

SUPPLEMENTAL QUESTIONNAIRE

R.15-01-008 2022 Annual Report

[Gill Ranch Storage LLC.]

Rule making (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission
Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks
Consistent with Senate Bill 1371, Leno.

In partial fulfillment of Rule making (R.) 15-01-008 to Adopt Rules and Procedures
Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce
Natural Gas Leaks Consistent with Senate Bill 1371, Leno.

In Response to Data Request R15-01-008 2022 Annual Report

Date: [6/15/23]

The following data have been prepared to comply with Senate Bill 1371 (Leno, 2014), Section 2, Article 3,
Order Instituting Rulemaking (OIR) 15-01-008, and to provide responses to Data Request R. 15-01-008 2021
Annual Report.

- 1. A summary of changes to utility leak and emission management practices from January 1, 2022 to December 31, 2022. The report must include a detailed summary of changes, including the reasoning behind each change and an explanation of how each change will reduce methane leaks and emissions.**

Response:

In 2022 GRS reduced it's emissions by doing the following: We had 116 start-ups that did not require a blow down, which computes to approximately 1,404,590 scf in emission reductions.

2. A list of new graded and ungraded gas leaks discovered, tracked by geographic location in a Geographic Information System (GIS) or best equivalent, by grade, component or equipment, pipe size, schedule and material, pressure, age, date discovered and annual volume of gas leaked for each, by month, from January 1, 2022 through December 31, 2022.

Response:

See Appendices

3. **A list of graded and ungraded gas leaks repaired, tracked by geographic location in a Geographic Information System (GIS) or best equivalent, by month, from January 1, 2022 through December 31, 2022. Include the grade, component or equipment, pipe size, schedule and material, pressure, age, date discovered, date of repair, annual volume of gas leaked for each and the number of days from the time the leak was discovered until the date of repair.**

Response:

See Appendices

4. A list of ALL open graded and ungraded leaks, regardless of when they were found, tracked by geographic location in a Geographic Information System (GIS) or best equivalent that are being monitored, or are scheduled to be repaired, by month, from January 1, 2022 through December 31, 2022. Include the grade, component or equipment, pipe size, schedule and material, pressure, age, date discovered, scheduled date of repair, and annual volume of gas leaked for each.

Response:

All leaks found were repaired, leaving no leaks to be monitored.

5. **System-wide gas leak and emission rate data, along with any data and computer models used in making that calculation, for the 12 months from January 1, 2022 through December 31, 2022.**

Response:

See Appendices

6. **Calculable or estimated emissions and non-graded gas leaks, as defined in Data Request [Company Name] R15-01-008 2018 Annual Report for the 12 months from January 1, 2022 through December 31, 2022.**

Response:

See Appendices

Rulemaking (R) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371, Leno.
In Response to Data Request, R15-01-008 - 2022 June Report
Appendix 1 - Rev. 03/30/22

Transmission Pipeline Leaks:

Sum total	0
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Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371, Leno.
In Response to Data Request, R15-01-008 - 2022 June Report
Appendix 1 - Rev. 03/30/22

Notes:

Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.

At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange

Transmission Pipeline Damage (3rd party dig-ins, natural disasters, etc.):

ID	Geographic Location	Damage Type	Pipe Material	Pipe Size (nominal)	Pipe Age (months)	Pressure (psi)	Leak Grade	Above Ground or Below Ground	Discovery Date (MM/DD/YY)	Repair Date (MM/DD/YY)	Number of Days Leaking	Emission Factor (Mscf/Day)	Annual Emissions (Mscf)	Explanatory Notes / Comments
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27 MILE TRANSMISSION PIPELINE

Sum total

0

[Gill Ranch Storage Llc.], [June 15, 2023]

Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371, Leno.

**In Response to Data Request, R15-01-008 - 2022 June Report
Appendix 1 - Rev. 03/30/22**

Notes:

Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.
At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange.

Transmission Pipeline Blowdowns:

ID	Geographic Location	Number of Blowdown Events	Annual Emissions (Mscf)	Explanatory Notes / Comments
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Sum total 0

Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371, Leno.
In Response to Data Request, R15-01-008 2022 June Report
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Notes:

Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.

At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange

The emissions captured on this tab represent the emissions associated with the operational design and function of the component. Any intentional release of natural gas for safety or maintenance purposes should be included in the Blowdowns worksheet.

Transmission Pipeline Component Vented Emissions:

Total Number of Devices	Device Type	Bleed Rate	Manufacturer	Emission Factor (Mscf/day)	Annual Emission (Mscf)	Explanatory Notes / Comments
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Sum total

0

[Gill Ranch Storage LLC], [June 15, 2023]
Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371, Leno.
In Response to Data Request, R15-01-008 2022 June Report
Appendix 1 - Rev. 03/30/22

Notes:
Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.
At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange
The emissions captured on this tab represent the emissions associated unintentional leaks that if repaired would not leaking. If the component is releasing gas or "bleeding" as a result of its design or function then it is not to be captured in this tab.

Transmission Pipeline Component Fugitive Leaks:

ID	Geographic Location	Device Type	Bleed Rate	Manufacturer	Discovery Date (MM/DD/YY)	Repair Date (MM/DD/YY)	Number of Days Leaking	Emission Factor (Mscf/day)	Annual Emission (Mscf)	Explanatory Notes / Comments
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Sum total 0

[Gill Ranch Storage LLC], [June 15, 2023]

Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks

Consistent with Senate Bill 1371, Leno.

In Response to Data Request, R15-01-008 2022 June Report

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Notes:

Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.

At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange.

Transmission Pipeline Odorizers:

ID	Geographic Location	Number of Units	Emission Factor (Mscf/yr)	Annual Emission (Mscf)	Explanatory Notes / Comments
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Sum total

0

Provided as an example.

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Appendix 1 - Rev. 03/30/22

Header column "Comment" boxes displayed below for reference.	
Column Heading	Description and Definition of Required Contents (IF not self-explanatory)
Tab: Pipeline Leaks	
ID	
Geographic Location	GIS, zip code, or equivalent
Pipe Material	PB = cathodically protected steel, bare PC = cathodically protected steel, coated UB = unprotected steel, bare UC = unprotected steel, coated
Pipe Size (nominal)	
Pipe Age (months)	
Pressure (psi)	MOP = maximum operating pressure over the past year
Leak Grade	1 = grade 1 2 = grade 2 2+ = grade 2+ 3 = grade 3 AH = Above Ground Hazardous synonymous with Grade 1. AN = Above Ground Non-Hazardous AM = Above Ground Non-Hazardous Minor (akin to grade 3 below ground leak). N = non-graded or ungraded
Above Ground or Below Ground	A = above ground B = below ground
Discovery Date (MM/DD/YY)	
Repair Date (MM/DD/YY)	Date that the pipeline repair stopped the leak. Any associated blowdowns resulting from the repair should be included in the blowdowns tab.
Scheduled Repair Date (MM/DD/YY)	If leak is open, specify the scheduled date of repair, or type "M," signifying that the leak is being monitored with no scheduled date of repair. Then, provide the reason for not scheduling a repair in Column for that purpose.
Reason for Not Scheduling a Repair	If not scheduled for repair (e.g. with a "M" for monitoring the leak in Scheduled Repair Date), then provide the reason for not scheduling a repair.
Number of Days Leaking	If the leak was discovered by survey in the year of interest, then assume leaking from January 1st of subject year <u>thru</u> repair date or December 31st of subject year, whichever is earlier. (E.G. Days Leaking = Repair - Jan 1st + 1 day.) (For days leaking for leaks carried over use January 1st as start date for emissions calculations.) For O&M discovered leaks, assume that the leak begins with the discovery date <u>thru</u> repair date or December 31st of subject year, whichever is earlier.
Emission Factor (Mscf/Day)	
Annual Emissions (Mscf)	
Explanatory Notes / Comments	
Tab: All Damages	
ID	
Geographic Location	GIS, zip code, or equivalent
Damage Type	E = excavation damage N = natural force damage O = other outside force damage

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Header column "Comment" boxes displayed below for reference.	
Column Heading	Description and Definition of Required Contents (IF not self-explanatory)
Pipe Material	PB = cathodically protected steel, bare PC = cathodically protected steel, coated UB = unprotected steel, bare UC = unptotected steel, coated
Pipe Size (nominal)	
Pipe Age (months)	
Pressure (psi)	MOP = maximum operating pressure over the past year
Leak Grade	1 = grade 1 2 = grade 2 2+ = grade 2+ 3 = grade 3 N = non-graded or ungraded
Above Ground or Below Ground	AH = above ground, hazardous AN = above ground, non-hazardous B = below ground
Discovery Date (MM/DD/YY)	
Repair Date (MM/DD/YY)	
Number of Days Leaking	<p>If date and time stamp are reliable and used consistently by respondent, then emissions may be calculated based on actual time leaking. E.G. Repair time - damage event time = duration of event.</p> <p>If respondent has average or historical leak duration based on the nature and circumstances of damages, then these may be applied to like damage events. The emissions factors should be adequately supported and explained in the filing.</p> <p>If actual time stamps and historical averages are not available, then whole days should be used in the engineering calculation. The leak begins with the damage event date thru repair date or December 31st of subject year, whichever is later. E.G. Days Leaking = Repair date - date of damage + 1 day.</p>
Emission Factor (Mscf/Day)	
Annual Emissions (Mscf)	
Explanatory Notes / Comments	Provide method of calculation and example of formula. Explain how any EF's used were derived.
Tab: Blowdowns	
ID	
Geographic Location	GIS, zip code, or equivalent
Number of Blowdown Events	
Annual Emissions (Mscf)	
Explanatory Notes / Comments	Provide method of calculation and example of formula.
Tab: Component Vented Emissions	
Geographic Location	GIS, zip code, or equivalent
Device Type	C = connector O = open-ended line M = meter P = pneumatic device PR = pressure relief valve V = valve

Appendix 1 - Rev. 03/30/22

Header column "Comment" boxes displayed below for reference.	
Column Heading	Description and Definition of Required Contents (IF not self-explanatory)
Bleed Rate	L = low bleed I = intermittent bleed H = high bleed NA = not applicable
Manufacturer	
Annual Emissions (Mscf)	Because the emissions are a factor of design or function, these emissions counted for the entire year. E.G. 365 days times the actual volume emitting if known, or the approved Emissions Factor.
Explanatory Notes / Comments	Note whether the emissions are based on actual volumetric measures.
Tab: Component Leaks	
ID	
Geographic Location	GIS, zip code, or equivalent
Device Type	C = connector O = open-ended line M = meter P = pneumatic device PR = pressure relief valve V = valve
Bleed Rate	L = low bleed I = intermittent bleed H = high bleed NA = not applicable
Manufacturer	
Discovery Date (MM/DD/YY)	List the actual discovery date. If the leak was discovered in the year of interest, then we will assume the component was leaking from the beginning of the year for emissions reporting purposes, or prior survey date if surveyed previously within the year of interest.
Repair Date (MM/DD/YY)	Date that the component repair stopped the leak. Any associated blowdowns as a result of the repair should be included in the blowdowns tab.
Number of Days Leaking	Assume Leaking from January 1 of subject year or prior survey date, whichever is later, thru the repair date (if repaired in year of interest) or December 31 of subject year, whichever is earlier. For O&M discovered leaks, assume that the leak begins with the discovery date thru repair date or December 31st of subject year, whichever is earlier.
Annual Emissions (Mscf)	
Explanatory Notes / Comments	
Tab: Odorizers	
ID	
Geographic Location	GIS, zip code, or equivalent
Number of Units	
Emission Factor (Mscf/yr)	
Annual Emission (Mscf)	All of the emissions from the odorizing process and equipment.
Explanatory Notes / Comments	

Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371, Leno.
In Response to Data Request, R15-01-008 2022 June Report
Appendix 7; Rev. 03/30/22

Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.

At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange

Use the Population based emission factor if facility is not surveyed. Use Leaker based emission factor if facility is surveyed, and report only the found leaking components.

[illegible]

[Gill Ranch Storage Llc.] [June 15, 2023]
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In Response to Data Request, R15-01-008 2021 June Report
Appendix 7: Rev. 03/30/21

Notes:
Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-on value.
At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange.
The emissions captured in this tab represent the emissions associated with the operational design and function of the compressor. Any intentional release of natural gas for safety or maintenance purposes should be included in the Workdowns worksheet.

Previous Reporting Changes:

- 1) New Column for Measurement Frequency - See box comments.
- 2) Added new column for Emission Factor Measurement Date - Pressurized Operations.
- 3) Added a fourth compressor operating mode "Offline" in addition, a measurement of emissions (EF) should be taken during Offline mode, to ensure that no emissions are emitting from the system.
- 4) Alternate emission measurement method, where applicable and measured by the operator.
- 5) Alternate emission measurement method, where applicable and measured by the operator.
- 6) Measure centrifugal compressor emissions additional columns added for these emissions:
 - Dry seal
 - Wet seal
 - Wet seal oil degassing vents in Pressurized life mode

Transmission Compressor Vented Emissions:

ID	Geographic Location	Compressor Type	Prime Mover	Number of Cylinders	Number of Seals	Seal Type	Measurement Frequency	Emission Factor Measurement Date - Pressurized Operations	Operating Mode: Pressurized Operating (Hours)	Operating Mode: Pressurized Life (Hours)	Operating Mode: Spontaneous Life (Hours)	Operating Mode: Offline (Hours)	Emission Factor: Pressurized Operating (x10 ⁶ lbs/yr)	Emission Factor: Pressurized Life (x10 ⁶ lbs/yr)	Emission Factor: Spontaneous Life (x10 ⁶ lbs/yr)	Emission Factor: Offline (x10 ⁶ lbs/yr)	Emission Factor: Pressurized Operating Seal Packing (x10 ⁶ lbs/yr)	Emission Factor: Pressurized Life - Wet Seal Oil Degassing Vents (x10 ⁶ lbs/yr)	Emission Factor: Pressurized Life - Wet Seal (x10 ⁶ lbs/yr)	Emission Factor: Spontaneous Life - Wet Seal (x10 ⁶ lbs/yr)	Emission Factor: Dry Seal (x10 ⁶ lbs/yr)	Emission Factor: Seal Packing (x10 ⁶ lbs/yr)	Emission Factor: Pressurized Life - Wet Seal Oil Degassing Vents (x10 ⁶ lbs/yr)	Emission Factor: Spontaneous Life - Wet Seal (x10 ⁶ lbs/yr)	Emission Factor: Dry Seal (x10 ⁶ lbs/yr)	Annual Emissions (lb/yr)	Explanatory Notes / Comments	
Hypothetical values used to provide an example.																												
Unit C-210	93637	R	E	6	6	W	A	1/1/2023	679	0	0		8081	357	0	0											227.86	
Unit C-220	93637	R	E	6	6	W	A	1/1/2023	403	0	0		8317	77.8	0	0											30.23	
Unit C-230	93637	R	E	6	6	W	A	1/1/2023	250	0	0		8150	171	0	0											40.19	
Unit C-240	93637	R	E	6	6	W	A	1/1/2023	709	0	0		8011	81	0	0											53.98	
Unit C-250	93637	R	E	6	6	W	A	1/1/2023	880	0	0		7900	81	0	0												

[Gill Ranch Storage LLC.] [June 15, 2023]

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Consistent with Senate Bill 1371, Leno.

In Response to Data Request, R15-01-008 2022 June Report

Appendix 7; Rev. 03/30/22

Notes:

Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.

At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange

Underground Storage Blowdowns:

ID	Geographic Location	Source	Compressor Type	Number of Blowdown Events	Annual Emissions (Mscf)	Explanatory Notes / Comments
C-210	93637 C	R		33	279.347	START UP AND MAINTENANCE BLOWDOWNS
C-220	93637 C	R		24	294.268	START UP AND MAINTENANCE BLOWDOWNS
C-230	93637 C	R		37	320.826	START UP AND MAINTENANCE BLOWDOWNS
C-240	93637 C	R		44	346.45	START UP AND MAINTENANCE BLOWDOWNS
C-250	93637 C	R		64	458.874	START UP AND MAINTENANCE BLOWDOWNS
WELL 202	93637 W	NA		1	8.617	MAINTENANCE BLOWDOWN
WELL 204	93637 W	NA		2	276.765	MAINTENANCE BLOWDOWN
WELL 206	93637 W	NA		1	252.668	MAINTENANCE BLOWDOWN
WELL 102	93637 W	NA		2	3.101	MAINTENANCE BLOWDOWN
WELL 104	93637 W	NA		2	171.427	MAINTENANCE BLOWDOWN
PIT-3000	93637 O	NA		48	1035.597	MAINTENANCE BLOWDOWN
SC 113 123 133	93637 O	NA		1	94.56	MAINTENANCE BLOWDOWN
PIT-1132	93637 O	NA		1	90.649	MAINTENANCE BLOWDOWN
PR 701	93637 O	NA		1	115.723	MAINTENANCE BLOWDOWN
261					3748.872	

Rulemaking (R). 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371, Leno.

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Notes:

Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.

At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange

The emissions captured on this tab represent the emissions associated with the operational design and function of the component. Any intentional release of natural gas for safety or maintenance purposes should be included on the Blowdowns worksheet.

Underground Storage Component Vented Emissions (See note above):

ID	Geographic Location	Device Type	Bleed Rate	Manufacturer	Pressure (psi)	Survey Date (MM/DD/YY)	Number of Days Emitting	Emission Factor, Engineering or Manufacturer's based Estimate of Emissions (Mscf/day)	Annual Emissions (Mscf)	Explanatory Notes / Comments
PCV-8110	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-8210	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-8310	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-8410	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-7710	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-7810	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-7510	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-7610	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-7110	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-7210	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-7310	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
PCV-7410	93637	P	L	FISHER	110		0	0.216	0	0 emmissions in 2020, Controller is operating using Nitrogen.
									0	

[Gill Ranch Storage LLC.] [June 15, 2023]

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In Response to Data Request, R15-01-008 2022 June Report

Appendix 7; Rev. 03/30/22

Notes:

Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.

At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange

The emissions captured on this tab represent the emissions associated unintentional leaks that if repaired would not leaking. If the component is releasing gas or "bleeding" as a result of its design or function then it is not to be captured in this tab.

Underground Storage: Compressor and Component Fugitive Leaks (see note above):

Underground Storage: Compressor and Component Fugitive Leaks (see note above):										12/31/2021	1/1/2021			
ID	Geographic Location	Device Type	Bleed Rate	Manufacturer	Pressure (psi)	Discovery Date (MM/DD/YY)	Repair Date (MM/DD/YY)	Prior Survey Date (MM/DD/YY)	Number of Days Leaking	Emission Factor or Engineering Estimate (Mscf/day)	Emissions (Mscf)	Explanatory Notes / Comments		
C-230 2" UNION	93637 C	NA	NA	NA	300	08/20/22	08/22/22	12/12/21	252.00	0.1342	33.8184	GS-700	BY HEATHE CONSULTANTS USED FOR SURVEYING	
C-240 1" PLUG	93637 C	NA	NA	NA	200	08/20/22	08/24/22	12/12/21	254.00	0.1342	34.0868	GS-700	BY HEATHE CONSULTANTS USED FOR SURVEYING	
VALVE 1011	93637 V	NA	NA	NA	2328	08/21/22	08/22/22	12/12/21	252.00	0.1342	33.8184	GS-700	BY HEATHE CONSULTANTS USED FOR SURVEYING	
VALVE 1103	93637 V	NA	NA	NA	2328	08/21/22	08/22/22	12/12/21	252.00	0.1342	33.8184	GS-700	BY HEATHE CONSULTANTS USED FOR SURVEYING	
C-230 PSV-1961	93637 C	NA	NA	NA	300	08/21/22	08/22/22	12/12/21	252.00	0.1342	33.8184	GS-700	BY HEATHE CONSULTANTS USED FOR SURVEYING	
FV-2261	93637 V	NA	NA	NA	40	12/21/22	12/21/22	08/22/22	121.00	0.1342	16.2382	GS-700	BY HEATHE CONSULTANTS USED FOR SURVEYING	
FV-2461	93637 V	NA	NA	NA	200	12/21/22	12/21/22	08/22/22	121.00	0.1342	16.2382	GS-700	BY HEATHE CONSULTANTS USED FOR SURVEYING	
											201.8368			

[Gill Ranch Storage Llc.] [June 15, 2023]

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In Response to Data Request, R15-01-008 2022 June Report
Appendix 7; Rev. 03/30/22

Pursuant to SB 1371, Leno - Natural gas: leakage abatement, the California Public Utilities Commission (CPUC) requests that the following information be transmitted to the CPUC and the California Air Resources Board (CARB):
Note - Definitions in Data Request, R15-01-008 2022 June Report

The following question in the above mentioned data request is answered using the spreadsheets in this Appendix (#7):

(6) Calculable or estimated emissions and non-graded gas leaks, as defined in Data Request R15-01-008 2022 June Report.

Notes:

Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.

At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange

Underground Storage Dehydrator Vented Emissions:

ID	Geographic Location	Type of Dehydrator (Glycol or Desiccant)	Vapor Recovery Unit or Thermal Oxidizer (Y/N)	Annual Volume of Gas Withdrawn (Mscf)	Emission Factor (Y/N)	Engineering Estimate (Y/N)	Annual Emissions (Mscf)	Explanatory Notes / Comments
DEHY 1/DEHY 2	93637	GLYCOL	Y	12,711,807	N	N	NA	

Appendix 7 - Rev. 03/30/22

Header column "Comment" boxes displayed below for reference.	
Column Heading	Description and Definition of Required Contents (If not self-explanatory)
Storage Leaks & Emissions	
ID	
Geographic Location	GIS, zip code, or equivalent
Source	W/C = wellhead connector W/V = wellhead valve W/PRV = wellhead pressure relief valve W/OEL = wellhead open-ended line W/F = wellhead flange W/O = wellhead other C = casing P = pipeline O = other
Number of Sources	
Discovery Date	Report Discovery Date if calculating wellhead component emissions using Leaker EFs
Repair Date	Report Discovery Date if calculating wellhead component emissions using Leaker EFs
Number of Days Leaking	Calculate Number of Days Leaking using the formula: Repair Date minus Discovery Date + 1 day
Emission Factor (Mscf/yr)	
Annual Emissions (Mscf)	
Explanatory Notes / Comments	

Compressor Vented Emissions	
ID	
Geographic Location	GIS, zip code, or equivalent
Compressor Type	C = centrifugal R = reciprocating
Prime Mover	E = electric motor C = internal combustion engine
Number of Cylinders in Compressor	
Number of Seals	
Seal Type	W = wet D = dry O = other
Measurement Frequency	A - Annual Q - Quarterly M - Monthly W - Weekly D - Daily
Emission Factor: Measurement Date - Pressurized Operations	
Operating Mode: Pressurized Operating (hours)	Use these EF columns as well as the columns for the Compressor Measurements noted in Columns R thru AB when they are applicable. If the data is not captured by the operator, then add a note explaining why the applicable measurement data was not recorded or available in the Explanatory Notes / Comments column.
Operating Mode: Pressurized Idle (hours)	
Operating Mode: Depressurized Idle (hours)	
Operating Mode: Offline (Hours)	
Emission Factor: Pressurized Operating (scf/hr)	
Emission Factor: Pressurized Idle (scf/hr)	
Emission Factor: Depressurized Idle (scf/hr)	

The Columns P thru AB were added to the template and should be used for the indicated measured compressor emissions, which include Centrifugal compressors in accordance with OGR and your operating practice.

For the 2020 data reporting of compressor vented emissions: Where more than one measurement was taken during the year (e.g. after a maintenance cycle* monthly, or

Emission Factor: Offline (scf/hr)	If the "Offline" hours are counted, then a measurement of "offline" emissions should be taken to determine whether emissions occur. (We should not assume they are zero.)	<p>maintenance cycle (monthly, or quarterly), use the measured EF multiplied by the activity hours that occurred during the corresponding period. For example, if the compressor measurement was taken quarterly, then the measured EF should be multiplied by the activity hours that occurred in the respective quarter, and the same for more frequent measurements (e.g. monthly, weekly etc.). For each compressor devote one row per measurement period (see example provided). In the case of a single annual measurement EF, then that EF would apply to the activity hours for each respective mode for the entire year (which is consistent with prior year reporting practice).</p> <p>* If a measurement is taken after a maintenance cycle and no other measurements were taken during the remainder of the year, then use this measured EF for the activity hours occurring after the measurement date thru 12/31/xx. The activity hours prior to the maintenance of the compressor from the beginning of the year should use the previously measured EF, even if the EF was measured in the prior year.</p>
Emission Factor: Pressurized Operating - Rod Packing (scf/hr)	These are new columns for reporting year 2020 of 2019 data. These only apply to operators who during their operations and surveys of compressor stations measure their Compressor Vented Emissions for these components of the compressor. Not all gas operators measure vented emissions and establish flow rates for vented emissions while at the various modes of operation.	
The current regulations require an annual		
Emission Factor: Pressurized Operating - Blowdown Valve (scf/hr)	<p>CPUC Staff strongly encourage more frequent measurement of the following compressor vented emissions. Compliance minimum is once annually, though Staff suggest the minimum frequency should be quarterly and measured at roughly the same time each quarter (e.g. on or around the component survey given mode of operation). More frequent measurements, e.g. monthly would be better due to the temporal changes in conditions that effect emissions. The more frequent measurements also provide an opportunity to detect worn rod packing or seals, which exacerbate emissions, and with timely awareness of suboptimal operations gas operators have an opportunity for accelerating maintenance to correct worn parts. The following steps for reporting more frequent measurements in 2019 are outlined in the adjacent cell, and should be provided if available.</p> <p>Advance notice for 2021 reporting, CPUC Staff will propose quarterly reporting at the winter workshop. Therefore, gas companies are requested to start measuring compressor emissions on at least a quarterly basis for the remainder of 2020, if not doing so already. This will ensure gas companies are prepared to report these emissions in accordingly in 2021.</p>	
Emission Factor: Pressurized Operating - Wet Seal Oil Degassing Vent (scf/hr)		
Emission Factor: Pressurized Operating - Wet Seal (scf/hr)		
Emission Factor: Pressurized Operating - Dry Seal (scf/hr)		
Emission Factor: Pressurized Idle - Rod Packing (scf/hr)		
Emission Factor: Pressurized Idle - Blowdown Valve (scf/hr)		
Emission Factor: Pressurized Idle - Wet Seal Oil Degassing Vent (scf/hr)		
Emission Factor: Pressurized Idle - Wet Seal (scf/hr)		
Emission Factor: Pressurized Idle - Dry Seal (scf/hr)		
Emission Factor: Pressurized Idle - Isolation Valve (scf/hr)		
Emissions (Mscf)		
Explanatory Notes / Comments		

Blowdowns	
ID	
Geographic Location	GIS, zip code, or equivalent
Source	W = wellhead rework C = compressor P = pipeline O = other
CompressorType	C = centrifugal R = reciprocating
Number of Blowdown Events	
Annual Emissions(Mscf)	
Explanatory Notes / Comments	

Component Vented Emissions	
ID	
Geographic Location	GIS, zip code, or equivalent
Device Type	C = connector OE = open-ended line M = meter P = pneumatic device PR = pressure relief valve V = valve O = other devices

Bleed Rate	L = low bleed I = intermittent bleed H = high bleed NA = not applicable
Manufacturer	
Pressure (psi)	MOP = maximum operating pressure over the past year
Survey Date (MM/DD/YY)	
Number of Days Emitting	Because the emissions are a factor of design or function, these emissions counted for the entire year.
Emission Factor, Engineering or Manufacturer's based Estimate of Emissions (Mscf/day)	Explain in the comment column the basis for your emission estimate.
Annual Emissions (Mscf)	
Explanatory Notes / Comments	

Compressor and Component Leaks	
ID	
Geographic Location	GIS, zip code, or equivalent
Device Type	C = connector OE = open-ended line M = meter P = pneumatic device PR = pressure relief valve V = valve O = other devices
Bleed Rate	L = low bleed I = intermittent bleed H = high bleed NA = not applicable
Manufacturer	
Pressure (psi)	MOP = maximum operating pressure over the past year
Discovery Date (MM/DD/YY)	List the actual discovery date. If the leak was discovered in the year of interest, then we will assume the component was leaking from the beginning of the year for emissions reporting purposes.
Repair Date (MM/DD/YY)	Date that the component repair stopped the leak. Any associated blowdowns as a result of the repair should be included in the blowdowns tab.
Prior Survey Date (MM/DD/YY)	Before the discovery date of the leak, there was a "Prior Survey Date" when the compressor station was tested and no leak was found. There should be records as to when the compressor station was last surveyed. If the survey spanned two or more days, enter the final date. Note, a facility level survey date is sufficient to establish the prior survey date.

Number of Days Leaking	<p>The algorithm that is used for determining the number of days leaking should conform to the following guidance: For the number days leaking prior to the date of discovery (survey date in the year of interest), calculate the number of days between the Discovery Date and the Prior Survey Date then divided by 2. [Dividing by 2 approximates the average time leaking between the leak discovery and the prior survey date. See below guidance when a leak is discovered in a prior period and repaired in the year of interest.]</p> <p>$(\text{Discovery Date} - \text{Prior Survey Date})/2$</p> <p>Calculate the number of days leaking after discovery (survey) date, by subtracting the discovery date from the repair date, unless the leak has not been repaired, where the number of days should be calculated by subtracting the discovery date from December 31 of the year of interest.*</p> <p>$(\text{Repair Date} - \text{Discovery Date})$, unless repair date greater than 12/31/XX then use 12/31/XX</p> <p>---</p> <p>$\text{Days Leaking} = (\text{Repair Date} - \text{Discovery Date}) + (\text{Discovery Date} - \text{Prior Survey Date})/2 + 1$</p> <p>* [This requires tracking the leak across different years, because the leak could be minor and conceivably span more than year before getting repaired. Therefore, in the cases where a leak is carried over to a subsequent year, an annual calculation should be made to reflect that the number of days leaking in the prior year have already been reported in the annual emissions inventory. In subsequent years the carried over leaks should reflect a beginning date of January 1 of the year of interest.]</p>
Emission Factor or Engineering Estimate (Mscf/day)	
Emissions (Mscf)	
Explanatory Notes / Comments	

Dehydrator Vented Emissions	
ID	
Geographic Location	GIS, zip code, or equivalent
Type of Dehydrator (Glycol or Desiccant)	
Vapor Recovery Unit OR Thermal Oxidizer (Y/N)	In order to claim 0 emissions, a Vapor Recovery Unit OR thermal oxidizer must be used 100% of the time during operation
Annual Volume of Gas Withdrawn (Mscf)	
Emission Factor (Y/N)	<p>If the glycol dehydrator has a Vapor Recovery Unit (VRU) or a thermal oxidizer, the emission factor is 0.</p> <p>If using a desiccant dehydrator, the emission factor is $2.23\text{E-}03$ mt CH₄/MMscf</p>
Engineering Estimate (Y/N)	If using an engineering estimate, please include an attachment of methodology or software used as a separate document. Record the annual emissions
Annual Emissions (Mscf)	<p>For dehydrators using an emission factor, annual emissions are calculated by multiplying annual volume of gas withdrawn and the emission factor</p> <p>For dehydrators using an engineering estimate, record the annual emissions</p>
Explanatory Notes / Comments	

[Gill Ranch Storage LLC] [June 15, 2023]
 Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371,
 Leno.

In Response to Data Request, R15-01-008 2022 June Report
 Appendix 8; Rev. 03/30/22

Notes:
 Please round all natural gas emissions to nearest Mscf.

Summary Tables:

System Categories	Emission Source Categories	Fugitive or Vented	For Reference Only: Original 2015 Baseline Emissions (Mscf)	2015 Proposed Adjusted Baseline Emissions (Mscf)	2021 Total Annual Volume of Leaks & Emissions (Mscf)	2021 Total Annual Count of Leak & Emission Items	2022 Total Annual Volume of Leaks & Emissions (Mscf)	2022 Total Annual Count of Leak & Emission Items	Emission Change for Year Over Year Comparison from 2021 to 2022 (Mscf)	Percentage Change for Year Over Year Comparison from 2021 to 2022	Count Change for Year Over Year Comparison from 2021 to 2022	Percentage Change for Year Over Year Comparison from 2021 to 2022	Emission Change for Year Over Year Comparison from 2015 to 2022 (Mscf)	Percentage Change for Year Over Year Comparison from 2015 to 2022	Explanation for Significant Percentage Change for Year Over Year Comparison from 2021 to 2022
Transmission Pipelines	Pipeline Leaks	Fugitive							-	#DIV/0!	-	#DIV/0!	0	#DIV/0!	
	All Damages	Fugitive							-	#DIV/0!	-	#DIV/0!	0	#DIV/0!	
	Blowdowns	Vented							-	#DIV/0!	-	#DIV/0!	0	#DIV/0!	
	Component Emissions	Vented							-	#DIV/0!	-	#DIV/0!	0	#DIV/0!	
	Component Leaks	Fugitive							-	#DIV/0!	-	#DIV/0!	0	#DIV/0!	
	Odorizers	Vented							-	#DIV/0!	-	#DIV/0!	0	#DIV/0!	
Transmission M&R Stations	Station Leaks & Emissions	Fugitive							-	#DIV/0!	-	#DIV/0!	0	#DIV/0!	
	Blowdowns	Vented							-	#DIV/0!	-	#DIV/0!	0	#DIV/0!	
Transmission Compressor Stations	Compressor Emissions	Vented							-	#DIV/0!	-	#DIV/0!	0	#DIV/0!	
	Compressor Leaks	Fugitive							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Blowdowns	Vented							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Component Emissions	Vented							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Component Leaks	Fugitive							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Storage Tank Leaks & Emissions	Vented							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
Distribution Main & Service Pipelines	Pipeline Leaks	Fugitive							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	All Damages	Fugitive							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Blowdowns	Vented							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Component Emissions	Vented							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Component Leaks	Fugitive							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Station Leaks & Emissions	Fugitive							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
Distribution M&R Stations	All Damages	Fugitive							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Blowdowns	Vented							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
Customer Meters	Meter Leaks	Fugitive							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	All Damages	Fugitive							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Vented Emissions	Vented							-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
Underground Storage	Storage Leaks & Emissions	Fugitive	0		0	0			-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
	Compressor Emissions	Vented	5822.48		6033	1038	1699.765	5	(4,333)	(71.8%)	(1,033)	(89.5%)	(4,122.72)	(70.8%)	
	Compressor Leaks	Fugitive	0		0	0	101.7236	3	102	#DIV/0!	3	#DIV/0!	101.72	#DIV/0!	
	Blowdowns	Vented	3734		3515	244	3748.872	261	234	6.7%	17	7.0%	14.87	0.4%	
	Component Emissions	Vented	866.3		0	11	0	0	-	#DIV/0!	(11)	(100.0%)	(866.30)	(100.0%)	
	Component Leaks	Fugitive	2592.74		229	17	100.1132	4	(129)	(56.3%)	(13)	(76.5%)	(2,492.63)	(96.1%)	
	Dehydrator Vent Emissions	Fugitive	0		0	0	0	0	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	
Unusual Large Leaks	(Description)		0				0	0	-		0%	#DIV/0!	-	#DIV/0!	
Total			13015.52		9777	NA	5650.4738	NA	(4,127)	-42%	NA	NA	(7,365.05)	(56.6%)	

[Gill Ranch Storage LLC.], [June 15, 2023]

Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated
Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371,
In Response to Data Request, R15-01-008 2022 June Report
Appendix 8; Rev. 03/30/22

System Wide Leak Rate Data

1/1/2022 - 12/31/2022

The highlighted cells show the volumes that are summed together as the throughput for calculating the system wide leak rate.

Gas Storage Facilities:

Average Close of the Month Cushion Gas Storage Inventory (Mscf)	Average Close of the Month Working Gas Storage Inventory (Mscf)	Total Annual Volume of Injections into Storage (Mscf)	Total Annual Volume of Gas Used by the Gas Department (Mscf)	Total Annual Volume of Withdrawals from Storage (Mscf)	Explanatory Notes / Comments
3,543,307	14,584,990	6,481,195	27,162	12,711,812	

Transmission System:

Total Annual Volume of Gas Used by the Gas Department (Mscf)	Total Annual Volume of Gas Transported to or for Customers* in State (Mscf)	Total Annual Volume of Gas Transported to or for Customers* out of State (Mscf)	Total Annual Volume of Gas Transported to utility-owned or third-party storage fields for injection into storage (Mscf)	Explanatory Notes / Comments
NA	NA	NA	NA	

Distribution System:

Total Annual Volume of Gas Used by the Gas Department (Mscf)	Total Annual Volume of Gas Transported to or for Customers* in State (Mscf)	Total Annual Volume of Gas Transported to or for Customers* out of State (Mscf)	Explanatory Notes / Comments
NA	NA	NA	GRS HAS NO DISTRIBUTION SYSTEMS

*The term customers includes anyone that the utility is transporting gas for, including customers who purchase gas from the utility.

Customers can be anyone including residential, businesses, other utilities, gas transportation companies, etc.

[Gill Ranch Storage Llc], [June 15, 2023]

**Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated
Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371,
In Response to Data Request, R15-01-008 2022 June Report
Appendix 8; Rev. 03/30/22**

Summary Tables:

Natural Gas Properties	Average Mole Percent	Explanatory Notes / Comments
Methane	94.5	
Carbon Dioxide	0	
Ethane	3.121	
C3+	0.176	
C6+	0.009	
Oxygen	0.2	
Hydrogen	0	
Sulfur	0.000015	
Water	NA	
Carbon Monoxide	0	
Particulate Matter	NA	
Inert Gas	NA	
Odorant	0.00008	

[Gill Ranch Storage Llc.], [June 15, 2023]

Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leaks Consistent with Senate Bill 1371, Leno.

In Response to Data Request, R15-01-008 2022 June Report

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System Categories	Emission Source Categories	Emission Factor Sources	Description [in natural gas volume]
Transmission Pipeline	Transmission Pipeline Leaks	Engineering Estimate	Emissions estimated from size of breach / pressure / duration calculation
	All damages (as defined by PHMSA)	Engineering Estimate	Emissions estimated either from modelling or size of breach / pressure / duration
	Transmission Pipeline Blowdowns	Engineering Estimate	Unique equipment volume (corrected for pressure and temperature)
	Pneumatic Devices - Pneumatic/Hydraulic Valve Operators, and Turbine Valve Operators	MRR	Low Continuous Bleed = 0.0336 Mscf/day/dev Intermittent Bleed = 0.0576 Mscf/day/dev High Continuous Bleed = 0.4457 Mscf/day/dev Hydraulic Valve Operator = TBD Turbine Valve Operator = TBD
	Pressure Relief Valves	MRR	Pressure relief valve = 0.9518 Mscf/day/dev
	Odorizer (Odorizer and Gas Sampling Vents)	TCR	1.27 Mscf/yr/odorizer (if manufacturing specs are available, use the manufacturing specs instead of the default emission factor)
Transmission M&R	M&R Stations - Direct Industrial Sales	MRR	# of leaks > 10,000 ppm x Subpart W EF (ref: Table W-3 of Subpart W of Part 98) Direct Sale = 12.2 Mscf/yr/station Non-compressor components Valve = 0.1572 Mscf/day/dev Connector = 0.1399 Mscf/day/dev Open-ended line = 0.276 Mscf/day/dev Pressure relief valve = 0.0492 Mscf/day/dev Meter = 0.0728 Mscf/day/dev
	M&R Stations - Transmission-to-Transmission Company Interconnect	MRR	# of leaks > 10,000 ppm x Subpart W EF (ref: Table W-3 of Subpart W of Part 98) Trans-to-trans = 1,554.8 Mscf/yr/station Non-compressor components Valve = 0.1572 Mscf/day/dev Connector = 0.1399 Mscf/day/dev Open-ended line = 0.276 Mscf/day/dev Pressure relief valve = 0.0492 Mscf/day/dev Meter = 0.0728 Mscf/day/dev
	Transmission M&R Leaks	MRR	# of leaks > 10,000 ppm x Subpart W EF (ref: Table W-3 of Subpart W of Part 98) Non-compressor components Valve = 0.1572 Mscf/day/dev Connector = 0.1399 Mscf/day/dev Open-ended line = 0.276 Mscf/day/dev Pressure relief valve = 0.0492 Mscf/day/dev Meter = 0.0728 Mscf/day/dev
	Transmission M&R blowdown	Engineering Estimate	Unique equipment volume (corrected for pressure and temperature)
Transmission Compressor Stations	Compressor station - Equipment leaks from valves, connectors, open ended lines, pressure relief valves, and meters (using leak detection)	MRR	Leaker EFs-Compressor Station (Component Leaks identified per survey use the following EFs) # of leaks > 10,000 ppm x Subpart W EF (ref: Table W-3 of Subpart W of Part 98) Compressor Components Valve = 0.3562Mscf/day/dev Connector = 0.1342 Mscf/day/dev Open-Ended Line = 0.4145 Mscf/day/dev Pressure Relief Valve = 0.9518 Mscf/day/dev Meter = 0.4639 Mscf/day/dev Other = 0.0984 Mscf/day/dev Non-compressor components Valve = 0.1541 Mscf/day/dev Connector = 0.1370 Mscf/day/dev Open-ended line = 0.2705 Mscf/day/dev Pressure relief valve = 0.0482 Mscf/day/dev Meter = 0.0703 Mscf/day/dev Other = 0.0984 Mscf/day/dev
	Compressor Station - Transmission storage tanks	MRR	Direct measurement of tank vapor vent stack + operating hours (pg 218-219 of Regulation for MRR)
	Compressors (Centrifugal) - Transmission--data collection will require time spent in modes (active, pressurized idle, de-pressurized idle), compressor venting	MRR	Direct measurement x operating hours (operating mode)
	Compressors (Reciprocating) - Transmission--data collection will require time spent in modes (active, pressurized idle, de-pressurized idle)compressor rod packing venting	MRR	Direct measurement x operating hours (operating mode)
	Compressor station - Equipment and pipeline blowdowns	MRR	Eq. W - 14A # of blowdowns * piping volume
	Compressor Station - Natural gas pneumatic device venting	MRR	Low Continuous Bleed = 0.0336 Mscf/day/dev Intermittent Bleed = 0.0576 Mscf/day/dev High Continuous Bleed = 0.4457 Mscf/day/dev
Distribution Mains and Services Pipelines	Distribution Mains (Below-Ground Leaks)	GRI (1996)	Unprotected Steel Main = 0.1548 Mscf/day/leak Protected Steel Main = 0.0612 Mscf/day/leak Plastic Main = 0.2988 Mscf/day/leak
	Distribution Mains (Above Ground Leaks) - Not MSA	GRI (1996)	Unprotected Steel Main = 0.1548 Mscf/day/leak Protected Steel Main = 0.0612 Mscf/day/leak Plastic Main = 0.2988 Mscf/day/leak
	Distribution Service (Below-Ground Leaks)	GRI (1996)	Copper = 0.0226 Mscf/day/leak Unprotected Steel Service = 0.0600 Mscf/day/leak Protected Steel Service = 0.0276 Mscf/day/leak Plastic Service = 0.0089 Msc/day/leak
	Distribution Service (Above-Ground Leaks) - Not MSA	GRI (1996)	Copper = 0.0226 Mscf/day/leak Unprotected Steel Service = 0.0600 Mscf/day/leak Protected Steel Service = 0.0276 Mscf/day/leak Plastic Service = 0.0089 Msc/day/leak

	Distribution Main, Pressure Relief Valves	MRR	Pressure relief valve = 0.00696 Mscf/day/dev
	Distribution Mains and Services blowdown	MRR	Equation W-14A , Eq. W-35 , Eq. W-36
	All damages (as defined by PHMSA)	MRR	Equation W-14A , Eq. W-35 , Eq. W-36
	Pneumatic Devices - Pneumatic/Hydraulic Valve Operators, and Turbine Valve Operators	Engineering Estimate	Manufacturer Supplied Information (e.g., Bristol, Becker, Moore, etc)
Distribution M&R Stations	Distribution Above grade M&R Station Leaks (> 300 psi)	GRI (1996)	1,684.5 Mscf/yr/station
	Distribution Above grade M&R Station Leaks (100 - 300 psi)	GRI (1996)	896.5 Mscf/yr/station
	Distribution Above grade M&R Station Leaks (< 100 psi)	GRI (1996)	40.6 Mscf/yr/station
	Distribution Below grade M&R Station Leaks (> 300 psi)	GRI (1996)	12.176 Mscf/yr/station
	Distribution Below grade M&R Station Leaks (100 - 300 psi)	GRI (1996)	1.840 Mscf/yr/station
	Distribution Below grade M&R Station Leaks (< 100 psi)	GRI (1996)	0.964 Mscf/yr/station
	Distribution M&R Station, Leaker Based	MRR	Leaker EFs (Component Leaks identified per survey use the following EFs) Connector = 0.043Mscf/day/dev Block Valve = 0.014 Mscf/day/dev Control Valve = 0.240 Mscf/day/dev Pressure Relief Valve = 0.007 Mscf/day/dev Orifice Meter = 0.005 Mscf/day/dev Regulator = 0.020 Mscf/day/dev Open-Ended Line = 0.671 Mscf/day/dev
	M&R Stations - Farm Taps	MRR	# of leaks > 10,000 ppm x Subpart W EF (ref: Table W-3 of Subpart W of Part 98) Farm Tap = 12.2 Mscf/yr/station Leaker EFs (Component Leaks identified per survey use the following EFs) Connector = 0.043Mscf/day/dev Block Valve = 0.014 Mscf/day/dev Control Valve = 0.240 Mscf/day/dev Pressure Relief Valve = 0.007 Mscf/day/dev Orifice Meter = 0.005 Mscf/day/dev Regulator = 0.020 Mscf/day/dev Open-Ended Line = 0.671 Mscf/day/dev
Commercial, Industrial and Residential Meters	Distribution M&R Station Blowdowns	Engineering Estimate	Average Pressure x Average Volume x # of inspections & Maintenance Activities
	Distribution M&R Station Pneumatics	Engineering Estimate	Manufacturer Supplied Information (e.g., Bristol, Bettis Actuators, etc)
	Residential Meters	GRI (1996)	0.148 Mscf/yr/meter
	Commercial and Industrial Meters	GRI (1996)	0.051 Mscf/yr/meter
	Vented Emission from MSA	Engineering Estimate	Estimated volume release by MSA and activity type
Underground Storage	Dehydrator Vents - Storage	GRI (1996)	One of the following three cases per dehydrator facility 1. Glycol dehydrator with VRU and thermal oxidizer = 0 Mscf 2. Glycol dehydrator with no control device = Engineering Estimate 3. Desiccant dehydrator = 2.23E-03 mt CH4/MMscf (Alternative: Eq. 5 in MRR)
	Storage - piping leakage	MRR	Leaker EFs-Storage Station, Gas Service (Component Leaks identified per survey use the following EFs) Connector = 0.1342 Mscf/day/dev Valve = 0.3562 Mscf/day/dev Pressure Relief Valve = 0.9518 Mscf/day/dev Open-Ended Line = 0.4145 Mscf/day/dev Meter = 0.4639 Mscf/day/dev Other = 0.0984 Mscf/day/dev Population EFs-Storage Wellheads, Gas Service (For all un-surveyed components use the following EFs) Connector = 0.0002 Mscf/day/dev Valve = 0.0024 Mscf/day/dev Pressure Relief Valve = 0.0041 Mscf/day/dev Open Ended Line = 0.0007 Mscf/day/dev
	Storage - surface casing leakage	Engineering Estimate	TBD
	Storage - Wellhead leakage	MRR	Leaker EFs-Storage Wellheads, Gas Service (Component Leaks identified per survey use the following EFs) Connector (other than flanges) = 0.0288 Mscf/day/dev Valve = 0.1080 Mscf/day/dev Pressure Relief Valve = 0.0984 Mscf/day/dev Open-Ended Line = 0.0600 Mscf/day/dev Flange = 0.0912 Mscf/day/dev Other = 0.0984 Mscf/day/dev Population EFs-Storage Wellheads, Gas Service (For all un-Surveyed components, use the following EFs) Connector = 0.0002 Mscf/day/dev Valve = 0.0024 Mscf/day/dev Pressure Relief Valve = 0.0041 Mscf/day/dev Open-Ended Line = 0.0007 Mscf/day/dev
	Storage - Compressor & blowdowns	Engineering Estimate	Eq. 13 of MRR (piping volume x # of blowdowns)
	Storage - Wellhead Rework blowdown and bring-in	Engineering Estimate	Eq. 9,10,11,12 of MRR
	Pressure Relief Valves	MRR	Pressure relief valve = 0.9518 Mscf/day/dev.
	Pneumatic Devices - Pneumatic/Hydraulic Valve Operators, and Turbine Valve Operators	MRR	Low Continuous Bleed = 0.0336 Mscf/day/dev Intermittent Bleed = 0.0576 Mscf/day/dev High Continuous Bleed = 0.4457 Mscf/day/dev Hydraulic Valve Operator = TBD Turbine Valve Operator = TBD