had both routed to the elevated BD line stack). Even with that addition, the new data is still higher.
- RAISES EF for **BD vents** (for centrifugal)
  - Co #1's centrifugal average BD leak is much larger at 15787 Mscfy/compressor

Measurement Comments

There are a few observations to make:

1. Preliminary results are not ready for use, and not formally published and reviewed

2. Site layouts and designs limit some measurements

    a. Not all vents are accessible, or safely accessible
    b. Some vents are joined, and when different equipment in different operating modes are joined to the same vent, we cannot produce the stratified EF‘s.

Photos from Recent Visits
(3 stations)

Photos show:

- Large design variability, access issues
- Need to customize approach for measurement of vents at each site

Outside Packing Vent Stack
(joined at bottom to common oil drain)

Individual Recip BD Vents

Recip BD Vent Measurement

Site BD (All Recips to 1 Vent)

Calibrated Bag Measurement

Rod Packing Vent

Compressor Starter Vent

Station Combined Vent (1 of 4)

Some Conclusions

- More Sampling Needed
  - Station Design….each is unique

- EPA GHG MRR Subpart W may have a large effect on this program. Direction of the final rule should be monitored.

Path Forward

- Monitor EPA's Mandatory Reporting Rule, Subpart W, which should be issued in Sept or Oct 2010
- Gather more direct measurement data (Measure more compressor station sites and gas plant sites) Target: 6-10 more stations geographically diverse.
- Survey INGAA members for company practices on compressor operating practices that affect leak rate
- Produce and publish updated compressor emission factors.