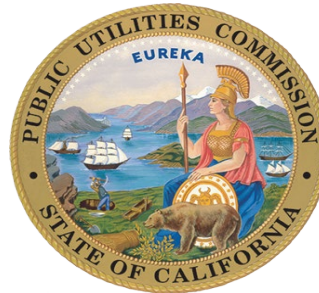




**California Public Utilities Commission  
SB 1371 – R.15-01-008 Gas Leak Abatement**

**NGLA - 2021 Template & Reporting Issues Workshop  
Topics – Compressor Emissions**

**January 22, 2021**



**Ed Charkowicz**

**Safety Policy Division  
Risk Assessment & Safety Analytics**



# NGLA - 2021 Template & Reporting Issues Workshop Topics – Compressor Emissions

## Compressor Emissions Problem Statement:

- 1. Compressor Emissions vary widely and indiscriminately, and with only one annual measurement under undefined circumstances there is very little confidence the measurements reflect reasonable approximations of compressor emissions.

## Background:

Decrease from Adjusted Baseline (Mscf)				
	2015	Decrease		2019
Transmission Comp	106,258	(52,102)	<b>(49.0%)</b>	54,156
Storage Comp	103,909	(76,477)	<b>(73.6%)</b>	27,432



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## Background:

### Reducing Methane Emissions From Compressor Rod Packing Systems \*

#### Economic and Environmental Benefits

Method for Reducing Natural Gas Losses	Volume of Natural Gas Savings (Mcf/year)	Value of Natural Gas Savings (\$/year)			Implementation Cost (\$)	Payback (Months)		
		\$3 per Mcf	\$5 per Mcf	\$7 per Mcf		\$3 per Mcf	\$5 per Mcf	\$7 per Mcf
Economic replacement of rings and rods in compressor rod packing	865 <sup>a</sup>	\$2,595	\$4,325	\$6,055	\$540 <sup>b</sup>	3	2	1

General Assumptions:

<sup>a</sup> Pipeline Research Committee International (1999).

<sup>b</sup> \$1,620 cost of ring replacement every three years rather than four years (industry average).

\* [https://www.epa.gov/sites/production/files/2016-06/documents/ll\\_rodpack.pdf](https://www.epa.gov/sites/production/files/2016-06/documents/ll_rodpack.pdf)





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**Background:**

**Reducing Methane Emissions From Compressor Rod Packing Systems \***

<b>Exhibit 3: Economic Replacement Threshold for Packing Rings</b>	
<b>Leak Reduction Expected (scfh)</b>	<b>Payback Period<sup>a</sup> (months)</b>
55	7
29	12
20	18
16	22
13	27

<sup>a</sup> Assumes packing ring replacement costs of \$1,620, \$7.00/Mcf gas, and 8,000 operating hours/year.

\* [https://www.epa.gov/sites/production/files/2016-06/documents/ll\\_rodpack.pdf](https://www.epa.gov/sites/production/files/2016-06/documents/ll_rodpack.pdf)





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Federal and State Rules only require once annual measurement \*

Federal Rules indicate rod packing replacement within 26,000 operating hours, or 3-years (subject to debate).

State OGR rules require rod packing maintenance (replacement) on cylinders emitting more than 2-cfm. They allow for all compressor cylinders to be measured together for a cumulative measurement threshold. E.G. 6 cylinder compressor may emit up to 12-cfm or 720 cfh.

In 2019 all operators' compressors met threshold requirements.

\* According to federal EPA regulations 40 CFR Section 60.5410 More frequent periodic measurements during the year would validate this level of emissions and provide more reliable emission estimates.





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## Workshop Topics – Compressor Emissions

### Compressor Emissions:

#### 2019 YOY Changes in Weighted Average EF during Pressurized Operations (Scfh):

- Transmission Facilities:

Weighted Avg EF - For Pressurized Operations Only				
	2018	2019	Delta	% change
PG&E	249.06	320.11	71.05	28.5%
SDG&E	33.30	82.37	49.07	147.4%
SoCalGas	725.83	61.12	(664.71)	(91.6%)

- Storage Facilities:

Weighted Avg EF - For Pressurized Operations Only				
Ops Efs Only	2018	2019	Delta	% change
CVGS	104.81	86.27	(18.54)	(17.7%)
Gill Ranch GS	380.26	343.68	(36.58)	(9.6%)
Lodi GS	241.39	256.61	15.22	6.3%
PG&E	291.48	198.74	(92.74)	(31.8%)
SoCalGas	162.59	23.48	(139.11)	(85.6%)
WGGS	388.58	240.87	(147.71)	(38.0%)





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## Discussion/Questions:

- What impacts the accuracy of the measurement?
  - Compressor at full operating temperature vs. cold
  - Ambient temperature and pressure
  - Age of rod packing (immediately after maintenance.
  - Type of measurement device (inherent accuracy)
  - Combination of factors
- What measurement protocols make sense?
  - Time after start up
  - Recording other factors at time of measurement
  - Frequency





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## Workshop Topics – Compressor Emissions

### Discussion/Questions:

- Quantification of emissions
  - Hours of operation between measurements multiplied by the prior measurement, or the current measurement
  - Or Average the prior and current measurement multiplied by hours of operation between them.
  - Weighted average measurement
- What to do with outlier measurements?
  - Follow-up measurements? Timing? How many?
  - Should one reading over threshold trigger maintenance?
  - How should extremely low readings be handled? Should they be counted?
  - Is Root Cause Analysis necessary?







# NGLA - 2021 Template & Reporting Issues Workshop Topics – Compressor Emissions

## Staff Proposal:

- Minimum Quarterly emission measurements of compressor operating modes
- Establish measurement protocols with stakeholders
- Report weighted average compressor emissions
- Implement in 2021





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## Next Steps:

- Provide Written comments on this issues with observations and suggestions by February 5, 2021
- If necessary, convene a working group by end of February to reach consensus on measurement protocols.
- Send data requirement by March 31, 2021.

