

Southwest Gas Corporation

R.15-01-008 Annual Report Natural Gas Leakage Abatement

In partial fulfillment of:

**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.**

And in response to:

**Safety Policy Division Data Request
Southwest Gas R15-01-008 2022 Annual Report**

By:
Southwest Gas Corporation

Reporting Period:
January 1, 2021 through December 31, 2021

Date:
June 15, 2022

**Southwest Gas Corporation
Response to
Safety Policy Division Data Request
Southwest Gas R15-01-008 2022 Annual Report**

EXECUTIVE SUMMARY

Southwest Gas Corporation (Southwest Gas) is a multi-jurisdictional natural gas local distribution company, engaged in the retail transmission, distribution, transportation, and sale of natural gas for domestic, commercial, agricultural, and industrial uses. Southwest Gas serves approximately 200,000 California customers.

Southwest Gas was a named respondent in Rulemaking 15-01-008 (Rulemaking), opened in January 2015 by the California Public Utilities Commission (Commission) pursuant to Senate Bill (SB) 1371¹, which requires, "...the adoption of rules and procedures to minimize natural gas leakage from Commission-regulated natural gas pipeline facilities consistent with Public Utilities Code Section 961(d), §192.703(c) of Subpart M of Title 49 of the Code of Federal Regulation, the Commission's General Order 112-E, and the state's goal of reducing greenhouse gas emissions."^{2,3}

On June 15, 2017, the Commission approved Decision (D.) 17-06-015, which adopted ongoing annual reporting and timelines in accordance with SB 1371. Ordering Paragraph (OP) 1 in D.17-06-015 states in pertinent part:

The Natural Gas Leak Abatement Program Annual Reporting Framework contained in Section 5.2 and Appendix A (Definitions) of this decision is adopted consistent with the process detailed below:

The Commission's Safety and Enforcement Division (SED), in consultation with the Air Resources Board (ARB), shall direct the annual report process as follows:

- ...
- b) SED shall submit annual data requests to Respondents consistent with Public Utilities Code Section 975 (c) and SED advice by March 31 that covers the previous calendar year;
 - c) Respondents shall submit to SED and ARB Staff a response to the data request with populated excel spreadsheet templates via DVD by June 15;
 - d) Respondents shall submit responses through the "Supporting Documents" Feature on the Commission's Electronic Filing System by June 15 of each year;
 - e) Respondents shall submit responses consistent with the Commission's confidentiality rules and guidance in this decision;
 - f) Respondents shall post public versions of these reports on Respondents' websites and shall include all templates and associated data that are not confidential according to this decision;...

¹ SB 1371 became effective January 1, 2015, and added Article 3, §§975, 977 and 978 to the Public Utilities Code. All code references herein pertain to the Public Utilities Code.

² Order Instituting Rulemaking (OIR), at p.1.

³ General Order (GO) 112-F, adopted in Decision 15-06-044, on June 25, 2015, supersedes GO 112-E.

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On March 30, 2022, the Commission's Safety Policy Division (SPD) issued by email the 2022 annual data request, including revised annual reporting templates, for the 2021 reporting year. Southwest Gas submits its 2022 Natural Gas Leakage Abatement Report (Annual Report) responding to the six questions in the "Supplemental Questionnaire R.15-01-008 2021 Annual Report", and utilizing the reporting templates, including emission factors, definitions and instructions issued in the SPD data request.

Pursuant to OP 1(f) in D.17-06-015, Southwest Gas' 2022 Annual Report has been made available on its website at the following link: <https://www.swgas.com/en/california-rates-and-regulation>.

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INTRODUCTION

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 2022 Annual Report.

- (1) A summary of changes to utility leak and emission management practices from January 1, 2021 to December 31, 2021. 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.

Southwest Gas Response: Southwest Gas implemented the following changes to its procedures in 2021, which may contribute to reduced emissions or better tracking of emissions.

Southwest Gas included additional steps to its Leak Survey Procedure for aboveground leaks, which includes classifying and documenting fuzz or bubbles on its Class 3 (non-hazardous) leaks at time of discovery. This will ensure more accurate leak-based reporting. The required repair time for Class 3 leaks was also revised to 12 months not to exceed 15 months.

Southwest Gas also updated its Operations Manual to include its commitment to minimizing and eliminating methane emissions. The Company's commitment aligns with SB 1371 and the 2020 PIPES Act, Section 114, in several areas, including eliminating hazardous leaks, minimizing releases of natural gas from pipeline facilities, protection of the environment, and the replacement of pipelines that are known to leak based on material, design, or past operating and maintenance history as part of the Company's integrity management programs.

- (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, 2021 through December 31, 2021.

Southwest Gas Response: Please reference the attached Appendices 1-7.

- (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, 2021 through December 31, 2021. 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.

Southwest Gas Response: Please reference the attached Appendices 1-7.

**Southwest Gas Corporation
Response to
Safety Policy Division Data Request
Southwest Gas R15-01-008 2022 Annual Report**

- (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, 2021 through December 31, 2021. 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.

Southwest Gas Response: Please reference the attached Appendices 1-7.

- (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, 2021 through December 31, 2021.

Southwest Gas Response: Please reference the attached Appendix 8.

- (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, 2021 through December 31, 2021.

Southwest Gas Response: Please reference the attached Appendices 1-8.

Appendix 1
Transmission Pipelines

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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:
 Emissions included in the Report are based on miles of transmission pipeline. Therefore provide the miles of transmission pipeline in your system here.
 The following data on transmission pipeline leaks is for information purposes and will not be used to report transmission pipeline leak emissions this year.
 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 Leaks:

ID	Geographic Location	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)	Scheduled Repair Date (MM/DD/YY)	Reason for Not Scheduling a Repair	Number of Days Leaking	Emission Factor (Mscf/Day)	Annual Emissions (Mscf)	Explanatory Notes / Comments
Total															
														0	

Southwest Gas did not have any Transmission Pipeline leaks in 2021.

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Appendix 1 - Rev. 03/30/22

Notes:
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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/YYYY)	Repair Date (MM/DD/YYYY)	Number of Days Leaking	Emission Factor (Mscf/Day)	Annual Emissions (Mscf)	Explanatory Notes / Comments
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Southwest Gas did not have any transmission pipeline damages in 2021.

Total 0

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Appendix 1 - Rev. 03/30/22

Notes:
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 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
Southwest Gas did not have any transmission pipeline blowdowns in 2021.				
Total			0	

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 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
Total						0

Southwest Gas did not have any transmission component vented emissions in 2021.

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Appendix 1 - Rev. 03/30/22

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 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 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
Southwest Gas did not have any transmission component fugitive emissions in 2021.										
									Total	0

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Appendix 1 - Rev. 03/30/22

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 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
Southwest Gas did not have any Odorizer Emissions to report for 2021.					
Total				0	

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Appendix 2
Transmission M&R Stations

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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In Response to Data Request, R15-01-008 - 2022 June Report
Appendix 2 - 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. Facilities emissions that are based on a population count times an emission factor (See Appendix 9 for guidance).

Transmission M&R Station Total Leaks and Emissions:

Number of Stations	Station Classification	Emission Factor (Mscf/yr)	Annual Emission (Mscf)	Explanatory Notes / Comments
7	T	1554.8	10883.600	Emission Factors from Appendix 9 - Change in the number of stations from previous year - one station was replaced with a Distribution Station and another station was confirmed to not have transmission components, so was reclassified as a Distribution Station.
Total			10883.600	

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Appendix 2 - Rev. 03/30/22

Note:

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Transmission M&R Station Blowdowns:

ID	Geographic Location	Number of Blowdown Events	Annual Emissions (Mscf)	Explanatory Notes / Comments
12TR15007210	92347	1	0.5377428	1 INSPECTION
12TS10023140	92392	2	1.0754856	2 INSPECTIONS
12TS15007090	92392	1	0.5377428	1 INSPECTION
12TS15007091	92392	1	0.5377428	1 INSPECTION
12TS15007094	92307	2	1.0754856	1 INSPECTION AND 1 MAINTENANCE
12TS15010691	92356	1	0.5377428	1 INSPECTION
12TS15010692	92301	5	2.688714	5 INSPECTIONS

Formula: Gas loss due to flow lock ups + de-gassing
(Purge Line ID)²*(Avg PSI)*(Blow Time) + (Pipe Dia)²*(AVG PSI)*(0.372)*(Pipe

Total **6.9906564**

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In Response to Data Request, R15-01-008 - 2022 June Report
Appendix 2 - Rev. 03/30/22

Notes:

The data collected on this sheet is for informational purposes and may not be included in the emissions inventory for 2020. The worksheet is designed to track actual emissions for future reference and to determine if an actual leak based emission accounting is feasible for M&R stations.

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.

Transmission M&R Station Component Vented Emissions:

ID	Geographic Location	Station Classification	Device Type	Bleed Rate	Manufacturer	Number of Days Emitting	Annual Emissions (Mscf)	Explanatory Notes / Comments
12TS10023140	92395	A3	O	L	SPECTRASENSOR	365	17.52	MANUFACTURER'S BASED ESTIMATE OF EMISSIONS (1-2 cubic FEET PER HOUR: 2 ft ³ /hr * 24hrs/day * 365 days = 17,520 ft ³)
12TR15007210	92311	A3	O	L	SPECTRASENSOR	365	17.52	MANUFACTURER'S BASED ESTIMATE OF EMISSIONS (1-2 cubic FEET PER HOUR: 2 ft ³ /hr * 24hrs/day * 365 days = 17,520 ft ³)
Total							35.04	

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In Response to Data Request, R15-01-008 - 2022 June Report
Appendix 2 - Rev. 03/30/22

Notes:

The data collected on this sheet is for informational purposes and may not be included in the emissions inventory for 2020. The worksheet is designed to track actual leaks for future reference and to determine if an actual leak based emission accounting is feasible for M&R stations.

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 unintentional leaks that if repaired would not be 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 M&R Station Component Fugitive Leaks:

ID	Geographic Location	Station Classification	Device Type	Bleed Rate	Manufacturer	Discovery Date (MM/DD/YY)	Repair Date (MM/DD/YY)	Number of Days Leaking	Emission Factor (Mscf/day/dev)	Annual Emissions (Mscf)	Explanatory Notes / Comments
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Southwest Gas did not have any Transmission M&R Station component fugitive leaks in 2021.

Total 0

Appendix 3
Transmission Compressor Stations

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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In Response to Data Request, R15-01-008 - 2022 June Report
Appendix 3 - 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 Compressor Station Blowdowns:

ID	Geographic Location	Number of Blowdown Events	Annual Emissions (Mscf)	Explanatory Notes / Comments
Southwest Gas does not have any transmission compressor stations in California.				

Total 0

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In Response to Data Request, R15-01-008 - 2022 June Report
Appendix 3 - Rev. 03/30/22

Notes:

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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.

Transmission Compressor Station Component Vented Emissions:

ID	Geographic Location	Device Type	Bleed Rate	Manufacturer	Annual Emissions (Mscf)	Explanatory Notes / Comments

Southwest Gas does not have any transmission compressor stations in California.

Total 0.00

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In Response to Data Request, R15-01-008 - 2022 June Report
Appendix 3 - Rev. 03/30/22

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Transmission Compressor Station: Compressor and Component Fugitive Leaks:

ID	Geographic Location	Facility/Device Type	Emission Factor: Mscf/day/dev	Manufacturer	Discovery Date (MM/DD/YY)	Repair Date (MM/DD/YY)	Prior Survey Date (MM/DD/YY)	Number of Days Leaking	Annual Emissions (Mscf)	Explanatory Notes / Comments
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Southwest Gas does not have any transmission compressor stations in California.

Total 0.00

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In Response to Data Request, R15-01-008 - 2022 June Report
Appendix 3 - Rev. 03/30/22

Notes:

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Transmission Compressor Station Storage Tank Emissions:

Total Number	Discovery Date (DD/MM/YY)	Repair Date (DD/MM/YY)	Number of Days Emitting	Emission Factor (Mscf/yr)	Annual Emissions (Mscf)
Southwest Gas does not have any transmission compressor station storage facilities in California.					
Total					0.00

Appendix 4
Distribution Mains and Services

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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In Response to Data Request, R15-01-008 2022 June Report
Appendix 4; Rev. 03/30/22

Notes:
 Definitions in Data Request R15-01-008 2022 June Report
 If highlighted cells are filled in, the other cells will auto-populate

Summary of Data by Pipeline Facility/Material and Results for Annual System Leak Rate and Resulting Number of Unknown Leaks for Each Pipeline Facility/Material

Facility/Material	Total System Miles per material type	Miles on Annual Survey [M _{SA}]	Miles on Multi-Year Survey Cycles [M _{TC}]	Survey Interval (Yrs) [I]	Miles Surveyed Annually from Multi-Year Survey Cycles [M _{SL}]	Total # of Leaks Detected from Survey [N _{SL}]	If using a 3-year trailing leak rate average then include - 2019 Annual Leak Rate	If using a 3-year trailing leak rate average then include - 2020 Annual Leak Rate	2021 Annual Leak Rate [R _{X,3}]	If applicable, then calculate the 3-year Average Leak Rate [Leak Rate / Mile / Yr]	# of Unknown Leaks	Total # of Leaks Detected from O&M* [N _{X,0}]
									$R_{X,3} = \frac{N_{SL}}{M_{SA} + (I \times M_{SL})}$	$R_{X,3} = \frac{1}{3} \sum_{i=1}^3 R_{X,i}$	$N_{X,unk} = \frac{N_{SL}}{M_{SL}} \times (M_{SL}^{out} - M_{SL}) \times I$	
Main/Vintage* Plastic	2.119	2.119	0.000	1	0.000	0			0.00332	-	-	17
Main/Plastic	2.692,083	2.442,207	819,291	3		9						
Main/Plastic				4								
Main/Unprotected Steel				5								
Main/Unprotected Steel				3								
Main/Unprotected Steel				4								
Main/Unprotected Steel				5								
Main/Vintage* Protected Steel	182,737	172,188	10,569	1	0.000	1			0.00581	0.00581	0	5
Main/Protected Steel	343,412	110,159	233,253	3	120,174	1			0.00212	0.00212	0	
Main/Protected Steel				4								
Main/Protected Steel				5								
Service/Vintage* Plastic	1.164	1.164	0.000	1	0.000	0						7
Service/Plastic	2,452,185	181,450	2,270,735	3	831,406	15			0.00561	0.00561	12	
Service/Plastic				4								
Service/Unprotected Steel				5								
Service/Unprotected Steel				3								
Service/Unprotected Steel				4								
Service/Unprotected Steel				5								
Service/Vintage* Protected Steel				1								
Steel												
Service/Protected Steel	77,191	8,000	69,191	3	29,000	0						2
Service/Protected Steel				4								
Service/Protected Steel				5								
Service/Copper				3								
Service/Copper				4								
Service/Copper				5								
Total	5,750,891	724,936	5,025,955	N/A	1,798,871	26			N/A	N/A	21	31

*Definitions for "vintage" materials:

For SWG this is PVP and AA Pipe

Vintage Plastic

For SWG this is Pre-70's High Pressure Steel

Vintage Protected Steel

Estimated Emissions by Pipeline Facility/Material for Each Leakage Category

Leakage Category	Emission Factor (Mscf/day/leak)	2021 Emissions from Leaks detected Prior to 2021 (Mscf)	2021 Emissions from Leaks Detected from 2021 Survey (Mscf)	2021 Emissions from O&M Leaks Detected in 2021 (Mscf)	2021 Estimated Emissions from Unknown Leaks (Mscf)	Total Estimated Emissions from 2021 Emissions from Distribution Pipelines (Mscf)
Facility/Material						
Main/Vintage* Plastic	0.2988				0	0
Main/Plastic	0.2988		349,895	40,039	882,460	1,272,394
Main/Plastic	0.2988				0	0
Main/Plastic	0.2988				0	0
Main/Unprotected Steel	0.1548				0	0
Main/Unprotected Steel	0.1548				0	0
Main/Unprotected Steel	0.1548				0	0
Main/Vintage* Protected Steel	0.0612	44,876			0.686	45,562
Main/Protected Steel	0.0612		19,462	36	8,0499	63,742
Main/Protected Steel	0.0612				0	0
Main/Protected Steel	0.0612				0	0
Service/Vintage* Plastic	0.0089		23,354	0.151	39,318	62,823
Service/Plastic	0.0089				0	0
Service/Plastic	0.0089				0	0
Service/Unprotected Steel	0.0600				0	0
Service/Unprotected Steel	0.0600				0	0
Service/Unprotected Steel	0.0600				0	0
Service/Vintage* Protected Steel	0.0276				0	0
Service/Protected Steel	0.0276			0.088	0	0
Service/Protected Steel	0.0276				0	0
Service/Protected Steel	0.0276				0	0
Service/Copper	0.0226				0	0
Service/Copper	0.0226				0	0
Total	N/A	44,876	392,710	76,509	930,513	1,444,408

O&M leaks include any other pipeline leaks that are discovered during the year from operations and maintenance activity, third party and gas odor reports, etc. that are not accounted for in other categories of this worksheet.

The cells below should be used for calculating emissions when a risk based leak detection and repair practice is used by the Utility. This table is intended to help categorize emissions associated with large leaks (Super Emitters (SEs)), and non-large leaks (non-SEs).

Southwest Gas does not utilize a risk based leak detection and repair practice.

Leakage Category	2021 Emissions from Leaks detected Prior to 2020	2021 Emissions from Leaks Detected from 2020	2021 Emissions from O&M Leaks Detected in 2021	2021 Estimated Emissions from Unknown Leaks (Mscf)	Total Estimated Emissions from 2021
Large Leak Emitter Program					
Compliance Leak Survey - Non-LL					
Compliance Leak Survey - LL					
Large Leak Emitter Program Outside Compliance Area - Non-LL					
Large Leak Emitter Program Outside Compliance Area - LL					
O&M - Non-LL					
O&M - LL					
TOTAL					

Large Leak Emitter Program					
Compliance Leak Survey - Non-LL					
Compliance Leak Survey - LL					
Large Leak Emitter Program Outside Compliance Area - Non-LL					
Large Leak Emitter Program Outside Compliance Area - LL					
O&M - Non-LL					
O&M - LL					
TOTAL					

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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 4; Rev. 03/30/22

This summary purposefully should exclude damages, blowdowns, component emissions and component leaks.

	Count of Leaks Carried over from Prior Year(s)	Count of Leaks Discovered in the Year of Interest (2021)	Count of Leaks Repaired in the Year of Interest (2021)	Average Days to Repair Leaks	Count of Estimated Unsurveyed Leaks in the Year of Interest (2021)	Count of Remaining Leaks at final day of the Year of Interest (12/31/2021)	Emissions from Leaks Carried over from Prior Year(s).	Emissions from Leaks Discovered in the Year of Interest (2021).	Emissions from Estimated Unsurveyed Leaks in the Year of Interest (2021)	Total Emissions in the Year of Interest (2021) [Mscf of Natural Gas]
Grade 1	0	20	20	1	7	0	0.00	161.772	325.680	487.452
Grade 2	0	10	10	6	4	0	0.00	81.829	162.840	244.668
Grade 3	2	27	24	34	10	5	44.676	225.618	441.994	712.287
Graded Leak Total	2	57	54	N/A	21	5	44.676	469.219	930.513	1,444.4075
Above Ground Hazardous	0	0	0	0	0	0	0	0	0	0
Above Ground Non-Hazardous	0	0	0	0	0	0	0	0	0	0
Above Ground Non-Hazardous Minor	0	0	0	0	0	0	0	0	0	0
AG Total	0	0	0	0	0	0	0	0	0	0
Total of All Leaks	2	57	54	N/A	21	5	44.676	469.219	930.513	1,444.407
Main/Plastic	0	26	24	8	8	2	0.000	389.934	882.460	1272.394
Main/Unprotected Steel	0	0	0	0	1	0	0.000	0.000	0.000	0.000
Main/Protected Steel	2	7	6	43	0	3	44.676	55.692	8.735	109.1030
Service/Plastic	0	22	22	5	12	0	0.000	23.505	39.318	62.823
Service/Unprotected Steel	0	1	1	1	0	0	0.000	0.060	0.000	0.060
Service/Protected Steel	0	1	1	1	0	0	0.000	0.028	0.000	0.028
Service/Copper	0	0	0	0	0	0	0.000	0.000	0.000	0.000
Total	2	57	54	N/A	21	5	44.676	469.219	930.513	1,444.4075

Large Leak or Super Emitter Program Categorization	
Compliance Leak Survey - Non-LL	0
Compliance Leak Survey - LL	0

	Count of Leaks Carried over from Prior Year(s)	Count of Leaks Discovered in the Year of Interest (2021)	Count of Leaks Repaired in the Year of Interest (2021)	Average Days to Repair Leaks	Count of Estimated Unsurveyed Leaks in the Year of Interest (2021)	Count of Remaining Leaks at final day of the Year of Interest (12/31/2021)	Emissions from Leaks Carried over from Prior Year(s).	Emissions from Leaks Discovered in the Year of Interest (2021).	Emissions from Estimated Unsurveyed Leaks in the Year of Interest (2021)	Total Emissions in the Year of Interest (2021) [Mscf of Natural Gas]
Large Leak/Super Emitter Program Outside Compliance Area - Non-LL						0				0
Large Leak/Super Emitter Program Outside Compliance Area - LL						0				0
O&M - Non-LL						0				0
O&M - LL						0				0
TOTAL	-	-	-	-	-	-	-	-	-	-
Change Due to LL/SE Program on 2021:	(2)	(57)	(54)	#VALUE!	(21)	(5)	(45)	(469)	(931)	(1,444)
% Change Due to LL/SE Program on 2021:	(100.0%)	(100.0%)	(100.0%)		(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)

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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.

Distribution Main & Service Pipeline Damage (3rd party dig-ins, natural disasters, etc.):

ID	Geographic Location	Damage Type	Pipe Classification	Pipe Material	Pipe Size (nominal)	Pipe Age (months)	Pressure (psi)	Leak Grade	Above Ground or Below Ground	Discovery Date (MM/DD/YYYY)	Repair Date (MM/DD/YYYY)	Number of Days Leaking	Emission Factor or Engineering Estimate (Mscf/Dav)	Annual Emissions (Mscf)	Explanatory Notes / Comments
4352309	96161 E	E	DB	P	1"	12	60	1	B	11/18/2021	11/18/2021	1,000	0.009	0.009	Engineering Estimate
4351791	96148 E	DB	DB	P	1 1/2"	480	43	1	B	11/17/2021	11/17/2021	1,000	1.318	1.318	Engineering Estimate
4346204	96161 E	E	DB	P	1 1/2"	264	60	1	B	11/5/2021	11/5/2021	1,000	4.613	4.613	Engineering Estimate
4345367	96150 E	E	DB	P	1 1/2"	156	60	1	B	10/29/2021	10/29/2021	1,000	0.523	0.523	Engineering Estimate
4333627	96145 E	DB	DB	P	1"	288	43	1	B	10/6/2021	10/6/2021	1,000	13.100	13.100	Engineering Estimate
4334369	96150 E	E	DB	P	1 1/2"	UNK	35	1	B	9/29/2021	9/29/2021	1,000	3.403	3.403	Engineering Estimate
4327660	96150 E	E	DB	P	1 1/2"	336	60	1	B	9/25/2021	9/25/2021	1,000	7.931	7.931	Engineering Estimate
4327451	96160 E	E	DB	P	1 1/2"	156	35	1	B	9/23/2021	9/23/2021	1,000	0.008	0.008	Engineering Estimate
4327239	96145 E	DB	DB	P	1 1/2"	528	43	1	B	9/23/2021	9/23/2021	1,000	0.112	0.112	Engineering Estimate
4326533	96142 E	E	DB	P	1 1/2"	240	43	1	B	9/21/2021	9/21/2021	1,000	4.665	4.665	Engineering Estimate
4325931	96161 E	E	DB	P	1"	180	60	1	B	9/20/2021	9/20/2021	1,000	12.994	12.994	Engineering Estimate
4323493	96148 E	E	MB	P	2"	336	43	1	B	9/15/2021	9/22/2021	1,000	14.713	14.713	Engineering Estimate
4322281	96160 E	E	DB	P	1 1/2"	240	60	1	B	9/10/2021	9/10/2021	1,000	1.087	1.087	Engineering Estimate
4321729	96143 E	DB	DB	P	1"	396	43	1	B	9/9/2021	9/9/2021	1,000	0.164	0.164	Engineering Estimate
4311115	96161 E	E	DB	P	1"	36	60	1	B	8/19/2021	8/19/2021	1,000	0.571	0.571	Engineering Estimate
4309992	96161 E	E	DB	P	1 1/2"	408	35	1	B	8/16/2021	8/16/2021	1,000	1.011	1.011	Engineering Estimate
4312651	96141 E	E	DB	P	1"	288	43	1	B	8/10/2021	8/10/2021	1,000	0.032	0.032	Engineering Estimate
4306827	96161 E	E	DB	P	1 1/2"	192	60	1	B	8/10/2021	8/10/2021	1,000	2.646	2.646	Engineering Estimate
4306403	96161 E	E	DB	P	1"	264	60	1	B	8/10/2021	8/10/2021	1,000	32.740	32.740	Engineering Estimate
4304968	96150 E	E	DB	PC	3/4"	420	35	1	B	8/6/2021	8/6/2021	1,000	0.128	0.128	Engineering Estimate
4303467	96161 E	E	DB	P	1"	228	60	1	B	8/4/2021	8/4/2021	1,000	4.971	4.971	Engineering Estimate
4303139	96141 E	E	DB	P	1"	180	43	1	B	8/3/2021	8/3/2021	1,000	138.388	138.388	Engineering Estimate
4302691	96145 E	E	DB	P	1 1/2"	240	43	1	B	8/2/2021	8/2/2021	1,000	1.630	1.630	Engineering Estimate
4297751	96150 E	E	DB	P	1 1/2"	336	60	1	B	7/28/2021	7/28/2021	1,000	0.017	0.017	Engineering Estimate
4294438	96145 E	E	DB	P	1"	324	43	1	B	7/19/2021	7/19/2021	1,000	0.142	0.142	Engineering Estimate
4292987	96161 E	E	DB	P	1 1/2"	432	35	1	B	7/15/2021	7/15/2021	1,000	1.690	1.690	Engineering Estimate
4291903	96145 E	E	DB	P	1 1/2"	288	43	1	B	7/12/2021	7/12/2021	1,000	0.015	0.015	Engineering Estimate
4290650	96161 E	E	DB	P	1 1/2"	264	60	1	B	7/4/2021	7/4/2021	1,000	2.108	2.108	Engineering Estimate
4289020	96150 E	E	DB	P	1 1/2"	336	60	1	B	6/22/2021	6/22/2021	1,000	3.823	3.823	Engineering Estimate
4281864	96150 E	E	DB	P	1 1/2"	288	43	1	B	6/22/2021	6/22/2021	1,000	0.146	0.146	Engineering Estimate
4281734	96150 E	E	DB	P	3/4"	UNK	35	1	B	6/18/2021	6/18/2021	1,000	0.001	0.001	Engineering Estimate
4280673	96150 E	E	DB	P	1 1/2"	144	35	1	B	6/18/2021	6/18/2021	1,000	2.703	2.703	Engineering Estimate
4277442	96145 E	E	DB	P	1 1/2"	240	43	1	B	6/9/2021	6/9/2021	1,000	11.459	11.459	Engineering Estimate
4275969	96161 E	E	DB	P	1"	240	60	1	B	6/4/2021	6/4/2021	1,000	11.459	11.459	Engineering Estimate
4269020	96141 E	E	DB	P	1"	456	43	1	B	5/27/2021	5/27/2021	1,000	7.856	7.856	Engineering Estimate
4260516	96150 E	E	DB	P	1 1/2"	96	60	1	B	5/9/2021	5/9/2021	1,000	0.057	0.057	Engineering Estimate
4291491	96145 O	O	DB	P	1 1/2"	288	43	1	B	7/9/2021	7/9/2021	1,000	0.012	0.012	Engineering Estimate
4175573	92356 E	E	DB	P	1 1/2"	765	40	1	B	1/8/2021	1/8/2021	0.055	13.261	13.261	Engineering Estimate
4176655	92394 E	E	MB	P	2"	165	40	1	B	1/8/2021	1/8/2021	0.028	22.460	22.460	Engineering Estimate
4180723	92311 E	E	DB	P	1 1/2"	435	40	1	B	1/18/2021	1/18/2021	0.023	1.403	1.403	Engineering Estimate
4416685	92314 N	N	DB	P	1 1/2"	233	40	1	B	1/5/2021	1/2/2021	0.026	1.077	1.077	Engineering Estimate
92345 E	92345 E	E	DB	P	1 1/2"	174	40	3	B	1/18/2021	3/2/2021	0.021	0.012	0.012	Engineering Estimate
4191770	92345 E	E	DB	P	1 1/2"	266	40	1	B	1/31/2021	1/31/2021	0.077	1.057	1.057	Engineering Estimate
4193524	92345 E	E	DB	P	1 1/2"	369	40	1	B	2/5/2021	2/5/2021	0.037	2.066	2.066	Engineering Estimate
4203769	92392 E	E	DB	P	1"	181	60	1	B	2/22/2021	2/22/2021	0.019	0.621	0.621	Engineering Estimate
4214084	92395 E	E	DB	P	1"	397	40	1	B	1/27/2021	1/27/2021	0.028	6.291	6.291	Engineering Estimate
4215299	92345 E	E	DB	P	1 1/2"	760	40	1	B	3/8/2021	3/8/2021	0.026	12.857	12.857	Engineering Estimate
4186422	92345 O	O	DB	P	1 1/2"	406	40	1	B	1/28/2021	1/28/2021	0.020	0.046	0.046	Engineering Estimate
4198599	92345 E	E	DB	P	1 1/2"	389	40	2	B	2/11/2021	2/11/2021	0.028	1.139	1.139	Engineering Estimate
4217181	92395 E	E	DB	P	1"	1	40	1	B	3/12/2021	3/12/2021	0.015	1.854	1.854	Engineering Estimate
4218255	92392 E	E	DB	P	1 1/2"	365	60	1	B	3/15/2021	3/15/2021	0.025	1.854	1.854	Engineering Estimate
4222021	92344 E	E	MB	P	2"	320	60	1	B	3/23/2021	3/23/2021	0.031	1.579	1.579	Engineering Estimate
4218445	92392 O	O	DB	P	1 1/2"	503	60	1	B	3/16/2021	3/16/2021	0.034	4.237	4.237	Engineering Estimate
4227341	92344 E	E	DB	P	1"	195	60	1	B	3/26/2021	3/26/2021	0.037	11.210	11.210	Engineering Estimate
4235621	92345 E	E	DB	P	1"	237	40	1	B	4/6/2021	4/6/2021	0.018	15.592	15.592	Engineering Estimate
4238952	92344 E	E	DB	P	1 1/2"	200	60	1	B	4/12/2021	4/12/2021	0.035	0.435	0.435	Engineering Estimate
4239654	92345 E	E	DB	P	1"	370	40	1	B	4/14/2021	4/14/2021	0.029	0.278	0.278	Engineering Estimate
4247053	92395 E	E	DB	P	1"	175	40	1	B	4/19/2021	4/19/2021	0.007	0.017	0.017	Engineering Estimate

ID	Geographic Location	Damage Type	Pipe Classification	Pipe Material	Pipe Size (nominal)	Pipe Age (months)	Pressure (psi)	Leak Grade	Above Ground or Below Ground	Discovery Date (MM/DD/YYYY)	Repair Date (MM/DD/YYYY)	Number of Days Leaking	Emission Factor or Engineering Estimate (Mscf/Day)	Annual Emissions (Mscf)	Explanatory Notes / Comments
4248288	92311 E		DB	P	12"	233	40		1	4/20/2021	4/20/2021	0.020	0.002	0.002	Engineering Estimate
4246681	92392 E		DB	P	1"	169	60		1	5/17/2021	5/17/2021	0.036	25.520	25.520	Engineering Estimate
4268923	92342 E		DB	P	12"	561	40		1	4/28/2021	4/28/2021	0.046	2.826	2.826	Engineering Estimate
4269186	92314 E		DB	P	12"	224	40		1	5/27/2021	5/28/2021	0.020	1.168	1.168	Engineering Estimate
4269484	92347 E		DB	P	12"	224	40		1	4/17/2021	4/17/2021	0.046	1.539	1.539	Engineering Estimate
4279064	92392 E		DB	P	12"	405	40		1	6/15/2021	6/15/2021	0.014	0.009	0.009	Engineering Estimate
4278378	92345 O		MB	P	2"	366	60		1	6/13/2021	6/13/2021	0.048	97.453	97.453	Engineering Estimate
4281259	92344 E		DB	P	12"	383	60		1	6/21/2021	6/21/2021	0.032	1.410	1.410	Engineering Estimate
4283457	92392 E		DB	P	12"	1	60		1	6/18/2021	6/18/2021	0.022	0.003	0.003	Engineering Estimate
4292124	92311 E		DB	P	1"	15	40		1	7/7/2021	7/7/2021	0.000	0.011	0.011	Engineering Estimate
4292137	92308 E		DB	P	12"	371	60		1	7/13/2021	7/13/2021	0.020	0.016	0.016	Engineering Estimate
4296371	92395 E		MB	P	2"	402	40		1	7/22/2021	7/22/2021	0.042	76.186	76.186	Engineering Estimate
4297234	92386 E		DB	P	12"	371	40		1	7/27/2021	7/27/2021	0.022	0.050	0.050	Engineering Estimate
4297630	92395 E		DB	P	12"	182	40		1	7/28/2021	7/28/2021	0.019	0.603	0.603	Engineering Estimate
4298040	92392 E		MB	P	2"	182	60		1	7/28/2021	7/28/2021	0.028	5.727	5.727	Engineering Estimate
4304938	92395 E		DB	P	12"	133	40		1	8/6/2021	8/6/2021	0.017	0.056	0.056	Engineering Estimate
4307128	92392 E		DB	P	1"	436	40		1	8/11/2021	8/11/2021	0.017	0.997	0.997	Engineering Estimate
4321042	92394 N		MB	P	2"	145	40		1	8/31/2021	8/31/2021	0.016	4.824	4.824	Engineering Estimate
4307359	92307 E		DB	P	12"	192	40		1	8/11/2021	8/11/2021	0.023	1.448	1.448	Engineering Estimate
4312544	92314 E		DB	P	12"	333	40		1	8/25/2021	8/25/2021	0.015	0.034	0.034	Engineering Estimate
4312935	92315 E		DB	P	12"	228	40		1	8/26/2021	8/26/2021	0.015	0.389	0.389	Engineering Estimate
4314888	92345 E		DB	P	12"	250	40		1	8/30/2021	8/30/2021	0.026	0.016	0.016	Engineering Estimate
4322606	92314 E		DB	P	12"	373	40		1	9/10/2021	9/10/2021	0.049	3.857	3.857	Engineering Estimate
4323043	92301 E		DB	P	1"	3	60		1	9/13/2021	9/13/2021	0.045	0.001	0.001	Engineering Estimate
4325297	92394 E		DB	P	1"	205	60		1	9/17/2021	9/17/2021	0.046	11.994	11.994	Engineering Estimate
4326096	92392 E		DB	P	1"	5	60		1	9/21/2021	9/21/2021	0.026	0.002	0.002	Engineering Estimate
4332676	92311 E		MB	P	2"	327	40		1	10/4/2021	10/4/2021	0.031	22.715	22.715	Engineering Estimate
4333133	92345 E		DB	P	12"	432	40		1	10/5/2021	10/5/2021	0.023	2.404	2.404	Engineering Estimate
4335573	92307 E		MB	P	2"	425	40		1	10/11/2021	10/11/2021	0.023	30.392	30.392	Engineering Estimate
4337044	92395 E		DB	P	12"	188	40		1	10/13/2021	10/13/2021	0.016	0.901	0.901	Engineering Estimate
4217827	92395 O		DB	P	1"	10	40		1	3/13/2021	3/13/2021	0.035	0.002	0.002	Engineering Estimate
4337511	92345 E		DB	P	1"	13	40		1	10/13/2021	10/13/2021	0.024	0.002	0.002	Engineering Estimate
4341206	92311 E		DB	P	1"	228	40		1	10/22/2021	10/22/2021	0.040	9.371	9.371	Engineering Estimate
4341210	92394 E		DB	P	12"	456	40		1	10/24/2021	10/24/2021	0.035	0.469	0.469	Engineering Estimate
4341720	92392 E		DB	P	1"	172	60		1	10/25/2021	10/25/2021	0.027	29.470	29.470	Engineering Estimate
4344206	92395 E		DB	P	1"	187	40		1	11/2/2021	11/2/2021	0.016	0.629	0.629	Engineering Estimate
4351252	92345 E		DB	P	12"	239	40		1	11/16/2021	11/16/2021	0.048	11.391	11.391	Engineering Estimate
4353158	92395 E		DB	P	12"	213	40		1	10/5/2021	10/5/2021	0.029	1.488	1.488	Engineering Estimate
4353709	92307 E		DB	P	12"	277	40		1	5/16/2021	5/16/2021	0.033	1.536	1.536	Engineering Estimate
4353732	92308 E		DB	P	12"	237	60		1	10/4/2021	10/4/2021	0.022	0.050	0.050	Engineering Estimate
4356529	92345 E		DB	P	12"	319	40		1	12/2/2021	12/2/2021	0.025	0.003	0.003	Engineering Estimate
4363417	92392 E		DB	P	12"	174	60		1	11/20/2021	11/20/2021	0.038	2.660	2.660	Engineering Estimate
4363784	92345 E		DB	P	1"	30	40		1	12/4/2021	12/4/2021	0.015	0.000	0.000	Engineering Estimate
4364849	92311 E		DB	P	12"	476	40		1	12/5/2021	12/5/2021	0.040	1.791	1.791	Engineering Estimate
4366163	92398 E		DB	P	12"	284	40		1	12/6/2021	12/6/2021	0.028	1.520	1.520	Engineering Estimate
4366184	92342 E		DB	P	12"	304	40		1	12/9/2021	12/9/2021	0.036	0.022	0.022	Engineering Estimate
4366231	92315 E		DB	P	12"	509	40		1	10/28/2021	10/28/2021	0.007	0.320	0.320	Engineering Estimate
4366282	92315 E		DB	P	12"	231	40		1	9/13/2021	9/13/2021	0.010	0.369	0.369	Engineering Estimate
4367332	92345 E		DB	P	12"	423	40		1	12/13/2021	12/13/2021	0.026	1.432	1.432	Engineering Estimate
4368733	92308 E		DB	P	12"	396	40		1	10/25/2021	10/25/2021	0.014	1.425	1.425	Engineering Estimate
4368852	92345 E		DB	P	12"	408	40		1	12/18/2021	12/18/2021	0.051	2.546	2.546	Engineering Estimate
4369873	92314 E		DB	P	12"	169	40		1	9/12/2021	9/12/2021	0.037	0.988	0.988	Engineering Estimate
4369915	92315 E		MB	P	2"	453	40		1	7/21/2021	7/21/2021	0.017	7.154	7.154	Engineering Estimate
4378474	92315 E		DB	P	12"	258	40		1	11/15/2021	11/15/2021	0.022	0.050	0.050	Engineering Estimate
4393715	92386 E		DB	P	12"	474	40		1	11/16/2021	11/16/2021	0.008	0.467	0.467	Engineering Estimate

Total | 741,982

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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Appendix 4; Rev. 03/30/22

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Distribution Main & Service Pipeline Blowdowns:

ID	Geographic Location	Number of Blowdown Events	Pipe Size (nominal)	Length of Pipe	Pressure (psi)	Annual Emissions (Mscf)	Explanatory Notes / Comments
N/A	92363		1"	316	40	0.005 GHG Report	New Pipe Purges - 100 blowdown events were estimated based on volume of gas lost.
N/A	92363		2"	559	40	0.043 GHG Report	
N/A	92363		1"	1,605	40	0.028 GHG Report	Service Blowdowns - 33 blowdown events were estimated based on gas lost.
N/A	92363		1"	96	40	0.002 GHG Report	New riser purges - 32 events were estimated based on volume of gas lost
N/A	92363		2"	496	40	0.038 GHG Report	Main Blowdowns - 4 blowdown was estimated based on volume of gas lost
N/A	96161		1 1/8"	22986	52	0.485 GHG Report	
N/A	96150		2"	3542	52	0.331 GHG Report	New riser purges - 960 events were estimated based on volume of gas lost
N/A	96145		4"	16	52	0.005 GHG Report	
N/A	96150		1 1/8"	32093	52	0.620 GHG Report	
N/A	96161		2"	316	52	0.030 GHG Report	
N/A	96161		4"	1	52	0.000 GHG Report	Service Blowdowns - 687 blowdown events were estimated based on gas lost
N/A	96145		3/4"	13728	52	0.231 GHG Report	
N/A	96145		1 1/8"	24	52	0.001 GHG Report	
N/A	96145		2"	769	52	0.072 GHG Report	
N/A	96161		4"	372	52	0.125 GHG Report	
N/A	96150		6"	397	52	0.289 GHG Report	
N/A	96145		3/4"	149	52	0.003 GHG Report	Main Blowdowns - 17 blowdowns were estimated based on volume of gas lost
N/A	96150		2"	13237	52	1.400 GHG Report	
N/A	96150		4"	5147	52	2.166 GHG Report	
N/A	96150		6"	1922	52	1.785 GHG Report	
N/A	96150		8"	4162	52	7.009 GHG Report	
N/A	92395		0.5"	6891	40	0.007 GHG Report	
N/A	92395		1"	200086	40	0.865 GHG Report	
N/A	92395		2"	207839	40	3.981 GHG Report	
N/A	92395		4"	23837	40	1.640 GHG Report	
N/A	92395		6"	2413	40	0.360 GHG Report	New Pipe Purges - 2,037 blowdown events were estimated based on total job count.
N/A	92395		1"	304	240	0.005	
N/A	92395		2"	135	240	0.012 GHG Report	
N/A	92395		4"	2455	115	0.502 GHG Report	
N/A	92395		6"	15	240	0.006 GHG Report	
N/A	92395		0.5"	142091	40	0.571 GHG Report	
N/A	92395		1"	47	40	0.001 GHG Report	Service Blowdowns - 2,210 blowdown events were estimated from job count.
N/A	92395		0.75"	6885	40	0.095 GHG Report	
N/A	92395		1"	2	40	0.00003 GHG Report	
N/A	92395		2"	91441	40	7.007 GHG Report	
N/A	92395		4"	10233	40	2.816 GHG Report	
N/A	92395		6"	508	40	0.303 GHG Report	
N/A	92395		2"	61287	40	5.315 GHG Report	Main Blowdowns - 164 blowdown events were estimated from total job count.
N/A	92395		4"	9832	40	3.394 GHG Report	
N/A	92395		6"	12170	40	9.267 GHG Report	
N/A	92395		8"	82	40	0.113 GHG Report	

Total | **50.925**

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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Appendix 4; Rev. 03/30/22

Notes:

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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.

Distribution Main & Service Pipeline Component Vented Emissions (see note above):

Total Number of Devices	Device Type	Bleed Rate	Manufacturer	Engineering or Manufacturer's based Estimate of	Annual Emissions (Mscf)	Explanatory Notes / Comments
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Southwest Gas did not have any Distribution Main & Service Pipeline Component Vented Emissions

Total 0.00

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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 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 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.

Distribution Main & Service Pipeline Component Fugitive Leaks (see note above):

Total Number of Devices	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
1	O	H	N/A	10/26/2021	10/26/2021	1	377.8725	377.8725	Engineering Calculations

Total 377.8725

Internal Note: While tapping into an existing 6" High Pressure line for the North Tahoe Lateral Project a TOR fitting completion plug did not seat correctly and blew out. This caused gas to be released from the 2" fittings opening for approx. 1 Hour and 30 Min before the release of gas was stopped.

Appendix 5
Distribution M&R Stations

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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Appendix 5; Rev. 03/30/2022

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 At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange.
 After completing the tab on "Leak Based - Station Emissions" and "Station - Unknown Leaks" fill in the table for "Leak Based - Emissions Summary."

Distribution M&R Station Leaks:

ID	Geographic Location	M&R Station or Farm Tap Classification	Component Type	Incoming Pressure (psi)	Leak Grade	Upgraded Leak Grade or Downgraded Leak Grade	Leak Discovery Method	Discovery Date (MM/DD/YY)	Re-Grade Date (MM/DD/YY)	Repair Date (MM/DD/YY)	Scheduled Repair Date (MM/DD/YY)	Reason for Not Scheduling a Repair	Number of Days Leaking	Number of Days to Repair	Emission Factor (Mscf/Day)	Annual Emissions (Mscf)	Explanatory Notes / Comments	
Southwest Gas has no carry over Distribution M&R Station leaks to report.																		
Southwest Gas has no Distribution M&R Station leaks to report.																		
4211654	92395	A2	PC	185	3		M	4/12/2021	N/A	4/12/2021	N/A	N/A	1	1	0.02	0.020		
																Sum Total Emissions from leaks discovered in 2021:	0.00	
Sum Total Emissions from leaks carried over from before 2021																		
																Sum Total Emissions from leaks discovered in 2021:	0.020	
Sum Total Emissions from O&M Leaks discovered in 2021:																		
																Grand Total of all 2021 emissions from leaks	0.020	

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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Appendix 5; Rev. 03/20/22

This summary purposefully should exclude damages, blowdowns, component emissions and component leaks.

	Count of Leaks Carried over from Prior Year	Count of Leaks Discovered in the Year of Interest	Count of Leaks Repaired in the Year of Interest	Average Days to Repair Leaks	Count of Estimated Unsurveyed Leaks in the Year of Interest	Count of Remaining Leaks at final day of the Year of Interest (12/31/xx)	Emissions from Leaks Carried over from Prior Year.	Emissions from Leaks Discovered in the Year of Interest.	Emissions from Estimated Unsurveyed Leaks in the Year of Interest	Total Emissions in the Year of Interest [Mscf of Natural Gas]
Grade (Class) if Applicable										
(Class 1) Above Ground Hazardous	-	-	-	0	0	0	0	0.00	0.00	0.00
(Class 3) Above Ground Non-Hazardous	-	1	1	1	0	0	0	0.02	0.00	0.02
(Class 3) Above Ground Non-Hazardous Minor	-	-	-	0	0	0	0	0.00	0.00	0.00
Graded Leak Total	-	1	1	1	0	0	0	0.02	0.00	0.02

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 As revised in 2022, add F1, F2 and F3 for

Distribution M&R Station Leaks and Emissions

Number of Stations	Station Classification	Emission Factor (Mscf/yr)	Annual Emissions (Mscf)	Explanatory Notes / Comments	Year over Year Changes
58	A1	40.6	2354.8	Emission Appendix 9	8 stations retired due to the Master Meter MHP Project
110	A2	896.5	98615	Emission Appendix 9	One station replaced and reclassified as an A3 Station
47	A3	1684.5	79171.5	Emission Appendix 9	One station added, one station reclassified to an A3, one transmission station rebuilt to an A3 Distribution station, and one transmission station reclassified to A3 Distribution
1	B1	0.964	0.964	Emission Appendix 9	
13	B2	1.84	23.92	Emission Appendix 9	
1	B3	12.176	12.176	Emission Appendix 9	

Total | 180,178,360

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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 At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange

Distribution M&R Station 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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Southwest Gas did not have any Distribution M&R Station damages in 2021.

Total 0

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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Notes:

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

Distribution M&R Station Blowdowns:

ID	Geographic Location	Number of Blowdown Events	Annual Emissions (Mscf)	Explanatory Notes / Comments
14DR10001561	96145	1	0.163	Gas lost to blowdowns from regulator maintenance
14DR10001567	96145	1	0.163	Gas loss - blowdown - regulator maintenance
14DR10001569	96145	2	0.327	Gas loss - blowdown - regulator maintenance/ Extra Inspection
14DR15000502	96145	1	0.163	Gas loss - blowdown - regulator maintenance
14DR15005488	96145	1	0.163	Gas loss - blowdown - regulator maintenance
14DR15006870	96145	1	0.163	Gas loss - blowdown - regulator maintenance
14DS10018882	96145	1	0.163	Gas loss - blowdown - regulator maintenance
14DS10031220	96145	1	0.163	Gas loss - blowdown - regulator maintenance
15DR10001574	96161	2	0.327	Gas loss - blowdown - regulator maintenance/ Extra Inspection
15DR10001575	96161	2	0.327	CGas loss - blowdown - regulator maintenance/ Extra Inspection
15DR10001577	96161	1	0.163	Gas loss - blowdown - regulator maintenance
15DR10001572	96161	1	0.163	Gas loss - blowdown - regulator maintenance
15DR10001573	96161	1	0.163	Gas loss - blowdown - regulator maintenance
15DR10001576	96161	1	0.163	Gas loss - blowdown - regulator maintenance
15DS10026480	96161	1	0.163	Gas loss - blowdown - regulator maintenance
15DS10026920	96161	1	0.163	Gas loss - blowdown - regulator maintenance
16DM12230001	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DM12230003	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DM12230004	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DM12230005	96150	1	0.614	Pressure x Average Volume x # of inspections & Maintenance Activities - Average
16DS10009858	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DS10009859	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DS10009860	96150	1	0.163	Gas loss - blowdown - regulator maintenance
14DS10020461	96145	1	0.163	Gas loss - blowdown - regulator maintenance
16DS10009861	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DS10009863	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DS10009864	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DS10008077	96150	1	0.614	Pressure x Average Volume x # of inspections & Maintenance Activities - Average
16DS10026140	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DS10026141	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DS10008098	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DR15000321	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DR15003444	96150	1	0.163	Gas loss - blowdown - regulator maintenance
16DS10027120	96150	1	0.163	Gas loss - blowdown - regulator maintenance
19DSR5008310	92363	1	0.131	Gas lost to flow and lock-up of Reg. Station during Inspection
19DS10029841	92363	1	0.131	Gas lost to flow and lock-up of Reg. Station during Inspection
19DS10030820	92363	1	0.131	Gas lost to flow and lock-up of Reg. Station during Inspection
19DR25011230	92363	1	0.131	Installation of new odorizer system at PGE tap site.
19DS10027320	92363	1	0.131	Gas lost to flow and lock-up of Reg. Station during Inspection
19DM20030280	92363	1	0.131	CAT II Station Inspection
19DS10028960	92363	1	0.131	Inspection-Needles Pressure Relief Valve
19DS10029821	92363	1	0.131	Gas lost to flow and lock-up of Reg. Station during Inspection
11DM10000001	92311	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection

Gas lost to blowdowns from regulator maintenance
 $Q_1 = D^2 \cdot P \cdot 0.372$
 Q = Cubic feet of gas per 1,000 feet of pipeline
 D = Inside diameter of pipeline
 P = Gauge pressure of gas expressed in lb/square inch
 0.372 = Empirical constant

Gas lost to flow and lock-up of Reg. Station
 $Q_2 = D^2 \cdot P \cdot T / 60$
 Q = volume of gas in Mcf/hr at a pressure of 14.9 psi, 60°F and a specific gravity of 0.60
 D = diameter of the nipple or orifice in inches.
 P = absolute pressure in lb/inches² at some nearby point upstream from the opening.
 T = length of blow off in minutes.

Overall gas released from M & R Station maintenance
 $Q_{\text{overall}} = Q_1 + Q_2$

Engineering factor estimate for Appendix 5: Distribution M&R Station Blowdowns
 Eng. Factor = $Q_{\text{overall}} / \text{Number of Reg. Stations}$

ID	Geographic Location	Number of Blowdown Events	Annual Emissions (Mscf)	Explanatory Notes / Comments
12DR10000215	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000220	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000221	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000222	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000223	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000224	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000225	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000235	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000236	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000237	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000239	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10000249	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10032340	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10032540	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR10033440	92395	2	0.326	Gas lost to flow and lock-up of Reg. Station during 2 Inspections
12DR10033720	92395	2	0.326	Maintenance Blowdown.
12DR15004243	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR15004383	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR15005570	92395	2	0.326	Gas lost to flow and lock-up of Reg. Station 2 Inspections
12DR15006091	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR15007096	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR15008550	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR15009310	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR15009691	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR15010750	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DR15011350	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10005384	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10005486	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10005487	92395	3	0.489	Gas lost to flow and lock-up of Reg. Station during 3 Inspections
12DS10005489	92395	3	0.489	Maintenance Blowdown.
12DS10005863	92395	2	0.326	Gas lost to flow and lock-up of Reg. Station 2 Inspections
12DS10005864	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10005867	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10005868	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10005869	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10011919	92395	2	0.326	Maintenance Blowdown.
12DS10020980	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10022142	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10022180	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10023000	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10023142	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10023780	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10023900	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10024000	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10024600	92395	2	0.326	Gas lost to flow and lock-up of Reg. Station 2 Inspections
12DS10024641	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10025460	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10025760	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10025980	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10026424	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10026460	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10027640	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10027721	92395	2	0.326	Gas lost to flow and lock-up of Reg. Station 2 Inspections
12DS10027900	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection

ID	Geographic Location	Number of Blowdown Events	Annual Emissions (Mscf)	Explanatory Notes / Comments
12DS10028900	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12DS10034280	92395	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DM10000071	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DM10000072	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DM10000097	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10000014	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10000015	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10000018	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10000041	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10000060	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10000250	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10000251	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10000252	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10000253	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10000254	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR10032701	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DR15007290	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection and 1 Gas lost to flow and lock-up of Reg. Station during Inspection
13DR15007571	92314	2	0.326	Maintenance Blowdown.
13DR15007670	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
13DS10004442	92314	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
12TS15010690	92308	1	0.163	Gas lost to flow and lock-up of Reg. Station during Inspection
Total			40.755	

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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 5; Rev. 03/30/2022

Notes:

The data collected on this sheet is for informational purposes and may not be included in the emissions inventory for 2021. The worksheet is designed to track actual emissions for future reference and to determine if an actual leak based emission accounting is feasible for M&R stations.

If you record data using this table and you only leak survey part of your system, you must extrapolate emissions from leaks up to account for emissions from your entire system for the year.

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.

Distribution M&R Station Component Vented Emissions:

ID	Geographic Location	Station Classification	Device Type	Bleed Rate	Manufacturer	Number of Days Emitting	Engineering or Manufacturer's based Estimate of Emissions	Annual Emissions (Mscf)	Explanatory Notes / Comments
12DR10000049	92308	A3	O	L	SpectraSensor	365	0.048	17.52	Manufacturer's based Estimate of Emissions (1-2 cubic Feet per hour: 2 ft ³ /hr * 24hrs/day * 365 days = 17,520 ft ³)
Total								17.52	

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to
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In Response to Data Request, R15-01-008 2022 June Report
Appendix 5; Rev. 03/30/2022

Notes:

The data collected on this sheet is for informational purposes and will not be included in the emissions inventory for 2021. The worksheet is designed to track actual leaks for future reference and to determine if an actual leak based emission accounting is feasible for M&R stations.

If you record data using this table and you only leak survey part of your system, you must extrapolate emissions from leaks up to account for emissions from your entire system for the year.

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.

Distribution M&R Station Component Fugitive Leaks:

ID	Geographic Location	Station Classification	Device Type	Bleed Rate	Manufacturer	Pressure (psi)	Discovery Date (MM/DD/YY)	Repair Date (MM/DD/YY)	Number of Days Leaking	Emission Factor (Mscf/day)	Annual Emissions (Mscf)	Explanatory Notes / Comments
4328842	96150 A1		V	L		35	8/30/2021	9/23/2021	24	0.014	0.336	Grade 3 leak non-reportable
Total											0.336	

Appendix 6
MSA Systems

SOUTHWEST GAS CORPORATION, JUNE 15, 2022

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 6; Rev. 03/30/2022**

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.

Response:

Customer Meter Total Leaks and Emissions:

Number of Meters	Meter Type	Emission Factor (Mscf/yr)	Annual Emissions (Mscf)
194,287	R	0.148	28754.476
9,738	CI	0.051	496.638
Total			29,251.114

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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 6; Rev. 03/30/2022

Notes:

The intent of this worksheet is to capture event data that represent the fugitive leaks on MSA assets that if repaired would cease leaking. If the equipment or component is releasing gas or "bleeding" as a result of its design or function, then it is not to be captured in this tab and should be entered into the Component Emissions tab.

No emissions estimates from this worksheet should be included in Appendix 8, as this is being collected for informational purposes at this time.

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.

Response:

(Please add any clarifying explanations here above the table.)

Customer Meter Fugitive Leaks:

ID	Geographic Location	Meter Classification (Commercial/Industrial or Residential)	Leak Classification (Grade)	Discovery Date (DD/MM/YY)	Leak Repair Date (MM/DD/YY)	If not repaired by 12/31/2021 List the Scheduled Date of Repair (DD/MM/YY)	Repair Type	Number of Days Leaking	Number of Days to Repair	Comments or Additional Information (If you are able to quantify the leak rate by bubble pattern or other methods please include this volumetric data, and state what method was used to determine the flow/leak rate in these columns.)
5200366139	92345	R	AH	8/10/2021	8/10/2021		CR	222	1	
5200001146	92311	R	AN	12/6/2021	12/6/2021		CR	340	1	
5200056012	92395	R	AN	5/5/2021	5/5/2021		CR	125	1	
5200468336	92342	R	AN	12/17/2021	12/17/2021		CR	351	1	
5200008387	92395	R	AN	7/20/2021	7/20/2021		CR	201	1	
5200006154	92307	CI	AN	8/31/2021	9/14/2021		CR	257	15	
5201708318	92345	R	AN	12/18/2021	12/18/2021		CR	352	1	
5200022314	92307	CI	AN	8/15/2021	8/15/2021		CR	227	1	
5200186859	92311	R	AN	8/15/2021	8/15/2021		CR	227	1	
5200278898	92394	R	AN	8/3/2021	8/3/2021		CR	215	1	
5200065710	92301	R	AN	6/5/2021	6/5/2021		CR	156	1	
5200009028	92308	R	AN	10/15/2021	10/15/2021		CR	288	1	
5200063158	92345	R	AN	11/2/2021	11/2/2021		CR	306	1	
5200045374	92392	R	AN	11/28/2021	11/28/2021		CR	332	1	
5200234076	92345	R	AN	6/30/2021	7/8/2021		CR	189	9	
5200166278	92345	R	AN	6/30/2021	7/8/2021		CR	189	9	
5200016058	92345	R	AN	6/30/2021	7/8/2021		CR	189	9	
5200112132	92307	R	AN	10/21/2021	10/21/2021		CR	294	1	
5200097448	92314	R	AN	7/28/2021	10/20/2021		CR	293	85	
5200084465	92394	R	AN	7/28/2021	7/28/2021		CR	209	1	
5200008915	92308	R	AN	6/28/2021	7/7/2021		CR	188	10	
5200167866	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200282535	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200257644	92392	R	AN	7/3/2021	7/3/2021		CR	184	1	
5200036957	92314	R	AN	7/28/2021	7/29/2021		CR	210	2	
5202187811	92392	R	AN	12/8/2021	12/8/2021		CR	342	1	
5200127946	92395	R	AN	8/14/2021	8/14/2021		CR	226	1	
5200317523	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200133689	92345	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200231213	92345	R	AN	6/28/2021	7/8/2021		CR	189	11	
5200028353	92392	R	AN	5/31/2021	5/31/2021		CR	151	1	
5200214381	92308	R	AN	5/16/2021	5/16/2021		CR	136	1	
5200467727	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200287966	92308	R	AN	12/16/2021	12/17/2021		CR	351	2	
5200151209	92345	CI	AN	7/28/2021	7/29/2021		CR	210	2	

ID	Geographic Location	Meter Classification (Commercial/Industrial or Residential)	Leak Classification (Grade)	Discovery Date (DD/MM/YY)	Leak Repair Date (MM/DD/YY)	If not repaired by 12/31/2021 List the Scheduled Date of Repair (DD/MM/YY)	Repair Type	Number of Days Leaking	Number of Days to Repair	Comments or Additional Information (If you are able to quantify the leak rate by bubble pattern or other methods please include this volumetric data, and state what method was used to determine the flow/leak rate in these columns.)
5200231171	92345	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200067995	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200016140	92345	R	AN	6/24/2021	6/30/2021		CR	181	7	
5200123508	92395	CI	AN	8/31/2021	9/1/2021		CR	244	2	
5200422798	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200234155	92345	R	AN	6/25/2021	7/7/2021		CR	188	13	
5200234343	92345	R	AN	6/30/2021	7/13/2021		CR	194	14	
5200138379	92345	R	AN	6/30/2021	7/13/2021		CR	194	14	
5200123734	92395	CI	AN	8/31/2021	9/1/2021		CR	244	2	
5200214220	92308	R	AN	12/16/2021	12/29/2021		CR	363	14	
5200009744	92342	R	AN	5/2/2021	9/10/2021		CR	253	132	
5200094262	92311	R	AN	6/1/2021	6/15/2021		CR	166	15	
5202562505	92392	R	AN	12/10/2021	12/10/2021		CR	344	1	
5200010579	92395	R	AN	7/14/2021	7/14/2021		CR	195	1	
5200018791	92392	R	AN	12/24/2021	12/24/2021		CR	358	1	
5201781325	92392	R	AN	12/10/2021	12/10/2021		CR	344	1	
5200060210	92345	R	AN	6/25/2021	7/9/2021		CR	190	15	
5200284473	92345	R	AN	6/25/2021	7/9/2021		CR	190	15	
5200063119	92345	R	AN	6/24/2021	7/8/2021		CR	189	15	
5200031889	92311	CI	AN	8/31/2021	9/14/2021		CR	257	15	
5202509004	92392	R	AN	12/18/2021	12/18/2021		CR	342	1	
5200145720	92394	CI	AN	9/13/2021	9/28/2021		CR	271	16	
5200036702	92386	R	AN	7/28/2021	8/12/2021		CR	224	16	
5200047969	92307	CI	AN	9/14/2021	9/29/2021		CR	272	16	
5200179551	92311	R	AN	5/2/2021	5/18/2021		CR	138	17	
5200150181	92307	R	AN	7/28/2021	8/13/2021		CR	225	17	
5200382097	92345	R	AN	5/2/2021	5/19/2021		CR	139	18	
5200382291	92345	R	AN	5/2/2021	5/19/2021		CR	139	18	
5200051912	92307	R	AN	5/2/2021	5/19/2021		CR	139	18	
5200234109	92345	R	AN	5/2/2021	5/20/2021		CR	140	19	
5200014876	92345	R	AN	6/25/2021	7/13/2021		CR	194	19	
5200015531	92345	R	AN	6/25/2021	7/14/2021		CR	195	20	
5200234006	92345	R	AN	6/24/2021	7/13/2021		CR	194	20	
5200240334	92307	R	AN	7/21/2021	7/23/2021		CR	204	3	
5200227052	92308	R	AN	11/21/2021	11/21/2021		CR	325	1	
5200231381	92345	R	AN	7/21/2021	7/23/2021		CR	204	3	
5200031581	92327	CI	AN	10/30/2021	10/30/2021		CR	303	1	
5200049393	92395	CI	AN	12/18/2021	12/18/2021		CR	342	1	
5200185741	92315	R	AN	9/20/2021	9/22/2021		CR	265	3	
5200214402	92308	R	AN	7/23/2021	7/23/2021		CR	204	1	
5200147148	92395	CI	AN	8/16/2021	8/18/2021		CR	230	3	
5200063303	92345	CI	AN	7/28/2021	7/30/2021		CR	211	3	
5200067502	92395	CI	AN	11/9/2021	11/9/2021		CR	313	1	
5200106996	92308	R	AN	8/15/2021	8/15/2021		CR	227	1	
5200166449	92307	CI	AN	9/14/2021	9/16/2021		CR	259	3	
5200270729	92345	CI	AN	8/14/2021	8/14/2021		CR	226	1	
5200305316	92314	R	AN	7/21/2021	8/12/2021		CR	224	23	
5200003846	92345	R	AN	11/19/2021	11/19/2021		CR	323	1	
5200440096	92392	R	AN	9/13/2021	9/13/2021		CR	256	1	
5201963806	92345	R	AN	11/3/2021	11/3/2021		CR	307	1	
5200056217	92395	R	AN	7/21/2021	7/21/2021		CR	202	1	

ID	Geographic Location	Meter Classification (Commercial/Industrial or Residential)	Leak Classification (Grade)	Discovery Date (DD/MM/YY)	Leak Repair Date (MM/DD/YY)	If not repaired by 12/31/2021 List the Scheduled Date of Repair (DD/MM/YY)	Repair Type	Number of Days Leaking	Number of Days to Repair	Comments or Additional Information (If you are able to quantify the leak rate by bubble pattern or other methods please include this volumetric data, and state what method was used to determine the flow/leak rate in these columns.)
5200324199	92301	R	AN	8/23/2021	8/23/2021		CR	235	1	
5200186579	92311	R	AN	8/17/2021	8/17/2021		CR	229	1	
5200432830	92394	R	AN	9/15/2021	9/15/2021		CR	258	1	
5200478155	92394	R	AN	11/3/2021	11/3/2021		CR	307	1	
5200458824	92314	R	AN	7/28/2021	8/25/2021		CR	237	29	
5200016040	92345	R	AN	11/26/2021	11/26/2021		CR	330	1	
5200013081	92392	R	AN	11/4/2021	12/3/2021		CR	337	30	
5200033446	92311	R	AN	7/19/2021	7/19/2021		CR	200	1	
5200073885	92344	R	AN	12/17/2021	12/17/2021		CR	351	1	
5200080913	92392	CI	AN	6/30/2021	6/30/2021		CR	181	1	
5200001135	92311	CI	AN	8/16/2021	8/19/2021		CR	231	4	
5200050252	92394	R	AN	6/14/2021	6/14/2021		CR	165	1	
5200123582	92395	CI	AN	8/16/2021	8/19/2021		CR	231	4	
5200239635	92345	R	AN	11/30/2021	11/30/2021		CR	334	1	
5200153407	92307	CI	AN	8/16/2021	8/19/2021		CR	231	4	
5200002958	92311	CI	AN	8/16/2021	8/19/2021		CR	231	4	
5200088111	92301	R	AN	6/8/2021	6/8/2021		CR	159	1	
5200282223	92342	R	AN	12/10/2021	12/10/2021		CR	344	1	
5200000923	92311	R	AN	11/5/2021	11/5/2021		CR	309	1	
52000091562	92311	CI	AN	6/25/2021	6/29/2021		CR	180	5	
5200068870	92344	R	AN	11/30/2021	11/30/2021		CR	334	1	
5201896301	92395	R	AN	8/17/2021	8/17/2021		CR	229	1	
5200257604	92342	R	AN	12/20/2021	12/20/2021		CR	354	1	
5200049813	92395	R	AN	7/8/2021	7/8/2021		CR	189	1	
5200098555	92345	R	AN	9/14/2021	9/14/2021		CR	257	1	
5200098555	92345	R	AN	9/10/2021	9/10/2021		CR	253	1	
5200066792	92308	R	AN	11/5/2021	11/5/2021		CR	309	1	
5200334009	92345	R	AN	10/13/2021	10/13/2021		CR	286	1	
5200088048	92308	R	AN	11/5/2021	11/5/2021		CR	309	1	
5200132952	92345	R	AN	5/11/2021	5/11/2021		CR	131	1	
5200401670	92344	R	AN	11/10/2021	11/10/2021		CR	314	1	
5200145517	92345	R	AN	8/9/2021	8/9/2021		CR	221	1	
5200109706	92307	R	AN	11/28/2021	11/28/2021		CR	332	1	
5200090055	92315	CI	AN	8/16/2021	9/22/2021		CR	265	38	
5200109833	92307	R	AN	12/20/2021	12/20/2021		CR	354	1	
5200148859	92342	R	AN	11/26/2021	11/26/2021		CR	330	1	
5200428697	92392	CI	AN	11/10/2021	11/10/2021		CR	314	1	
5201934380	92392	R	AN	12/1/2021	12/1/2021		CR	335	1	
5200148652	92368	R	AN	5/18/2021	5/18/2021		CR	138	1	
5200028422	92301	R	AN	12/13/2021	12/13/2021		CR	347	1	
5200190959	92311	R	AN	6/18/2021	6/18/2021		CR	169	1	
5200440398	92392	R	AN	10/1/2021	10/1/2021		CR	274	1	
5200088177	92392	R	AN	6/9/2021	6/9/2021		CR	160	1	
5200090868	92314	R	AN	8/3/2021	8/3/2021		CR	215	1	
5200027966	92392	R	AN	9/20/2021	9/20/2021		CR	263	1	
5200047414	92308	R	AN	11/4/2021	12/15/2021		CR	349	42	
5200229261	92395	R	AN	11/28/2021	11/28/2021		CR	332	1	
5200071316	92392	R	AN	12/4/2021	12/4/2021		CR	338	1	
5200028426	92301	R	AN	5/8/2021	5/8/2021		CR	128	1	
5200007715	92308	R	AN	11/4/2021	12/16/2021		CR	350	43	
5200007775	92308	R	AN	11/4/2021	12/16/2021		CR	350	43	

ID	Geographic Location	Meter Classification (Commercial/Industrial or Residential)	Leak Classification (Grade)	Discovery Date (DD/MM/YY)	Leak Repair Date (MM/DD/YY)	If not repaired by 12/31/2021 List the Scheduled Date of Repair (DD/MM/YY)	Repair Type	Number of Days Leaking	Number of Days to Repair	Comments or Additional Information (If you are able to quantify the leak rate by bubble pattern or other methods please include this volumetric data, and state what method was used to determine the flow/leak rate in these columns.)
5200003057	92345	R	AN	12/9/2021	12/9/2021		CR	343	1	
5200028631	92315	R	AN	8/21/2021	8/21/2021		CR	233	1	
5202396021	92394	R	AN	9/17/2021	9/17/2021		CR	260	1	
5200284318	92307	R	AN	8/8/2021	8/8/2021		CR	220	1	
5200007756	92308	R	AN	11/4/2021	12/17/2021		CR	351	44	
5200236205	92392	R	AN	11/12/2021	11/12/2021		CR	316	1	
5200231224	92345	R	AN	12/6/2021	12/6/2021		CR	340	1	
5200013075	92395	R	AN	11/19/2021	11/19/2021		CR	323	1	
5200133845	92345	R	AN	12/28/2021	12/28/2021		CR	362	1	
5200009986	92342	R	AN	7/11/2021	7/11/2021		CR	192	1	
5200231108	92345	R	AN	12/3/2021	12/4/2021		CR	338	2	
5200416375	92345	R	AN	11/20/2021	11/20/2021		CR	324	1	
5200234096	92345	R	AN	8/25/2021	8/25/2021		CR	237	1	
5200015521	92345	R	AN	12/20/2021	12/20/2021		CR	354	1	
5200088255	92301	R	AN	6/21/2021	6/21/2021		CR	172	1	
5200145995	92342	R	AN	11/24/2021	11/24/2021		CR	328	1	
5200028205	92394	R	AN	11/20/2021	11/20/2021		CR	324	1	
5200428612	92392	CI	AN	10/20/2021	10/20/2021		CR	293	1	
5200041231	92308	R	AN	10/21/2021	10/21/2021		CR	294	1	
5200027870	92308	R	AN	10/28/2021	12/14/2021		CR	348	48	
5200287797	92345	CI	AN	6/24/2021	6/29/2021		CR	180	6	
5200138468	92345	R	AN	6/24/2021	6/29/2021		CR	180	6	
5200166307	92345	R	AN	6/18/2021	6/18/2021		CR	169	1	
5200123409	92395	R	AN	7/24/2021	7/24/2021		CR	205	1	
5200270510	92345	R	AN	6/24/2021	6/29/2021		CR	180	6	
5200501653	92345	R	AN	6/25/2021	8/10/2021		CR	222	49	
5200015491	92345	R	AN	8/10/2021	8/10/2021		CR	222	1	
5200060043	92345	R	AN	6/24/2021	6/29/2021		CR	180	6	
5200007848	92308	R	AN	10/28/2021	12/16/2021		CR	350	50	
5200007692	92308	R	AN	10/28/2021	12/16/2021		CR	350	50	
5200007862	92308	R	AN	12/16/2021	12/16/2021		CR	355	6	
5200174404	92345	R	AN	10/28/2021	12/16/2021		CR	350	50	
5200056406	92395	CI	AN	6/24/2021	6/29/2021		CR	180	6	
5200297331	92315	R	AN	12/17/2021	12/17/2021		CR	351	1	
5200041387	92308	R	AN	9/3/2021	9/3/2021		CR	246	1	
5200047026	92308	R	AN	9/8/2021	9/8/2021		CR	251	1	
5200047026	92308	R	AN	12/16/2021	12/21/2021		CR	355	6	
5200060459	92345	R	AN	6/24/2021	6/29/2021		CR	180	6	
5200298844	92311	CI	AN	11/19/2021	11/19/2021		CR	323	1	
5200007795	92308	R	AN	10/28/2021	12/17/2021		CR	351	51	
5200148598	92356	R	AN	8/16/2021	8/16/2021		CR	228	1	
5200082558	92307	R	AN	9/13/2021	9/13/2021		CR	256	1	
5200012771	92395	R	AN	5/8/2021	5/8/2021		CR	128	1	
5200013594	92392	R	AN	8/22/2021	8/22/2021		CR	234	1	
5200295152	92344	R	AN	6/13/2021	6/13/2021		CR	164	1	
5200366328	92345	R	AN	6/24/2021	6/29/2021		CR	180	6	
5200000827	92311	CI	AN	10/26/2021	10/26/2021		CR	299	1	
5200132530	92345	R	AN	10/4/2021	10/4/2021		CR	277	1	
5200456093	92392	R	AN	11/24/2021	11/24/2021		CR	328	1	
5200284265	92308	R	AN	10/22/2021	10/22/2021		CR	295	1	
5200336810	92345	R	AN	12/8/2021	12/8/2021		CR	342	1	

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5200030818	92311	R	AN	12/17/2021	12/17/2021		CR	351	1	
5200090794	92314	R	AN	7/23/2021	7/28/2021		CR	209	6	
5200092742	92311	R	AN	10/15/2021	10/15/2021		CR	288	1	
5200162613	92308	R	AN	11/24/2021	11/24/2021		CR	328	1	
5200001946	92398	CI	AN	8/5/2021	9/27/2021		CR	270	54	
5200381590	92392	R	AN	11/20/2021	11/20/2021		CR	324	1	
5200019771	92394	R	AN	12/21/2021	12/21/2021		CR	355	1	
5200381590	92392	R	AN	11/23/2021	11/23/2021		CR	327	1	
5200192439	92315	CI	AN	11/1/2021	11/1/2021		CR	305	1	
5200231014	92345	R	AN	7/21/2021	9/13/2021		CR	256	55	
5200045058	92395	R	AN	7/29/2021	7/29/2021		CR	210	1	
5200248719	92395	R	AN	6/5/2021	6/5/2021		CR	156	1	
5201832332	92315	R	AN	7/26/2021	7/26/2021		CR	207	1	
5200166037	92308	R	AN	11/4/2021	11/4/2021		CR	308	1	
5200062031	92345	R	AN	11/6/2021	11/6/2021		CR	310	1	
5200231149	92394	R	AN	9/14/2021	9/14/2021		CR	257	1	
5200096616	92345	R	AN	7/21/2021	7/27/2021		CR	208	7	
5200119868	92395	R	AN	9/16/2021	9/16/2021		CR	259	1	
5200440311	92344	R	AN	9/13/2021	9/13/2021		CR	256	1	
5200137267	92301	R	AN	11/12/2021	11/12/2021		CR	316	1	
5200231295	92345	R	AN	6/12/2021	6/12/2021		CR	163	1	
5200440284	92301	R	AN	7/21/2021	7/27/2021		CR	208	7	
5200151824	92344	R	AN	12/28/2021	12/28/2021		CR	362	1	
5200273127	92392	R	AN	9/26/2021	9/26/2021		CR	269	1	
5200032033	92311	R	AN	10/18/2021	10/18/2021		CR	291	1	
5200231386	92345	R	AN	9/21/2021	9/21/2021		CR	264	1	
5200088139	92394	R	AN	7/21/2021	7/27/2021		CR	208	7	
5200284465	92345	R	AN	11/12/2021	11/12/2021		CR	316	1	
5200001447	92311	R	AN	6/4/2021	6/4/2021		CR	155	1	
5200045335	92395	R	AN	12/6/2021	12/6/2021		CR	340	1	
5200214006	92308	R	AN	10/26/2021	10/26/2021		CR	299	1	
5200515397	92308	R	AN	10/28/2021	12/29/2021		CR	363	63	
5200034241	92345	R	AN	11/23/2021	12/29/2021		CR	363	63	
5200084364	92308	R	AN	6/12/2021	6/12/2021		CR	327	1	
5201711818	92301	R	AN	11/18/2021	11/18/2021		CR	163	1	
5200049872	92395	R	AN	12/29/2021	12/29/2021		CR	322	1	
5200071809	92392	R	AN	11/29/2021	11/29/2021		CR	363	1	
5200070104	92308	R	AN	12/22/2021	12/22/2021		CR	333	1	
5200013347	92392	R	AN	11/29/2021	11/29/2021		CR	356	1	
5200015424	92345	R	AN	11/2/2021	11/2/2021		CR	333	1	
5200203524	92308	R	AN	5/2/2021	8/13/2021		CR	225	104	
5200168949	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200282577	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200167868	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200167710	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200282622	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200027263	92308	R	AN	7/22/2021	7/23/2021		CR	204	2	
5200076219	92308	R	AN	7/22/2021	7/23/2021		CR	204	2	
5200282886	92308	R	AN	6/28/2021	6/29/2021		CR	180	2	
5200214446	92308	R	AN	12/16/2021	12/28/2021		CR	362	13	

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5200214497	92308	R	AN	12/16/2021	12/28/2021		CR	362	13	
5200214498	92308	R	AN	12/16/2021	12/28/2021		CR	362	13	
5200214274	92308	R	AN	12/16/2021	12/28/2021		CR	362	13	
5200007666	92308	R	AN	12/16/2021	12/28/2021		CR	362	13	
5200027159	92308	R	AN	12/16/2021	12/28/2021		CR	362	13	
5200027626	92307	R	AN	12/16/2021	12/29/2021		CR	363	14	
5200031244	92314	R	AN	8/31/2021	9/16/2021		CR	259	17	
5200031128	92314	R	AN	8/31/2021	9/16/2021		CR	259	17	
5200458867	92314	R	AN	8/31/2021	9/16/2021		CR	259	17	
5200234294	92345	R	AN	5/2/2021	5/20/2021		CR	140	19	
5200029006	92315	R	AN	9/20/2021	9/22/2021		CR	265	3	
5200196129	92314	CI	AN	9/20/2021	9/22/2021		CR	265	3	
5200192330	92315	R	AN	9/20/2021	9/22/2021		CR	265	3	
5200196362	92314	R	AN	8/25/2021	9/16/2021		CR	259	23	
5200322132	92314	R	AN	8/25/2021	9/16/2021		CR	259	23	
5200031009	92314	R	AN	8/16/2021	9/15/2021		CR	259	23	
5200448855	92315	R	AN	8/16/2021	9/15/2021		CR	258	31	
5200307055	92314	R	AN	9/14/2021	9/17/2021		CR	260	4	
5200127304	92315	R	AN	9/20/2021	9/23/2021		CR	266	4	
5200279468	92314	R	AN	8/16/2021	9/17/2021		CR	260	33	
5200185793	92315	R	AN	8/16/2021	9/23/2021		CR	266	4	
5200444641	92315	R	AN	10/22/2021	9/20/2021		CR	263	36	
5200167619	92395	R	AN	10/22/2021	10/22/2021		CR	295	1	
5200084281	92301	CI	AN	11/4/2021	12/15/2021		CR	349	42	
5200421203	92392	CI	AN	11/4/2021	12/15/2021		CR	349	42	
5200116917	92308	R	AN	11/4/2021	12/17/2021		CR	351	44	
5200127368	92315	R	AN	8/5/2021	9/20/2021		CR	263	47	
5200093965	92308	R	AN	12/16/2021	12/21/2021		CR	355	6	
5200047106	92308	R	AN	12/16/2021	12/21/2021		CR	355	6	
5200006234	92307	R	AN	12/16/2021	12/21/2021		CR	355	6	
52000340864	92307	R	AN	12/16/2021	12/21/2021		CR	355	6	
5200214429	92308	R	AN	12/16/2021	12/21/2021		CR	355	6	
5200094999	92308	R	AN	12/16/2021	12/21/2021		CR	355	6	
5200009487	92308	R	AN	12/16/2021	12/21/2021		CR	355	6	
5200355832	92395	R	AN	10/12/2021	10/12/2021		CR	285	1	
5200007839	92308	R	AN	10/28/2021	12/28/2021		CR	362	62	
1210606008	92345	R	AN	2/11/2021	3/11/2021		CR	70	29	
1211273078	92394	R	AN	1/8/2021	3/12/2021		CR	71	64	
1211333151	92308	R	AN	3/19/2020	1/4/2021		CR	4	292	
1210214768	92307	R	AN	10/5/2020	1/6/2021		CR	6	94	
1210286209	92308	R	AN	10/9/2020	1/8/2021		CR	8	92	
1210213977	92307	R	AN	10/2/2020	1/15/2021		CR	15	106	
1210292318	92308	R	AN	10/13/2020	1/20/2021		CR	20	100	
1210221988	92308	R	AN	10/2/2020	1/21/2021		CR	21	112	
1210119624	92307	R	AN	1/22/2021	1/22/2021		CR	22	1	
1110081047	92398	R	AN	2/10/2021	2/10/2021		CR	41	1	
1111006534	92311	R	AN	2/17/2021	2/17/2021		CR	48	1	
1210385751	92392	R	AN	3/2/2021	3/2/2021		CR	61	1	
1211553134	92345	R	AN	1/27/2021	3/15/2021		CR	74	48	
1210031106	92345	R	AN	1/18/2021	3/16/2021		CR	75	58	

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1210045502	92345	R	AN	1/12/2021	3/17/2021		CR	76	65	
1210055734	92345	R	AN	1/12/2021	3/17/2021		CR	76	65	
1210018115	92345	R	AN	1/11/2021	3/18/2021		CR	77	67	
1211272713	92392	R	AN	3/22/2021	3/22/2021		CR	81	1	
1211174677	92308	R	AN	11/19/2020	3/25/2021		CR	84	127	
1210606168	92345	R	AN	1/1/2021	1/1/2021		CR	1	1	
1211434299	92394	R	AN	1/4/2021	1/4/2021		CR	4	1	
1210516199	92392	R	AN	1/6/2021	1/6/2021		CR	6	1	
1210590994	92345	R	AN	1/7/2021	1/7/2021		CR	7	1	
1211127817	92392	R	AN	1/7/2021	1/7/2021		CR	7	1	
1211234464	92345	R	AN	1/8/2021	1/8/2021		CR	8	1	
1110099827	92311	R	AN	1/11/2021	1/11/2021		CR	11	1	
1210265749	92392	R	AN	1/11/2021	1/11/2021		CR	11	1	
1211151304	92345	R	AN	1/12/2021	1/12/2021		CR	12	1	
1210067622	92345	R	AN	1/14/2021	1/14/2021		CR	14	1	
1211505038	92342	R	AN	1/14/2021	1/14/2021		CR	14	1	
1210011973	92345	R	AN	1/15/2021	1/15/2021		CR	15	1	
1211564508	92345	R	AN	1/15/2021	1/15/2021		CR	15	1	
1210654813	92345	R	AN	1/16/2021	1/16/2021		CR	16	1	
1210017038	92345	R	AN	1/18/2021	1/18/2021		CR	18	1	
1210041338	92345	R	AN	1/18/2021	1/18/2021		CR	18	1	
1210271065	92392	R	AN	1/18/2021	1/18/2021		CR	18	1	
1210266690	92392	R	AN	1/21/2021	1/21/2021		CR	21	1	
1210148575	92307	R	AN	1/25/2021	1/25/2021		CR	25	1	
1211181051	92308	CI	AN	10/2/2020	1/26/2021		CR	26	117	
1210291104	92308	CI	AN	10/8/2020	1/26/2021		CR	26	111	
1210283605	92308	R	AN	10/7/2020	1/27/2021		CR	27	113	
1211439179	92392	R	AN	1/31/2021	1/31/2021		CR	31	1	
1210582606	92392	R	AN	2/1/2021	2/1/2021		CR	32	1	
1210675979	92345	R	AN	2/2/2021	2/2/2021		CR	33	1	
1210035445	92345	CI	AN	2/3/2021	2/3/2021		CR	34	1	
1210673495	92345	R	AN	2/3/2021	2/3/2021		CR	34	1	
1210044463	92345	R	AN	2/4/2021	2/4/2021		CR	35	1	
1211268379	92394	R	AN	2/4/2021	2/4/2021		CR	35	1	
1210480486	92395	R	AN	3/9/2020	2/5/2021		CR	36	334	
1211465807	92308	R	AN	2/5/2021	2/5/2021		CR	36	1	
1210180177	92308	R	AN	2/6/2021	2/7/2021		CR	38	2	
1211465789	92308	R	AN	2/7/2021	2/7/2021		CR	38	1	
1210386006	92395	R	AN	4/20/2020	2/9/2021		CR	40	296	
1210429422	92395	R	AN	4/21/2020	2/9/2021		CR	40	295	
1210492317	92395	R	AN	2/9/2021	2/9/2021		CR	40	1	
1211038465	92345	R	AN	2/9/2021	2/9/2021		CR	40	1	
1211507160	92301	R	AN	2/9/2021	2/9/2021		CR	40	1	
1210601860	92345	R	AN	2/12/2021	2/12/2021		CR	43	1	
1211553191	92392	R	AN	2/12/2021	2/12/2021		CR	43	1	
1311066925	92314	R	AN	2/12/2021	2/12/2021		CR	43	1	
1210620166	92345	CI	AN	2/15/2021	2/15/2021		CR	46	1	
1211504209	92342	R	AN	2/18/2021	2/18/2021		CR	49	1	
1210506234	92395	R	AN	2/19/2021	2/19/2021		CR	50	1	
1210359403	92301	R	AN	2/22/2021	2/22/2021		CR	53	1	
1210666449	92345	R	AN	2/23/2021	2/23/2021		CR	54	1	

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1211406497	92308	R	AN	2/23/2021	2/23/2021		CR	54	1	
1210468976	92394	R	AN	2/25/2021	2/25/2021		CR	56	1	
1211700601	92392	R	AN	2/26/2021	2/26/2021		CR	57	1	
1210288716	92308	CI	AN	10/2/2020	3/2/2021		CR	61	152	
1210213727	92307	R	AN	10/5/2020	3/2/2021		CR	61	149	
1211138493	92307	CI	AN	10/5/2020	3/2/2021		CR	61	149	
1210192948	92307	R	AN	10/13/2020	3/2/2021		CR	61	141	
1210611326	92345	R	AN	2/10/2021	3/2/2021		CR	61	21	
1210525361	92392	R	AN	3/2/2021	3/2/2021		CR	61	1	
1211575574	92308	R	AN	3/5/2021	3/5/2021		CR	64	1	
1210616329	92345	R	AN	3/1/2021	3/1/2021		CR	69	10	
1210537546	92392	R	AN	11/20/2020	3/1/2021		CR	70	112	
1211235541	92345	R	AN	2/3/2021	3/1/2021		CR	70	37	
1210675522	92345	R	AN	2/4/2021	3/1/2021		CR	70	36	
1210677974	92345	R	AN	2/10/2021	3/1/2021		CR	70	30	
1210606257	92345	R	AN	2/11/2021	3/1/2021		CR	70	29	
1210638079	92345	R	AN	2/11/2021	3/1/2021		CR	70	29	
1211546356	92394	R	AN	1/5/2021	3/1/2021		CR	71	67	
1211227193	92394	R	AN	1/7/2021	3/1/2021		CR	71	65	
1210676755	92345	R	AN	2/9/2021	3/1/2021		CR	71	32	
1210677284	92345	R	AN	2/10/2021	3/1/2021		CR	71	31	
1210397649	92395	CI	AN	2/22/2021	3/1/2021		CR	71	19	
1210053616	92345	R	AN	3/1/2021	3/1/2021		CR	71	1	
1211269475	92394	R	AN	1/11/2021	3/1/2021		CR	75	65	
1210126262	92307	R	AN	3/16/2021	3/16/2021		CR	75	1	
1211264754	92394	R	AN	1/4/2021	3/17/2021		CR	76	73	
1210553431	92392	R	AN	2/23/2021	3/17/2021		CR	76	23	
1210553445	92392	R	AN	2/23/2021	3/17/2021		CR	76	23	
1210119639	92307	R	AN	3/17/2021	3/17/2021		CR	76	1	
1210670798	92345	R	AN	2/2/2021	3/18/2021		CR	77	45	
1210671063	92345	R	AN	2/2/2021	3/18/2021		CR	77	45	
1211542745	92345	R	AN	2/2/2021	3/18/2021		CR	77	45	
1211045882	92392	R	AN	3/18/2021	3/18/2021		CR	78	1	
1210032748	92345	R	AN	1/21/2021	3/22/2021		CR	81	61	
1210666754	92345	R	AN	2/2/2021	3/22/2021		CR	81	49	
1210668848	92345	R	AN	2/4/2021	3/22/2021		CR	81	47	
1210046472	92345	R	AN	2/5/2021	3/22/2021		CR	81	46	
1210612615	92345	R	AN	3/5/2021	3/22/2021		CR	81	18	
1211045173	92345	R	AN	1/8/2021	3/23/2021		CR	82	75	
1210674130	92345	R	AN	1/11/2021	3/23/2021		CR	82	72	
1210674835	92345	R	AN	1/11/2021	3/23/2021		CR	82	72	
1211570980	92345	R	AN	2/4/2021	3/23/2021		CR	82	48	
1210605889	92345	R	AN	2/17/2021	3/23/2021		CR	82	35	
1210481900	92395	R	AN	3/23/2021	3/23/2021		CR	82	1	
1211473447	92345	R	AN	1/8/2021	3/24/2021		CR	83	76	
1210670892	92345	R	AN	2/2/2021	3/24/2021		CR	83	51	
1210673476	92345	R	AN	2/3/2021	3/24/2021		CR	83	50	
1210673902	92345	R	AN	2/3/2021	3/24/2021		CR	83	50	
1210673936	92345	R	AN	2/3/2021	3/24/2021		CR	83	50	
1211461009	92345	CI	AN	2/3/2021	3/24/2021		CR	83	50	

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1210603738	92345	R	AN	3/4/2021	3/24/2021		CR	83	21	
1210603738	92345	R	AN	3/4/2021	3/24/2021		CR	83	21	
1211433371	92394	R	AN	3/28/2021	3/28/2021		CR	87	1	
1210051448	92345	R	AN	1/14/2021	3/30/2021		CR	89	76	
1110098120	92311	R	AN	1/25/2021	3/30/2021		CR	89	65	
1110096779	92311	R	AN	1/26/2021	3/30/2021		CR	89	64	
1210167011	92307	R	AN	3/31/2021	3/31/2021		CR	90	1	
1210102818	92307	CI	AN	4/2/2021	4/2/2021		CR	92	1	
1211290458	92345	R	AN	4/2/2021	4/2/2021		CR	92	1	
1210262282	92392	R	AN	4/5/2021	4/5/2021		CR	95	1	
1210266582	92395	R	AN	4/5/2021	4/5/2021		CR	95	1	
1210017432	92345	R	AN	4/7/2021	4/7/2021		CR	97	1	
1210321752	92342	R	AN	4/8/2021	4/8/2021		CR	98	1	
1210483126	92395	R	AN	4/8/2021	4/8/2021		CR	98	1	
1211429271	92344	R	AN	4/8/2021	4/8/2021		CR	98	1	
1210041502	92345	R	AN	4/11/2021	4/11/2021		CR	101	1	
1210170974	92308	R	AN	4/15/2021	4/15/2021		CR	105	1	
1210632482	92345	CI	AN	4/15/2021	4/15/2021		CR	105	1	
1210228613	92308	CI	AN	4/17/2021	4/17/2021		CR	107	1	
1211514200	92308	CI	AN	4/17/2021	4/18/2021		CR	108	2	
1211576327	92307	R	AN	4/19/2021	4/19/2021		CR	109	1	
1210675490	92345	R	AN	2/3/2021	3/11/2021		CR	70	37	
1211222078	92394	R	AN	1/4/2021	3/12/2021		CR	71	68	
1211228513	92394	R	AN	1/7/2021	3/12/2021		CR	71	65	
1210343604	92395	R	AN	2/22/2021	3/17/2021		CR	76	24	
1210553638	92392	R	AN	2/23/2021	3/17/2021		CR	76	23	
1211483294	92345	R	AN	2/2/2021	3/18/2021		CR	77	45	
1210668867	92345	R	AN	2/4/2021	3/18/2021		CR	77	43	
1211197202	92345	R	AN	2/18/2021	3/18/2021		CR	77	29	
1210612333	92345	R	AN	1/11/2021	3/30/2021		CR	89	79	
1210674003	92345	R	AN	3/17/2021	4/27/2021		CR	117	42	
1210603954	92345	R	AN	4/23/2021	4/27/2021		CR	117	5	
1210662665	92345	R	AN	4/23/2021	4/27/2021		CR	117	5	
5200091562	92311	CI	AN	8/16/2021	8/16/2021		CR	228	1	
5200148790	92342	R	AN	1/11/2021	1/11/2021		CR	11	1	
1410029249	96145	N/A	AN	1/31/2021	1/31/2021		TLA	1	1	
1410044803	96145	N/A	AN	9/29/2020	1/8/2021		TLA	102	102	
1411072947	96150	N/A	AN	1/22/2021	1/22/2021		CR	1	1	
1411097361	96150	N/A	AN	1/18/2021	1/18/2021		CR	1	1	
1411106181	96150	N/A	AN	1/18/2021	1/18/2021		TLA	1	1	
1411144074	96150	N/A	AN	1/18/2021	1/18/2021		CR	1	1	
1411151129	96150	N/A	AN	1/21/2021	1/21/2021		TLA	1	1	
1411151401	96150	N/A	AN	1/15/2021	1/15/2021		TLA	1	1	
1411153800	96150	N/A	AN	1/28/2021	1/28/2021		TLA	1	1	
1411158127	96150	N/A	AN	1/16/2021	1/16/2021		TLA	1	1	
1411182958	96150	N/A	AN	1/22/2021	1/22/2021		CR	1	1	
1411229191	96150	N/A	AN	1/14/2021	1/14/2021		TLA	1	1	
1511104971	96161	N/A	AN	1/2/2021	1/2/2021		CR	1	1	
1410010457	96145	N/A	AN	2/23/2021	2/23/2021		TLA	1	1	
1410025554	96145	N/A	AN	2/10/2021	2/10/2021		TLA	1	1	

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1511163889	96161	N/A	AN	2/18/2021	2/18/2021		TLA	1	1	
1411014395	96145	N/A	AN	3/23/2021	3/23/2021		TLA	1	1	
1411093412	96150	N/A	AN	3/2/2021	3/2/2021		TLA	1	1	
1411130674	96150	N/A	AN	3/3/2021	3/3/2021		TLA	1	1	
1410003626	96145	N/A	AN	4/21/2021	4/21/2021		TLA	1	1	
1410008929	96145	N/A	AN	4/2/2021	4/2/2021		TLA	1	1	
1411047818	96150	N/A	AN	6/30/2020	4/10/2021		TLA	285	285	
1411065056	96150	N/A	AN	9/21/2020	4/10/2021		TLA	202	202	
1411065061	96150	N/A	AN	9/21/2020	4/10/2021		TLA	202	202	
1511103147	96161	N/A	AN	4/6/2021	4/6/2021		TLA	1	1	
1410056227	96145	N/A	AN	1/1/2021	1/7/2021		TLA	7	7	
1411034326	96145	N/A	AN	1/1/2021	1/7/2021		TLA	7	7	
1411049072	96150	N/A	AN	1/1/2021	1/9/2021		TLA	9	9	
1411081951	96150	N/A	AN	1/19/2021	1/19/2021		CR	1	1	
1411087994	96150	N/A	AN	1/26/2021	1/26/2021		TLA	1	1	
1411090979	96150	N/A	AN	1/1/2021	1/9/2021		TLA	9	9	
1411215128	96150	N/A	AN	1/1/2021	1/22/2021		TLA	22	22	
1411258099	96145	N/A	AN	1/1/2021	1/15/2021		TLA	15	15	
1511067000	96161	N/A	AN	1/1/2021	1/18/2021		TLA	18	18	
1511093358	96161	N/A	AN	1/1/2021	1/14/2021		TLA	14	14	
1511142686	96161	N/A	AN	1/1/2021	1/14/2021		TLA	14	14	
1511148004	96161	N/A	AN	1/1/2021	1/21/2021		TLA	21	21	
1511154236	96161	N/A	AN	1/1/2021	1/21/2021		TLA	21	21	
1511155811	96161	N/A	AN	1/1/2021	1/9/2021		TLA	9	9	
1410055883	96145	N/A	AN	2/26/2021	2/26/2021		TLA	1	1	
1411051745	96150	N/A	AN	1/1/2021	2/2/2021		TLA	33	33	
1411059303	96150	N/A	AN	1/1/2021	2/1/2021		TLA	32	32	
1411261572	96150	N/A	AN	2/4/2021	2/4/2021		TLA	1	1	
1511159281	96161	N/A	AN	1/1/2021	2/10/2021		CR	41	41	
1411109583	96150	N/A	AN	1/1/2021	3/4/2021		TLA	63	63	
1411155646	96150	N/A	AN	1/1/2021	3/4/2021		TLA	63	63	
1511048879	96161	N/A	AN	1/1/2021	3/20/2021		TLA	79	79	
1511155563	96161	N/A	AN	1/1/2021	3/2/2021		TLA	61	61	
1411043664	96150	N/A	AN	1/1/2021	4/13/2021		TLA	103	103	
1411046060	96150	N/A	AN	1/1/2021	4/10/2021		TLA	100	100	
1411046375	96150	N/A	AN	1/1/2021	4/27/2021		TLA	117	117	
1411049546	96150	N/A	AN	1/1/2021	4/10/2021		CR	100	100	
1411052874	96150	N/A	AN	1/1/2021	4/10/2021		TLA	100	100	
1411053346	96150	N/A	AN	1/1/2021	4/16/2021		TLA	100	100	
1411060068	96150	N/A	AN	1/1/2021	4/16/2021		TLA	106	106	
1411063775	96150	N/A	AN	1/1/2021	4/16/2021		TLA	106	106	
1411088220	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411090518	96150	N/A	AN	1/1/2021	4/26/2021		TLA	116	116	
1411090541	96150	N/A	AN	1/1/2021	4/21/2021		TLA	111	111	
1411096373	96150	N/A	AN	1/1/2021	4/26/2021		TLA	116	116	
1411096387	96150	N/A	AN	1/1/2021	4/26/2021		TLA	116	116	
1411108242	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411129730	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	

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1411134710	96150	N/A	AN	1/1/2021	4/23/2021		TLA	113	113	
1411134796	96150	N/A	AN	1/1/2021	4/23/2021		TLA	113	113	
1411135131	96150	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1411135338	96150	N/A	AN	1/1/2021	4/16/2021		TLA	106	106	
1411135840	96150	N/A	AN	1/1/2021	4/21/2021		TLA	111	111	
1411136645	96150	N/A	AN	1/1/2021	4/16/2021		TLA	106	106	
1411137333	96150	N/A	AN	1/1/2021	4/22/2021		TLA	112	112	
1411139939	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411142192	96150	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1411142370	96150	N/A	AN	1/1/2021	4/28/2021		TLA	118	118	
1411142825	96150	N/A	AN	1/1/2021	4/16/2021		TLA	106	106	
1411167549	96150	N/A	AN	1/1/2021	4/28/2021		TLA	118	118	
1411171598	96150	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1411173095	96150	N/A	AN	1/1/2021	4/16/2021		TLA	106	106	
1411174219	96150	N/A	AN	1/1/2021	4/28/2021		TLA	118	118	
1411176745	96150	N/A	AN	1/1/2021	4/10/2021		TLA	100	100	
1411177305	96150	N/A	AN	1/1/2021	4/12/2021		TLA	102	102	
1411181462	96150	N/A	AN	1/1/2021	4/26/2021		TLA	116	116	
1411182131	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411183063	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411183311	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411184117	96150	N/A	AN	1/1/2021	4/26/2021		TLA	116	116	
1411188441	96150	N/A	AN	1/1/2021	4/22/2021		TLA	112	112	
1411189299	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411191022	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411193971	96150	N/A	AN	1/1/2021	4/27/2021		TLA	117	117	
1411195394	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411204936	96150	N/A	AN	1/1/2021	4/21/2021		TLA	111	111	
1411212863	96150	N/A	AN	1/1/2021	4/26/2021		CR	116	116	
1411214938	96150	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1411216558	96150	N/A	AN	1/1/2021	4/26/2021		TLA	116	116	
1411217673	96150	N/A	AN	1/1/2021	4/26/2021		TLA	116	116	
1411219997	96150	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1411220268	96150	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1411224540	96150	N/A	AN	1/1/2021	4/21/2021		TLA	111	111	
1411224799	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411225401	96150	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1411226333	96150	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1411231135	96150	N/A	AN	1/1/2021	4/26/2021		CR	116	116	
1411232921	96150	N/A	AN	1/1/2021	4/10/2021		TLA	100	100	
1411233130	96150	N/A	AN	1/1/2021	4/22/2021		TLA	112	112	
1411233215	96150	N/A	AN	1/1/2021	4/27/2021		TLA	117	117	
1411236781	96150	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1411239046	96150	N/A	AN	1/1/2021	4/28/2021		TLA	118	118	
1411239099	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411246290	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411249283	96150	N/A	AN	1/1/2021	4/22/2021		TLA	112	112	

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1411252479	96150	N/A	AN	1/1/2021	4/21/2021		TLA	111	111	
1411252751	96150	N/A	AN	1/1/2021	4/13/2021		TLA	103	103	
1411252892	96150	N/A	AN	1/1/2021	4/21/2021		TLA	111	111	
1411253311	96150	N/A	AN	1/1/2021	4/13/2021		TLA	103	103	
1411253965	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411255054	96150	N/A	AN	1/1/2021	4/20/2021		TLA	110	110	
1411258530	96150	N/A	AN	1/1/2021	4/27/2021		TLA	117	117	
1511061930	96161	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1511061945	96161	N/A	AN	1/1/2021	4/17/2021		TLA	107	107	
1511084096	96161	N/A	AN	1/1/2021	4/21/2021		TLA	111	111	
1511102619	96161	N/A	AN	1/1/2021	4/21/2021		TLA	111	111	
1511119360	96161	N/A	AN	1/1/2021	4/21/2021		TLA	111	111	
1511138712	96161	N/A	AN	1/1/2021	4/27/2021		TLA	117	117	
1511158128	96161	N/A	AN	1/1/2021	4/10/2021		TLA	100	100	
5200233821	96150	N/A	AH	8/17/2021	8/17/2021		CR	1	1	
5200198072	96145	N/A	AH	12/28/2021	12/29/2021		CR	1	1	
5200048132	96145	N/A	AN	6/4/2021	6/4/2021		CR	1	1	
5200516691	96161	N/A	AN	8/14/2021	8/14/2021		CR	1	1	
5200045514	96150	N/A	AN	11/29/2021	11/29/2021		CR	1	1	
5200043090	96150	N/A	AN	12/28/2021	12/28/2021		CR	1	1	
5200463065	96150	N/A	AN	5/2/2021	5/4/2021		TLA	3	3	
5200369672	96161	N/A	AN	5/4/2021	5/4/2021		TLA	1	1	
5200102249	96145	N/A	AN	5/28/2021	6/3/2021		TLA	7	7	
5200413791	96161	N/A	AN	6/1/2021	6/2/2021		TLA	2	2	
5200054492	96161	N/A	AN	6/3/2021	6/3/2021		TLA	1	1	
5200315272	96150	N/A	AN	6/7/2021	6/8/2021		TLA	2	2	
5200373373	96145	N/A	AN	6/8/2021	6/9/2021		TLA	2	2	
5200373373	96145	N/A	AN	6/8/2021	6/9/2021		TLA	2	2	
5200353428	96150	N/A	AN	6/15/2021	6/15/2021		TLA	1	1	
5200478831	96145	N/A	AN	7/14/2021	7/14/2021		TLA	1	1	
5200044290	96150	N/A	AN	7/29/2021	8/5/2021		TLA	8	8	
5200040648	96145	N/A	AN	8/23/2021	8/23/2021		TLA	1	1	
5200044660	96150	N/A	AN	9/8/2021	9/8/2021		TLA	1	1	
5200118575	96150	N/A	AN	9/20/2021	9/20/2021		TLA	1	1	
5200244066	96161	N/A	AN	9/24/2021	9/24/2021		TLA	1	1	
5200618581	96150	N/A	AN	9/24/2021	9/24/2021		TLA	1	1	
5200232523	96161	N/A	AN	9/29/2021	9/30/2021		TLA	2	2	
5200044714	96150	N/A	AN	10/15/2021	10/15/2021		TLA	1	1	
5200618746	96150	N/A	AN	10/26/2021	10/26/2021		TLA	1	1	
5200375575	96150	N/A	AN	10/28/2021	10/28/2021		TLA	1	1	
5200044109	96150	N/A	AN	10/29/2021	10/29/2021		TLA	1	1	
5200102284	96145	N/A	AN	10/29/2021	10/29/2021		TLA	1	1	
5200618746	96150	N/A	AN	10/29/2021	10/29/2021		TLA	1	1	
5200375575	96150	N/A	AN	10/26/2021	10/26/2021		TLA	1	1	
5200044109	96150	N/A	AN	10/29/2021	10/29/2021		TLA	1	1	
5200102284	96145	N/A	AN	10/29/2021	10/29/2021		TLA	1	1	
5200108424	96150	N/A	AN	10/20/2021	11/1/2021		TLA	7	7	
5200244022	96161	N/A	AN	11/25/2021	11/25/2021		TLA	13	13	
5200128499	96161	N/A	AN	11/28/2021	11/28/2021		TLA	1	1	
5200044305	96150	N/A	AN	10/16/2021	11/30/2021		TLA	46	46	
5200044325	96150	N/A	AN	10/16/2021	11/30/2021		TLA	46	46	

ID	Geographic Location	Meter Classification (Commercial/Industrial or Residential)	Leak Classification (Grade)	Discovery Date (DD/MM/YY)	Leak Repair Date (MM/DD/YY)	If not repaired by 12/31/2021 List the Scheduled Date of Repair (DD/MM/YY)	Repair Type	Number of Days Leaking	Number of Days to Repair	Comments or Additional Information (If you are able to quantify the leak rate by bubble pattern or other methods please include this volumetric data, and state what method was used to determine the flow/leak rate in these columns.)
5200044301	96150	N/A	AN	10/16/2021	11/30/2021		TLA	46	46	
5200044311	96150	N/A	AN	10/16/2021	11/30/2021		TLA	46	46	
5200044316	96150	N/A	AN	10/16/2021	11/30/2021		TLA	46	46	
5200044315	96150	N/A	AN	10/16/2021	12/1/2021		TLA	47	47	
5200564848	96150	N/A	AN	12/1/2021	12/1/2021		TLA	1	1	
5200331428	96150	N/A	AN	12/1/2021	12/1/2021		TLA	1	1	
5201945821	96161	N/A	AN	12/2/2021	12/2/2021		TLA	1	1	
5200195788	96150	N/A	AN	12/6/2021	12/6/2021		TLA	1	1	
5200618661	96150	N/A	AN	12/8/2021	12/8/2021		TLA	1	1	
5200113626	96150	N/A	AN	12/10/2021	12/10/2021		TLA	1	1	
5200102463	96145	N/A	AN	12/11/2021	12/11/2021		TLA	1	1	
5200122499	96161	N/A	AN	12/13/2021	12/15/2021		TLA	3	3	
5200046452	96150	N/A	AN	12/14/2021	12/14/2021		TLA	1	1	
5200037185	96145	N/A	AH	6/16/2021	6/16/2021		CR	1	1	
5200134720	96161	N/A	AN	9/14/2021	9/14/2021		CR	1	1	
5200108348	96150	N/A	AN	10/2/2021	10/2/2021		CR	1	1	
5200369439	96161	N/A	AN	5/2/2021	10/5/2021		TLA	157	157	
5200369194	96161	N/A	AN	5/2/2021	9/27/2021		TLA	149	149	
5200334975	96150	N/A	AN	5/2/2021	5/13/2021		TLA	12	12	
5200046665	96150	N/A	AN	5/2/2021	6/14/2021		TLA	44	44	
5200233510	96150	N/A	AN	5/2/2021	5/13/2021		TLA	12	12	
5200046175	96150	N/A	AN	5/2/2021	5/13/2021		TLA	12	12	
5200618754	96150	N/A	AN	5/2/2021	5/18/2021		TLA	17	17	
5200290443	96150	N/A	AN	5/2/2021	6/14/2021		TLA	44	44	
5200290086	96150	N/A	AN	5/2/2021	5/27/2021		TLA	26	26	
5200564777	96150	N/A	AN	5/2/2021	5/19/2021		TLA	18	18	
5200209328	96150	N/A	AN	5/2/2021	5/12/2021		TLA	11	11	
5200207061	96150	N/A	AN	5/2/2021	5/18/2021		TLA	17	17	
5200354453	96150	N/A	AN	5/2/2021	5/12/2021		TLA	11	11	
5200564803	96150	N/A	AN	5/2/2021	5/25/2021		TLA	24	24	
5200233543	96150	N/A	AN	5/2/2021	5/25/2021		TLA	24	24	
5200233890	96150	N/A	AN	5/2/2021	5/12/2021		TLA	11	11	
5200113806	96150	N/A	AN	5/2/2021	5/27/2021		TLA	26	26	
5200354027	96150	N/A	AN	5/2/2021	5/25/2021		TLA	24	24	
5200108166	96150	N/A	AN	5/2/2021	5/12/2021		TLA	11	11	
5200044217	96150	N/A	AN	5/2/2021	5/19/2021		TLA	18	18	
5200334565	96150	N/A	AN	5/2/2021	5/25/2021		TLA	24	24	
5200315463	96150	N/A	AN	5/2/2021	6/25/2021		TLA	55	55	
5200375754	96150	N/A	AN	5/2/2021	5/15/2021		TLA	14	14	
5200207141	96150	N/A	AN	5/2/2021	5/18/2021		TLA	17	17	
5200207163	96150	N/A	AN	5/2/2021	5/12/2021		TLA	11	11	
5200207163	96150	N/A	AN	5/2/2021	5/12/2021		TLA	11	11	
5200124263	96161	N/A	AN	5/2/2021	6/12/2021		TLA	42	42	
5200104841	96150	N/A	AN	5/2/2021	6/7/2021		TLA	37	37	
5200503254	96150	N/A	AN	5/2/2021	11/13/2021		TLA	17	17	
5200053241	96161	N/A	AN	5/2/2021	5/18/2021		TLA	196	196	
5200564547	96150	N/A	AN	5/2/2021	5/18/2021		TLA	17	17	
5200125846	96161	N/A	AN	5/2/2021	11/13/2021		TLA	196	196	

ID	Geographic Location	Meter Classification (Commercial/Industrial or Residential)	Leak Classification (Grade)	Discovery Date (DD/MM/YY)	Leak Repair Date (MM/DD/YY)	If not repaired by 12/31/2021 List the Scheduled Date of Repair (DD/MM/YY)	Repair Type	Number of Days Leaking	Number of Days to Repair	Comments or Additional Information (If you are able to quantify the leak rate by bubble pattern or other methods please include this volumetric data, and state what method was used to determine the flow/leak rate in these columns.)
5200516659	96161	N/A	AN	5/2/2021	11/13/2021		TLA	196	196	
5200369122	96161	N/A	AN	5/2/2021	9/29/2021		TLA	151	151	
5200369100	96161	N/A	AN	5/2/2021	9/29/2021		TLA	151	151	
5200209185	96150	N/A	AN	5/2/2021	6/14/2021		TLA	44	44	
5200046870	96150	N/A	AN	5/2/2021	6/14/2021		TLA	44	44	
5200209132	96150	N/A	AN	5/2/2021	5/12/2021		TLA	11	11	
5200217637	96150	N/A	AN	5/2/2021	5/18/2021		TLA	17	17	
5200369116	96161	N/A	AN	5/2/2021	9/29/2021		TLA	151	151	
5200052291	96161	N/A	AN	5/2/2021	12/11/2021		TLA	224	224	
5200369457	96161	N/A	AN	5/2/2021	11/23/2021		TLA	206	206	
5200126472	96161	N/A	AN	5/2/2021	6/3/2021		TLA	33	33	
5200209952	96150	N/A	AN	5/2/2021	5/27/2021		TLA	26	26	
5200369413	96161	N/A	AN	5/2/2021	10/5/2021		TLA	157	157	
5200217843	96150	N/A	AN	5/2/2021	6/9/2021		TLA	39	39	
5200375516	96150	N/A	AN	5/2/2021	5/20/2021		TLA	19	19	
5200369442	96161	N/A	AN	5/2/2021	6/9/2021		TLA	39	39	
5200334552	96150	N/A	AN	5/2/2021	5/4/2021		TLA	3	3	
5200462111	96145	N/A	AN	5/10/2021	12/8/2021		TLA	213	213	
5200373318	96145	N/A	AN	5/26/2021	9/30/2021		TLA	128	128	
5200558764	96145	N/A	AN	5/27/2021	8/23/2021		TLA	89	89	
5200037145	96145	N/A	AN	6/7/2021	9/29/2021		TLA	115	115	
5200210037	96145	N/A	AN	6/14/2021	8/10/2021		TLA	58	58	
5200319999	96145	N/A	AN	6/16/2021	8/10/2021		TLA	56	56	
5200518603	96145	N/A	AN	6/16/2021	11/23/2021		TLA	161	161	
5200471885	96145	N/A	AN	6/21/2021	9/29/2021		TLA	101	101	
5200290286	96150	N/A	AN	7/8/2021	8/21/2021		TLA	45	45	
5200463251	96150	N/A	AN	7/12/2021	9/21/2021		TLA	72	72	
5200202242	96150	N/A	AN	7/15/2021	11/23/2021		TLA	132	132	
5200202498	96150	N/A	AN	7/20/2021	9/13/2021		TLA	56	56	
5200046268	96150	N/A	AN	9/21/2021	9/21/2021		TLA	1	1	
5200254868	96161	N/A	AN	10/6/2021	10/6/2021		TLA	1	1	

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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 6, Rev. 03/30/2022

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.

Response:

Damage to MSAs (Customer, third party, natural disasters, etc.):

ID	Geographic Location	Damage Type	Meter Type	Leak Classification (Grade)	Discovery Date (DD/MM/YY)	Leak Repair Date (MM/DD/YY)	If not repaired by 12/31/2021 List the Scheduled Date of Repair (DD/MM/YY)	Reason for Not Scheduling a Repair	Number of Days Leaking	Engineering Estimate (Mscf/Day)	Annual Emissions (Mscf)	Explanatory Notes / Comments
1210371389	92301 O	R	R	AH	1/6/2021	1/6/2021	N/A	N/A	0.019	0.00300	0.003	
1211082857	92301 O	R	R	AH	1/28/2021	1/28/2021	N/A	N/A	0.009	0.00001	0.000	
1210350294	92301 O	R	R	AH	2/12/2021	2/12/2021	N/A	N/A	0.011	0.00337	0.003	
1210457121	92394 O	R	R	AH	2/15/2021	2/15/2021	N/A	N/A	0.026	0.00194	0.002	
1210596223	92345 O	R	R	AH	3/30/2021	3/30/2021	N/A	N/A	0.017	0.03961	0.040	
5200161322	92301 O	R	R	AH	5/26/2021	5/26/2021	N/A	N/A	0.013	0.00900	0.009	
5200324243	92395 O	R	R	AH	6/3/2021	6/3/2021	N/A	N/A	0.012	0.03383	0.034	
5200416212	92395 O	R	R	AH	7/3/2021	7/3/2021	N/A	N/A	0.016	0.00271	0.003	
5200164752	92392 O	R	R	AH	7/8/2021	7/8/2021	N/A	N/A	0.006	0.00095	0.001	
5200014276	92392 O	R	R	AH	7/10/2021	7/10/2021	N/A	N/A	0.020	0.00342	0.003	
5200010399	92301 O	R	R	AH	7/31/2021	7/31/2021	N/A	N/A	0.031	0.02064	0.021	
5200187740	92386 O	R	R	AH	8/4/2021	8/4/2021	N/A	N/A	0.006	0.00044	0.000	
5200145756	92301 O	R	R	AH	9/29/2021	9/29/2021	N/A	N/A	0.007	0.04700	0.047	
5200196705	92345 O	R	R	AH	10/3/2021	10/3/2021	N/A	N/A	0.038	0.02500	0.025	
5200079680	92301 O	R	R	AH	12/15/2021	12/15/2021	N/A	N/A	0.012	0.00798	0.008	
4373075	96161 O	R	R	AH	8/21/2021	8/21/2021	N/A	N/A	1.000	0.8429	0.843	
1407878	96150 O	R	R	AH	11/30/2021	11/30/2021	N/A	N/A	1.000	0.5231	0.523	

Total 1.565

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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 6; Rev. 03/30/2022

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.

Include items like the following in this tab (Note whether emissions are included in the MSA EF used to estimate emissions for the MSA population and show only the event count.):

- Gas vented during all Regulator Change outs due to other than vent leakage.
- Large Customer MSA Regulator Inspection - External Regulator Inspections. List avg. amount vented.
- Large Customer MSA Regulator Inspection - Regulator change out & Internal Reg Inspection. List avg. amount vented.
- Diaphragm - CSF Read & Verify - List amount vented thru meter during read & verify order for decreased usage.
- Diaphragm - CSF Clock Test - List amount vented during Clock Test
- Diaphragm - CSF Registration Check - List amount ventedn during Registration Checks
- Diaphragm Size 1,2,3 Meter Change Out - List avg. gas vented on Size 1 Meter Change Out
- All Meter Change Out Size 4 thru 28 - List avg. gas vented for Size 5 to 10 Meter Change outs
- Field Meter Test of Diaphragm & Rotary - List avg. gas vented for Size 9 Meters
- Customer Orifice Meter Plate Insp. - Orifice Plate Inspected Monthly. List avg. amount vented

Response:

Customer Meter Blowdowns:

Number of Blowdowns	Meter Type	Emission Factor (Mscf/yr)	Annual Emissions (Mscf)	Explanatory Notes / Comments
5427	R	0.0002	1.0854	Meter Change Outs, Family Samples, Meter Set Inspections - Engineering estimate of .2 cubic ft per device.
489	CI	0.0002	0.0978	Meter Change Outs, Family Samples, Meter Set Inspections - Engineering estimate of .2 cubic ft per device.
Total			1.1832	

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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 6; Rev. 03/30/2022

Notes:

This worksheet is intended to capture the actual number of equipment and components in this asset category that vent emissions as a part of their design and normal function. By listing the number and types of components (not captured elsewhere in other templates) that vent emissions we hope to obtain information that may provide insight into how to evolve to a method of reporting emissions based on the actual number of units and types emitting rather than a crude population based estimate.

Currently, the component related leaks are accounted for in the population based estimate for MSAs and any estimate of emissions associated with this list of equipment and components will not be added to that total. This tab is not intended to replace or supplant the Vented and Blowdown Emissions tab which are activity based emissions.

No emissions estimates from this worksheet should be included in Appendix 8, as this is being collected for informational purposes at this time.

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.

Response:

Customer Meter Component/Equipment Vented Emissions:

ID	Geographic Location	Device Type	Bleed Rate	Manufacturer	Number of Days Emitting	Engineering or Manufacturer's based Estimate of Emissions	Annual Emissions (Mscf)	Explanatory Notes / Comments
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Southwest Gas did not have any Customer Meter Component/Equipment vented (fugitive) emissions.

Total 0

Appendix 7
Storage Facilities

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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

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
 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.

Underground Storage Facility Leaks and Emissions:

ID	Geographic Location	Source	Number of Sources	Discovery Date (MM/DD/YY)	Repair Date (MM/DD/YY)	Number of Days Leaking	Emission Factor (Mscf/day/dev)	Annual Emissions (Mscf)	Explanatory Notes / Comments
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Southwest Gas does not have any underground storage facilities in California.

Total 0.00

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
Rulemaking (R) 12-5-100 to Amend the Safety and Health Regulations to Improve Gas Pipelines and Facilities to
Reduce Natural Gas Leak Emissions (with Senate Bill 1371, June 15, 2022)
Appendix 7, Part 6005001

Notes:
 -1. The leak detection rate shall be the highest of the detected emissions within the defined detection zone. Do not use any and/or one reading.
 -2. The minimum standard for this data measurement is the highest of the detected emissions, or the compressor, or the detection zone or the defined detection zone, or the compressor, or the detection zone or the defined detection zone.
 -3. This column is for the measurement of frequency. See box comments.
 -4. Add a 1 to the compressor or starting point "Other" is added, or measurement of emissions (EF) should be taken using other mode, to ensure that our emissions are tracked from the system.
 -5. Add an emissions measurement method when applicable and measured to the compressor.
 -6. Add an emissions measurement method when applicable and measured to the compressor.
 -7. Add an emissions measurement method when applicable and measured to the compressor.
 -8. Add an emissions measurement method when applicable and measured to the compressor.
 -9. Add an emissions measurement method when applicable and measured to the compressor.

The columns P thru AD were added to the template and should be used for the indicated measured compressor emissions, which include: Counting of compressor in accordance with OSE and your operating practices. Where more than one measurement was taken during the year (i.e., after a maintenance cycle), or quarterly, use the measured EF multiplied by the activity hours that occurred during its corresponding measurement period (i.e., monthly, weekly, etc.). For each compressor device use one per measurement period (see examples 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 period in consistent with your reporting practices). The following table for reporting more frequent measurements in 2019 are outlined in the adjacent cell and should be provided if applicable.
 OSE Staff strongly encourage more frequent measurement of the below compressor vented emissions. Compliance minimum is once annually, though staff suggest the minimum frequency should be quarterly and measured on every other quarter (i.e., on or around the compressor survey given mode of operation). More frequent measurements, as a priority, would be better than no measurements at all. More frequent measurements give operators more an opportunity for corrective maintenance to correct worn parts. The following table for reporting more frequent measurements in 2019 are outlined in the adjacent cell and should be provided if applicable.

Transmission Compressor Vented Emissions:

ID	Geographic Location	Compressor Type	Primo Mover	Number Offsites	Number Banks	Bank Type	Maximum Operating Frequency	Emissions Factor: HCFC, HCFC-125, HFC, PFC, SF6, Other	Compressor Operating Frequency	Operating Mode: Normal	Operating Mode: Start-Up	Operating Mode: Shutdown	Other (hours)	Annual Factor: CH4, CO2, CO, H2, Other (by mode)	Emissions Factor: CH4, CO2, CO, H2, Other (by mode)	Emissions Factor: CH4, CO2, CO, H2, Other (by mode)	Emissions Factor: CH4, CO2, CO, H2, Other (by mode)	Emissions Factor: CH4, CO2, CO, H2, Other (by mode)	Emissions Factor: CH4, CO2, CO, H2, Other (by mode)	Annual Emissions (MTC)	Regulatory Notes / Comments

Southwest Gas does not have any active ground storage facilities in California.

The OSE staff strongly encourage more frequent measurement of the below compressor vented emissions. Compliance minimum is once annually, though staff suggest the minimum frequency should be quarterly and measured on every other quarter (i.e., on or around the compressor survey given mode of operation). More frequent measurements, as a priority, would be better than no measurements at all. More frequent measurements give operators more an opportunity for corrective maintenance to correct worn parts. The following table for reporting more frequent measurements in 2019 are outlined in the adjacent cell and should be provided if applicable.

Total: 301

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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

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
Southwest Gas does not have any underground storage facilities in California.						
Total					0.00	

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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

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
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Southwest Gas does not have any underground storage facilities in California.

Total 0.00

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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

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 intentional leaks that if repaired would not leak. 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):

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
						12/31/2021		1/1/2021				

Southwest Gas does not have any underground storage facilities in California.

Total 0.00

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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

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
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Southwest Gas does not have any underground storage facilities in California.

Total 0.00

Appendix 8

Summary

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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 Emissions (Mscf)	2020 Total Annual Volume of Leaks & Emissions (Mscf)	2020 Total Annual Count of Leak & Emission Items	Emission Change for Year Over Year Comparison from 2020 to 2021 (Mscf)	Percentage Change for Year Over Year Comparison from 2020 to 2021	Count Change for Year Over Year Comparison from 2020 to 2021	Percentage Change for Year Over Year Comparison from 2020 to 2021	Emission Change for Year Over Year Comparison from 2015 to 2021 (Mscf)	Percentage Change for Year Over Year Comparison from 2015 to 2021	Explanation for Significant Percentage Change for Year Over Year Comparison from 2020 to 2021
Transmission Pipelines	Pipeline Leaks	Fugitive	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	Year-over-year decrease due to no transmission blowdowns in 2021.
	All Damages	Fugitive	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
	Blowdowns	Vented	327,000	0	0.085	1	(0)	(100.0%)	(1)	(100.0%)	-327	(100.0%)	
	Component Emissions	Vented	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
	Component Leaks	Fugitive	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
	Otherizers	Vented	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
Transmission M&R Stations	Station Leaks & Emissions	Fugitive	24,400	0	13,993,200	0	(3,110)	(22.2%)	(2)	(22.2%)	10,889	44,894.9%	Total stations decreased by 2 during 2021, one was replaced with a Distribution Station and one was reclassified to a Distribution Station after it was confirmed not to have transmission components.
	Blowdowns	Vented	-	6,991	6,991	13	(0,000)	(0.0%)	-	0.0%	6,991	0.0%	Discovers an error in the 2020 data, highlighted cell shows error in the 2020 data. Error was due to a formula not being carried over to all cells.
Transmission Compressor Stations	Compressor Emissions	Vented	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	Year-over-year increase due to one event where a fitting failed during installation.
	Compressor Leaks	Fugitive	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
	Blowdowns	Vented	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
	Component Emissions	Vented	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
	Component Leaks	Fugitive	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
	Storage Tank Leaks & Emissions	Vented	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
Distribution Main & Service Pipelines	Pipeline Leaks	Fugitive	511,760	0	2,177,088	82	(1,683,193)	(76.4%)	(23)	(28.0%)	213	0.4%	Year-over-year decrease due to less Distribution Pipeline Leaks in 2021.
	All Damages	Fugitive	1,905,140	0	1,199,467	155	(457,485)	(38.1%)	(43)	(27.7%)	(1,163,16)	(61.1%)	Year-over-year decrease due to less damages experienced in 2021.
	Blowdowns	Vented	31,880	0	76,865	4,797	(25,940)	(33.7%)	1,447	30.2%	19,05	59.7%	Year-over-year decrease in emissions due to implementation of pressure reduction procedural requirements for blowdowns/purging activities.
	Component Emissions	Vented	-	0	-	0	-	0.0%	-	0.0%	-	0.0%	Year-over-year increase due to one event where a fitting failed during installation.
	Component Leaks	Fugitive	-	0	0.00	0	377,873	100.0%	1	100.0%	377,87	100.0%	Year-over-year increase due to new stations' classifications, as this is population-based reporting.
	Station Leaks & Emissions	Fugitive	184,084,370	0	175,517,560	235	(4,660,800)	2.7%	(5)	(2.1%)	(3,908,01)	(2.1%)	Year-over-year decrease in emissions due to implementation of pressure reduction procedural requirements for blowdowns/purging activities.
Customer Meters	All Damages	Fugitive	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	The slight decrease due to less meters in the system in 2021 than in 2020, as this is population-based reporting.
	Meter Leaks	Fugitive	27,377,150	0	29,280,403	204,799	(29,289)	(0.1%)	(774)	(0.4%)	1,873,96	6.8%	
Underground Storage	Vented Emissions	Vented	15,180	0	4,755	23,774	(3,572)	(75.1%)	(17,859)	(75.1%)	(14,00)	(92.2%)	Year-over-year decrease due to less meter change outs in 2021 than in 2020.
	Storage Leaks & Emissions	Fugitive	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	Year-over-year decrease due to less damages experienced in 2021.
	Compressor Emissions	Vented	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
	Compressor Leaks	Fugitive	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
	Blowdowns	Vented	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
	Component Emissions	Vented	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	
Component Leaks	Fugitive	-	0	-	0	-	0.0%	-	0.0%	0	0.0%		
Unusual Large Leaks	Dehydrator Vent Emissions	Fugitive	-	0	-	0	-	0.0%	-	0.0%	0	0.0%	2020 Total updated after error on 2020 Appendix 2 was discovered.
	Total		214,315,320	0	222,329,653	NA	(291)	0%	NA	NA	7,732,92	3.6%	

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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

System Wide Leak Rate Data

1/1/2021 - 12/31/2021

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
N/A	N/A	N/A	N/A	N/A	

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
N/A	2,040,828	N/A	N/A	

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
N/A	12,035,450	N/A	

*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.

SOUTHWEST GAS CORPORATION, JUNE 15, 2022

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

Summary Tables:

Natural Gas Properties	Average Mole Percent	Explanatory Notes / Comments
Methane		
Carbon Dioxide		
Ethane		
C3+		
C6+		
Oxygen		
Hydrogen		
Sulfur		
Water		
Carbon Monoxide		
Particulate Matter		
Inert Gas		
Odorant		

Please note that Southwest Gas' natural gas for its California Service Territories is supplied by its 7 upstream suppliers, e.g., Southern California Gas Company, Transwestern Pipeline, Kern River Pipeline, Great Basin Gas Transmission Company, Tuscarora Pipeline, Northwest Pipeline, and El Paso Pipeline.

Appendix 9
Emission Factors

SOUTHWEST GAS CORPORATION, JUNE 15, 2022
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 9; Rev. 03/30/22

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
Transmission M&R	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)
	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

System Categories	Emission Source Categories	Emission Factor Sources	Description [in natural gas volume]
	Transmission M&R Leaks	MRR	<p># of leaks > 10,000 ppm x Subpart W EF (ref: Table W-3 of Subpart W of Part 98)</p> <p>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</p>
Transmission Compressor Stations	Transmission M&R blowdown	Engineering Estimate	<p>Unique equipment volume (corrected for pressure and temperature)</p>
	Compressor station - Equipment leaks from valves, connectors, open ended lines, pressure relief valves, and meters (using leak detection)	MRR	<p>Leaker EFs-Compressor Station <u>(Component Leaks identified per survey use the following EFs)</u> # of leaks > 10,000 ppm x Subpart W EF (ref: Table W-3 of Subpart W of Part 98)</p> <p>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</p> <p>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</p>
	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)

System Categories	Emission Source Categories	Emission Factor Sources	Description [in natural gas volume]
	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 Mscf/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 Mscf/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 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	

System Categories	Emission Source Categories	Emission Factor Sources	Description [in natural gas volume]	
Distribution M&R Stations	Distribution M&R Station, Leaker Based	MRR	<p>Leaker EFs</p> <p>(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</p>	
	M&R Stations - Farm Taps	MRR	<p># 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</p> <p>Leaker EFs</p> <p>(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</p>	
	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)	
	Commercial, Industrial and Residential Meters	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
		Dehydrator Vents - Storage	GRI (1996)	<p>One of the following three cases per dehydrator facility</p> <ol style="list-style-type: none"> 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)

System Categories	Emission Source Categories	Emission Factor Sources	Description [in natural gas volume]
Underground Storage	Storage - piping leakage	MRR	<p>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</p> <p>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</p>
	Storage - surface casing leakage	Engineering Estimate	TBD
	Storage - Wellhead leakage	MRR	<p>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</p> <p>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</p>
	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