NATURAL GAS LEAKAGE WORKSHOP

Natural Gas Leakage Abatement Report filed on May 15, 2015

September 23, 2015

Agenda

- Characterization of Methane Emissions
- System Wide Gas Leak Rate Approach
- Target Methane Emission Sources
- Methane Emissions Quantification

BACKGROUND

Reporting Requirements as Stated in the Rulemaking

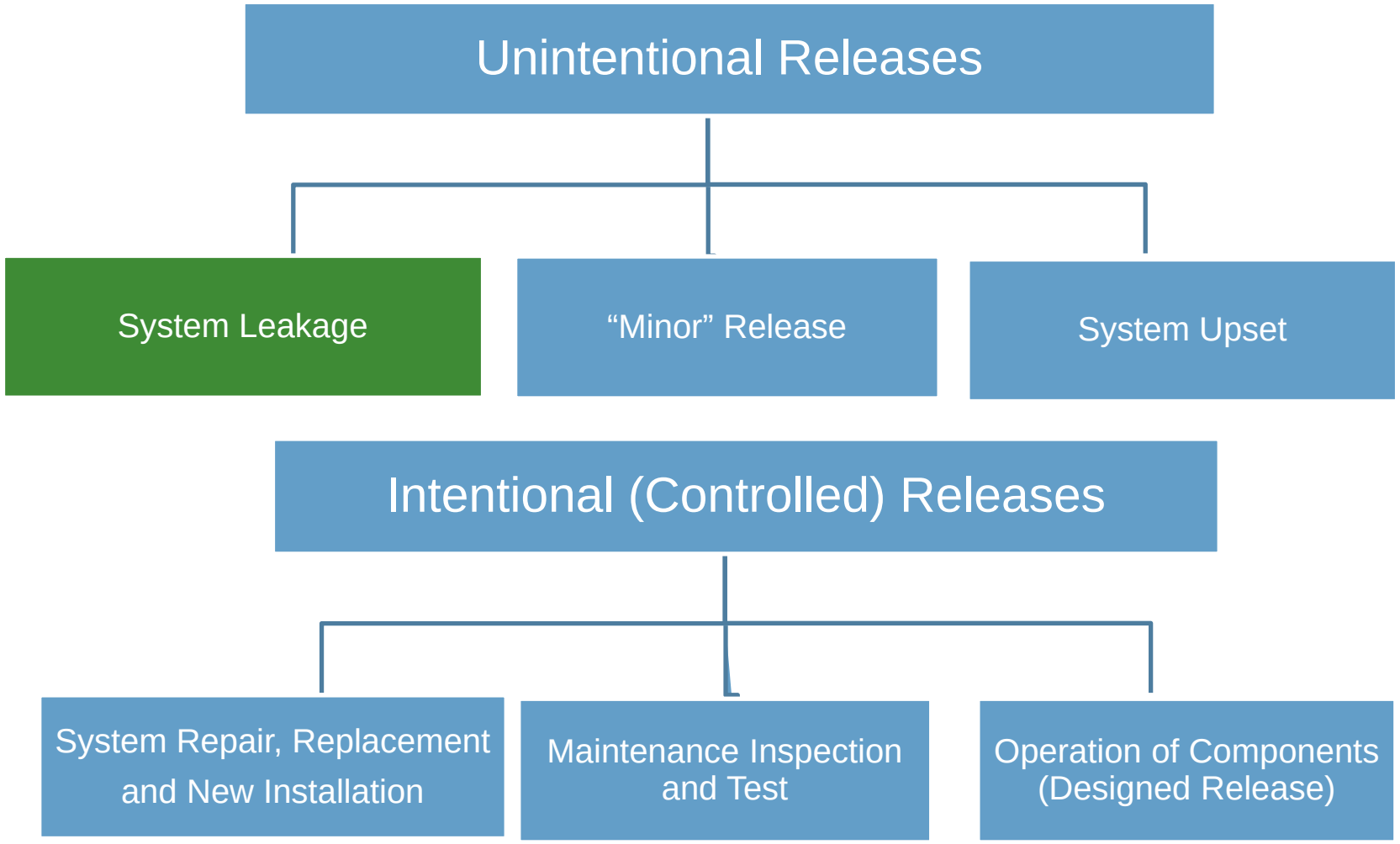
1. A description and general location of each gas corporation's gas pipeline facilities, including its intrastate transmission and distribution lines.
2. A summary of its current leak management practices.
3. A list of new methane leaks in 2013 by grade, and in 2014 by grade.
4. A list of open leaks that are being monitored or are scheduled to be repaired. If the open leak is only being monitored, provide the reason why the leak has not been scheduled to be repaired.
5. The total number of leaks detected and repaired in 2013 and 2014, and the time it took to repair those leaks once they were discovered.
6. A best estimate of gas loss due to leaks (list estimated gas loss by month for 2013 and 2014), and an explanation of how the estimates were derived.

SoCalGas and SDG&E
Proposed Definitions for SB 1371 Reporting

- **Leak (PHMSA)-** "An unintentional escape of gas from the pipeline"
  - PHMSA definition of "leak", required for reporting purposes
  - Includes Damages
- **Methane Emissions**
  - **"Minor" Release (PHMSA)- "**A non-hazardous release that can be eliminated by lubrication, adjustment, or tightening, is not a leak"
    - Unintentional release, but differentiated due to source
    - Not required to be reported to PHMSA
  - **System Upset-** items such as activation of regulator vents and relief valves due to temporary over-pressure conditions; and emergency shutdown (ESD) events on engines and compressors resulting in station blowdown
    - Unintentional, but necessary by system design
  - **Intentional (Controlled) Releases-** Items such as system repairs, replacements and new installation; maintenance, inspection and testing; and operation of components

Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA)

Emissions Characterization



SYSTEM WIDE GAS LEAK RATE

SED's Proposed System-Wide Gas Leak Rate Methodology

- The SED Data Request included a formula to calculate an annual system-wide leak rate
- This formula is similar to performing a mass balance of the gas entering and exiting the system
- Significant challenges with this approach, include: measurement error and synchronization of measurements
- SED's Proposed Gas Leak Rate Formula:

$$\text{System-Wide Gas Leak Rate} = \frac{\text{(Throughput)} - \text{(Company Use/Loss/Acct)}}{\text{(Throughput)}}$$

Comparing Proposed Gas Leak Rate Approaches

SoCalGas' Proposed Approach	SED's Proposed Approach
1133.87 MMCF	**-.0011 MMCF**

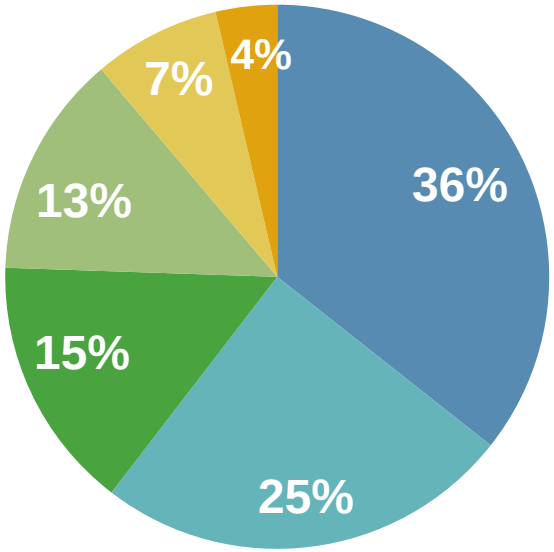
- Proposed formula does not properly take into account the many variables involved with measurement errors and synchronization of measurements at a single point in time

- SoCalGas believes another approach utilizing the detailed list of emission sources and estimated emissions that can be tied to activities, events, system components among other things, as required by SED's Data Request will provide a more defensible system methane emission rate

TOP METHANE EMISSION SOURCES

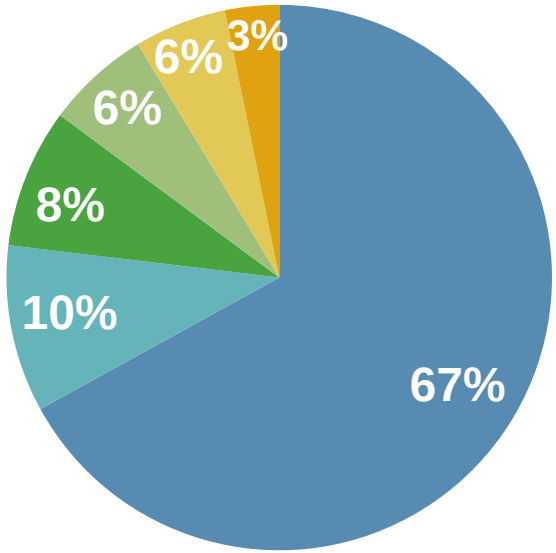
2014 Top Ten Reported Methane Emissions

SoCalGas



- Customer Meters & "Minor Releases" (1,8)
- Pipeline Leaks (2,7)
- Blow Down/Purge (3,9,10)
- Compressor Operations (4,6)
- System Damages (5)
- Other

SDG&E



- Customer Meters & "Minor Releases" (1,5)
- Compressor Operations (6,7,8,9)
- System Damages (2)
- Blow Down/Purge (4,10)
- Pipeline Leaks (3)
- Other

SoCalGas A Sempra Energy utility

SDGE A Sempra Energy utility

RECOMMENDATIONS FOR QUANTIFICATION

Identify System Elements to Quantify Methane Emissions

System Asset or Activity	Time Based	Event Based	Throughput Based
Pipelines & Mains (by Material Leak Rate)	X	X	
Services (by Material Leak Rate)	X	X	
Regulator Stations (by type)	X	X	
Customer Meters (by type)	X	X	
Storage/LNG Facilities (by type)	X	X	Partial
Compressor Stations (by type)	X	X	Partial
Pneumatics (by type)	X	X	
Damages (by Facility type)	X	X	
Blowdown and Purge (by Facility type)		X	
System Design (by Component type)	X	X	
Inspection and Test (by Facility type)	X	X	

Leak Quantification Technologies

- Technology solutions are currently being developed by many industry R&D projects
- Future Vision:
  - Quantify leak at time of Leak detection and classification
  - Use measured flux to calculate methane emissions based on time between detection and repair
  - No change to Hazardous Leak response/repair procedures
  - Prioritize High Volume Non-Hazardous Leaks to reduce time to repair and associated methane emissions
    - Must allow time for One-Call (Locate and Mark) and construction planning when replacement (rather than repair) is necessary
    - Replacement is necessary to manage integrity of non state-of-the-art system pipeline materials

Leak Quantification for Methane Emissions Reduction

- What can we do now:
  - Influence of system differences on baseline
  - SoCalGas - prioritize oldest non-hazardous leaks for repair
  - SoCalGas - begin shifting away from “monitoring” Leak Indications
  - SoCalGas & SDG&E – improve system reporting of “minor” releases and top methane emission sources

“Better information for better decision making”

Next Steps

- Understand **operational constraints** and Company **practices**
- **Agree** on:
  - **Criteria** for determining **methane sources** to **report** & to focus **reduction efforts**
  - **Methodology** for **calculating** methane emissions
  - Each Company's **asset inventory** and **key activities**
- **Determine Best Management Practices**
  - **Control technologies** & **limitations**
  - Evaluate Cost/Benefit – suggest using Cap & Trade price as benchmark for **cost-effectiveness thresholds**
  - Allow for **flexibility** on selection process based on each Company's asset inventory, key activities, operational constraints and practices

END