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BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Adopt Rules and Procedures Governing Commission-Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leakage Consistent with Senate Bill 1371.

Rulemaking 15-01-008
(Filed January 15, 2015)

ADMINISTRATIVE LAW JUDGE'S RULING ENTERING SUMMARY OF BEST PRACTICES WORKING GROUP ACTIVITIES AND STAFF RECOMMENDATIONS INTO THE RECORD AND SEEKING COMMENTS

Background

Rulemaking (R.) 15-01-008 was initiated by the California Public Utilities Commission (Commission) to carry out the intent of Senate Bill (SB) 1371 (Statutes 2014, Chapter 525).¹ SB 1371 requires the adoption of rules and procedures to minimize natural gas leakage from Commission-regulated natural gas pipelines consistent with Public Utilities Code Section 961 (d), § 192.703 (c) of Subpart M of Title 49 of the Code of Federal Regulations, the Commission's General Order 112-E and their successors, and the state's goal of reducing greenhouse gas (GHG) emissions SB 1371, which became effective on January 1, 2015, added Article 3 to the Public Utilities Code.² Article 3, which is entitled Methane Leakage Abatement, consists of §§ 975, 977, and 978. SB 1371

¹ See R.15-01-008 "Order Instituting Rulemaking to Adopt Rules and Procedures Governing Commission-Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leakage consistent with Senate Bill 1371," issued January 22, 2015.

² Unless otherwise stated, all code section references are to the Public Utilities Code.

also directs the Commission, in consultation with the California Air Resources Board (ARB), to achieve the goals of the Rulemaking.

Included in Article 3 is § 975 (e)(4) which states in part, that the Commission shall:

(4) Establish and require the use of Best Practices for leak surveys, patrols, leak survey technology, leak prevention, and leak reduction. The commission shall consider in the development of Best Practices the quality of materials and equipment.

Two related questions in the July 24, 2015 Scoping Memo in this rulemaking are:

5. Should the Commission require specific methods and technologies to detect and measure leaks? What Best Practices should be required?
6. How should preventive maintenance and operations and other efforts be employed to prevent leaks and other emissions, including third-party dig-ins?³

The Scoping Memo also encouraged the use of a Working Group and workshops to accomplish scoping memo objectives.⁴ Accordingly, the California Public Utilities Commission (Commission) and the Air Resources Board (ARB) staff (Staff) coordinated a series of six meetings with interested parties which led to the creation of a consolidated spreadsheet listing over 100 Best Practices for policies, practices, and technologies that specifically relate to the system components and various operation areas. As Staff points out, among other things, the spreadsheet briefly describes the proposed Best Practices, which Parties proposed them, lists pros and cons, and includes where information is readily available, estimated emissions that may be avoided through the use of the Best Practices, and potential costs of measures. The Best Practices are further

³ Scoping Memo at 7-8.

⁴ Scoping Memo at 13.

organized by functional categories: Operating Practices, Monitoring, Process and Program Development & Training, Existing/Standard Practices, Research & Development, Integrity Management Crossover (may apply to several categories), Maintenance Practices, Design, and Regulatory Issue.

The spreadsheet is provided as Attachment A to this ruling and is available on the Commission's Safety and Enforcement Division Risk Assessment Section web site.⁵ In the attached Best Practices summary (Attachment 1), Staff also made recommendations pertaining to mandatory requirements, Commission/ARB approval of compliance plans and audits, and voluntary use of Best Practices.

Four Principles for Methane Leak Abatement Best Practices

To guide development of methane leak abatement Best Practices, Staff proposed that the Best Practices Working Group adopt four principles for Methane Leak Abatement Best Practices. According to Staff, the four following principles incorporate parties' informal comments to the extent that Staff agrees with them:

1. Best Practices go beyond technologies and tools to embody a new way of doing things. Policies, practices, and education are as important as new technologies, and may provide additional methane reduction opportunities at lower cost (For example, the "find it, fix it" policy for fixing leaks when found, in some cases, may be more cost effective than monitoring and returning later to fix the leak).
2. Industry standards for Safety and supplemental measures are needed to meet the challenge of eliminating methane emissions to the extent necessary to meet state goals.

⁵ Refer to Risk Assessment website at: <http://www.cpuc.ca.gov/riskassessment>.

3. If we can use the most advanced, technologically feasible, cost-effective measures to further reduce methane emissions beyond established targets, we should.
4. Improved methane detection by itself isn't enough; it should be coupled with better quantification and accurate categorization, and matched with a plan/timetable for mitigation in manners that are cost-effective and effective in minimizing the release of methane.

Comments on the Staff Summary and Recommendations

Consistent with Senate Bill 1371 and scoping memo objectives, comments on the Joint Staff Report should respond to the following questions:

1. What overall comments do you have about the Staff Summary and Recommendations?
2. Do you agree with the Four Principles for Methane Leak Best Practices? Why or Why not?
3. Do the proposed mandatory and voluntary management Best Practices, including categorization, rationale and associated deadlines for implementation, adequately address Public Utilities Code Article 3 (e)(4) and scoping memo questions #5 and #6?
4. What process should be used to ensure best management practices are up-to-date and continue to improve as new technologies, tools, and information become available over time, etc.?

IT IS RULED that:

1. The California Public Utilities Commission (Commission) and California Air Resources Board "Natural Gas Leakage Abatement Summary of Best Practices Working Group Activities and Staff Recommendations dated March 2016" and accompanying Excel spreadsheet (work product from the Best Practices Working Group), found on the Commission's website at

<http://www.cpuc.ca.gov/riskassessment/> are accepted into the record of this proceeding as Attachment 1 and Attachment A, respectively.

2. Initial comments of not more than 15 pages in response to this ruling may be filed and served no later than Friday, April 22, 2016.

3. Reply comments of not more than 5 pages in response to comments may be filed and served no later than Friday, May 6, 2016.

Dated March 24, 2016, at San Francisco, California.

/s/ COLETTE E. KERSTEN

Colette E. Kersten
Administrative Law Judge

ATTACHMENT 1

California Public Utilities Commission and
California Air Resources Board

Natural Gas Leakage Abatement
Summary of Best Practices Working Group
Activities
And Staff Recommendations

In partial fulfillment of

Senate Bill 1371 (Leno, 2014) &
Order Instituting Rulemaking (OIR) 15-01-008

Elizabeth Scheehle, CARB
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March, 2016

Table of Contents

| | |
|---------------------------------------|----|
| INTRODUCTION | 2 |
| IDENTIFICATION OF BEST PRACTICES..... | 3 |
| RECOMMENDATIONS..... | 9 |
| ATTACHMENTS..... | 22 |

DISCLAIMER

This report was prepared by California Public Utilities Commission (CPUC) and California Air Resources Board staff. It does not necessarily represent the views of the CPUC, its Commissioners, the CARB, or the State of California. The CPUC, CARB, the State of California, its employees, contractors, and subcontractors make no warrant, expressed or implied, and assume no legal liability for the information in this report. This report has not been approved or disapproved by the CPUC or the CARB, nor have the agencies passed upon the accuracy or adequacy of the information in this report.

INTRODUCTION

Methane is a greenhouse gas (GHG) 72 times more potent than carbon dioxide on a 20 year timeframe. Researchers have identified the oil and gas industry as a significant source of methane emissions. In California, Senate Bill (SB) 1371 (Leno, 2014) was signed by Governor Brown on September 21, 2014, to reduce methane emissions from leaks in the gas transmission, distribution and storage facilities in California. SB 1371 adds Article 3 (commencing with Section 975) to Chapter 4.5 of Part 1 of Division 1 of the Public Utilities Code. Included in Article 3 is Section 975. (e) (4) which states, in part, that the Commission shall:

"(4) Establish and require the use of best practices for leak surveys, patrols, leak survey technology, leak prevention, and leak reduction. The commission shall consider in the development of best practices the quality of materials and equipment."

In addition, SB 1371 states, "The bill would require the commission to commence a proceeding by January 15, 2015, to adopt those rules and procedures, in consultation with the State Air Resources Board¹."

In January 2015, the California Public Utilities Commission (CPUC or Commission) launched Rulemaking (R.) 15-01-008 in response to SB 1371 to investigate new technologies in gas leak detection in the transmission, distribution and storage process, specifically optimizing for methane reductions.² The July 24, 2015, Scoping Memo and Assigned Commissioner Ruling (Scoping Memo) for this rulemaking states,

¹ This is a reference to the California State Air Resources Board (CARB).

² "Order Instituting Rulemaking to Adopt Rules and Procedures Governing Commission-Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leakage Consistent with Senate Bill 1371," issued January 22, 2015.

"CARB will work with the Commission to determine the best management practices and other mitigation technologies for achieving GHG reductions. CARB will collaborate with the Commission and provide GHG expertise throughout the proceeding. The two agencies will ensure, on ongoing bases, that both the public safety and the State's climate change goals will be achieved."³

This report describes the process and results of CPUC/CARB exploration of best practices (BPs) for the reduction of methane leaks and emissions from utility gas systems. Under the direction of the Assigned Administrative Law Judge and in coordination with the Assigned Commissioner's Office, this process included several staff-conducted public workshops and the convening of a technical working group open to parties to the rulemaking.

Disclaimer: Despite the effort to be inclusive and collaborative during the working group process, this document and its recommendations are not to be considered a consensus report. Instead it represents CPUC/CARB staff proposals for adoption, and will be subject to comments by Parties to the rulemaking before being forwarded to the CPUC for consideration.

IDENTIFICATION OF BEST PRACTICES

In 2014 and 2015, Safety and Enforcement Division (SED) staff researched BPs for the identification and mitigation of leaks from the utility gas system. The research included internet searches and personal contacts with vendors, utilities, research organizations and regulators, in both the United States and overseas. On March 18, 2015, ALJ Kersten issued a ruling entering the SED staff report, titled "Survey of

³ Scoping Memo, p. 16.

Natural Gas Leakage Abatement Best Practices”, dated March 17, 2015, into the record. The purpose of this paper was to identify technologies and practices presently in use, technologies and practices which are new and/or currently not in use in California, and those which are in various stages of research and development (R&D).⁴

On July 24, 2015, the Scoping Memo for this rulemaking was issued. Two of the questions included in the Scoping Memo were:

5. Should the Commission require specific methods and technologies to detect and measure leaks? What BPs should be required?
6. How should preventive maintenance and operations and other efforts be employed to prevent leaks and other emissions, including third-party dig-ins?⁵

The Scoping Memo also established workshops, by stating, "This proceeding will hold workshops to discuss the leakage issues and the types of activities and metrics that are currently used or should be developed to detect, monitor, and repair such leaks. The workshops could also discuss potential ratemaking treatments to facilitate minimizing these leaks. These workshops will be led by the Commission’s Safety and Enforcement Division (SED), in cooperation with CARB."

The Scoping Memo further described the scope of the BPs workshop:

"2. Working Group Workshop on Best Practices

(Phase 1, Items 5 & 6) – Based on “target” emission sources, best practices to identify, measure, avoid and repair leaks discuss:

- BPs to identify leaks;

⁴ This report can be found on the CPUC Risk Assessment webpage at:
<http://www.cpuc.ca.gov/riskassessment/>

⁵ Scoping Memo at 13.

- Best protocols, methods and procedures to quantify methane emissions and leaks;
- Best preventive maintenance and operations practices to avoid and prevent leaks, emissions from blowdowns, operational emissions and other emissions, including third-party dig-ins; and
- BPs to repair leaks (e.g. customer meters are a major source of leaks. What is a cost effective way to repair those?)"

In compliance with the direction of the Scoping Memo, a workshop was held on October 27, 2015, where several parties made the following presentations:⁶

- CPUC - Cost Effectiveness
- Professor Joseph C. von Fischer of Colorado State University - Leak Quantification Using Mobile Sensors
- Environmental Defense Fund - SED Workshop on Best Practices
- Sempra - Natural Gas Leakage Workshop: Working Group Workshop on Best Practices
- PG&E - Leak Abatement Best Practices Workshop: Implementing Best Practices and Ongoing R&D Projects
- Southwest Gas - Best Practices Workshop R.15-01-008: Methane Leakage

Subsequent to the workshop, meetings were held, by telephone and in person, to further zero in on the specific BPs preferred by the parties to identify and mitigate leaks and emissions. All parties were noticed and invited to participate in the working

⁶ All parties to the proceeding were invited to participate in the workshop and make presentations. All presentations can be found on the CPUC Risk Assessment webpage at: <http://www.cpuc.ca.gov/riskassessment/>

group. All teleconferences and meetings were well attended by the parties and their representatives.⁷ In general, the parties felt that the meetings were productive.

BPs meetings and topics of discussion were as follows:

- December 8, 2015, teleconference:
 - Transmission Blowdowns and M&R Station Blowdowns
- December 22, 2015, teleconference:
 - Compressor Stations – Leaks from Valves, Connections, Meters, Vents, Packing, Blowdowns, etc.
- January 5, 2016, teleconference:
 - Storage – Control Vents, Leaks, Blowdowns, Storage Compressors, Casings, other sources of Leaks and Emissions.
- January 19, 2016, meeting at the offices of the Environmental Defense Fund (EDF) at 123 Mission St., San Francisco:
 - Customer Meter and PHMSA “minor” releases (threaded connection leaks) AND Leak Surveys, Patrols, Leak Survey Technology, Leak Prevention, Leak Reduction, Leak Repair and Required Repair Times for Leaks.
 - “Know Your Risers” presentation by the Utility Workers Union of America, addressing the dangers of corroded anodeless

⁷ The parties who participated were Sempra Utilities, Pacific Gas and Electric (PG&E), Southwest Gas, Central Valley Storage, Lodi Gas Storage, Wild Goose Gas Storage, the Environmental Defense Fund (EDF), the Utility Workers Union of America (UWUA), the Coalition of California Utility Employees (CCUE), the Utility Reform Network (TURN), the California Air Resources Board (CARB), the CPUC Organization of Ratepayers Advocates (ORA) and the CPUC Risk Assessment Group.

risers, a steel casing with a plastic pipe inside that carries the gas to the stop valve and meter assembly.

- January 20, 2016, continuation meeting at the EDF offices:
 - Selection of BPs for the Working Group Proposal.
 - Cost Effectiveness – Discussion by Southern California Gas regarding the cost effectiveness methodology presented in the ICF Report titled, “Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries”, dated March 2014.
 - “Best Practices/Effective Results - Safe Harbor Proposal” presentation by the Independent Gas Storage Providers (ISPs)

These working group meetings led to the creation of a consolidated spreadsheet, listing over 100 potential BPs for policies, practices and technologies that specifically relate to the system components and operational areas mentioned above.⁸

The spreadsheet briefly describes the proposed BPs, which parties proposed them, lists pros and cons, and – where information was readily available – estimated emissions that may be avoided through the use of the best practice and the potential costs of the measures. Additional comments about the proposed items that came up during the working group meetings are included, as well as a link to the U.S. Environmental Protection Agency Natural Gas STAR site in cases where the item is already identified as a Best Practice by the U.S. EPA.

⁸ See Notes on Appendix A at the end of this document.

BPs are further identified by functional categories: Operational, Monitoring, Process/Program Development and Training, Existing/Standard Practices, Research & Development, Crossover (may apply to several categories) and Maintenance.

Although there may be other ways to categorize the list, staff believes the functional categorization is most useful at this point in the process.

The spreadsheet, which is proposed as an attachment to this document, is available on the SED Risk Assessment web site.⁹

The SED Risk Group also proposed that the Best Practices Working Group adopt the following Four Principles for Methane Leak Abatement Best Practices. The Four Principles shown below incorporate parties' informal comments to the extent that Staff agrees with them:

Four Principles for Methane Leak Abatement Best Practices

1. BPs go beyond technologies and tools to embody a new way of doing things. Policies, practices and education are as important as new technologies, and may provide additional methane reduction opportunities at lower cost (e.g., The "Find it, fix it" policy for fixing leaks when found, in some cases, may be more cost effective than monitoring or returning later to fix the leak).
2. Industry standards for Safety and supplemental measures are needed to meet the challenge of eliminating methane emissions to the extent necessary to meet State goals.

⁹ Refer to the Risk Assessment website at: <http://www.cpuc.ca.gov/riskassessment/>

3. If we can use the most advanced, technologically feasible, cost-effective measures to further reduce methane emissions beyond established targets, we should.
4. Improved methane detection by itself isn't enough; it should be coupled with better quantification and accurate categorization, and matched with a plan/timetable for mitigation in manners that are effective in minimizing the release of methane.

It should be noted that these Principles represent a deeper iteration of one of six statutory principles that were listed in SB 1371, in that they will guide the effort to “(4) Establish and require the use of best practices for leak surveys, patrols, leak survey technology, leak prevention, and leak reduction.”¹⁰

RECOMMENDATIONS

At this time, after the exhaustive review of BPs described above, the CPUC and CARB are prepared to make the following BP recommendations.

As stated in SB 1371, “The rules and procedures, including best practices and repair standards, shall be incorporated into the safety plans required by Section 961 and the applicable general orders adopted by the commission.”¹¹ At this time, the only applicable general order adopted by the commission is G.O. 112, Revision F and future revisions. Whether and how these proposals, should they be adopted by the Commission, would be incorporated into a general order, has not yet been determined.

¹⁰ PU Code Section 975(e)(4).

¹¹ SB-1371 Natural Gas: Leakage Abatement, Section. 2., Article 3., 975(f)

Mandatory Requirements

There are mandatory minimum requirements proposed here that are intended to ensure that the utilities and gas storage operators are using BPs to reduce Methane leaks and emissions. Some of the minimum requirements are not BPs as identified in the spreadsheet, but are the policies, procedures, programs, instructions and training necessary to implement the BPs.

In addition, it should be mandatory for all utilities to create and file with the CPUC and CARB, a compliance plan to compel the utilities to self-audit and certify what specific BPs they are using to mitigate methane leaks and emissions.

There are also mandatory minimum BPs proposed that are aimed at mitigating two of the largest categories of methane emissions and leaks. Those categories are blowdowns and threaded connections¹². Further, there are several minimum required BPs for the detection of graded and ungraded leaks, and to mitigate the uncontrolled release of methane to the environment.

All of the mandatory requirements have been proposed because they are either considered a crucial element to the success of the program (e.g., compliance, programs, training, etc.) or because they will detect or mitigate the largest volume of methane emitted and leaked (blowdowns, threaded fittings, graded and ungraded leaks, uncontrolled releases of methane). They also appear to be cost-effective, based on current utility experience or projected commercial cost (if still in R&D).

¹² As identified in the Methane Leak Abatement Proceeding Workshop on Cost-Effectiveness and Best Management Practices (R.15-01-008), October 27, 2015. Refer to the Risk Assessment website at: <http://www.cpuc.ca.gov/riskassessment/>

CPUC / CARB Approval and Audits

The CPUC, in consultation with CARB, will approve the compliance plans and mandatory procedures and practices described in this document using a process to be determined later in this proceeding. Also, note that all components of this compliance plan will be subject to audit by the CPUC in consultation with CARB and/or third-party certifiers, using an audit process to be determined, including unannounced random field inspections.

Voluntary Use of Best Practices

All other BPs found in Attachment A of this document, or the March 18, 2015, report found on the Risk Assessment website,¹³ are considered voluntary and may be used as appropriate by the Respondents to meet the emission targets eventually adopted by the CPUC. As technologies change and improve, additional best practices may be added and/or made mandatory.

¹³ Refer to the Risk Assessment website at: <http://www.cpuc.ca.gov/riskassessment/>

Mandatory Requirements and Best Practices

| Mandatory | Method 1 Category | Logic | Deadline |
|---|--|---|-------------------|
| Policies and Procedures | | | |
| Written compliance plan identifying the policies, programs, procedures, instructions, documents, etc. used to comply with the Final Decision in this Proceeding (R.15-01-008). Exact wording TBD by the company and approved by the CPUC, in consultation with CARB. | Regulatory Issue, Process and Program Development & Training | Each company is of a different size and has a different business model. In most cases, they are given the flexibility to choose the BPs that are cost-effective for them. However, they must submit a compliance plan for approval by the CPUC/CARB to ensure that they are complying with the emission targets and decisions of this proceeding and SB 1371. | January 31, 2017 |
| Written company policy stating that methane is a potent GHG that must be prevented from escaping to the atmosphere. Exact wording TBD by the company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training | Written company policies are needed to direct company activities and hold employees accountable for violations of the policy. | December 15, 2016 |
| Written company policy or procedure stating that non-emergency venting of transmission lines and distribution mains to atmosphere are only permitted after pressure inside the lines has been reduced to the level specified in Procedure XXX. Exact wording TBD by the company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training Purging | Written company policies are needed to direct company activities and hold employees accountable for violations of the policy. | December 15, 2016 |

| Mandatory | Method 1 Category | Logic | Deadline |
|--|--|---|-------------------|
| Policies and Procedures | | | |
| Written company policy or procedure stating that any project that requires evacuating methane must build time into the project schedule to reduce methane by using one of the approved BPs found in Procedure XXX. Schedules of transmission line work shall also be submitted to facilitate audits, with line venting schedule updates TBD. Exact wording TBD by the company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training | Written company policies are needed to direct company activities and hold employees accountable for violations of the policy. | December 15, 2016 |
| Written company procedures implementing the BPs approved for use to evacuate methane and how to use them. Exact wording TBD by the company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training | Written company procedures are needed to direct company activities and hold employees accountable for violations of the policy. | December 15, 2016 |
| Written company policy that requires that for any projects requiring evacuating methane, Work Planners shall clearly delineate, in procedural documents, such as work orders used in the field, the steps required to safely and efficiently reduce the pressure in the lines, prior to lines being vented. Exact wording TBD by the company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training | Written company procedures are needed to direct company activities and hold employees accountable for violations of the policy. | December 15, 2016 |
| Written company policy requiring bundling of work whenever possible to prevent multiple venting of the same piping. Exact wording TBD by the company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training | Requires coordination and awareness of construction, operations and maintenance activities. Multiple blow-downs of lines cause excess methane emissions. | December 15, 2016 |
| Written company emergency procedures which describe the actions company staff shall take to prevent and/or stop the uncontrolled release of methane from the gas system or storage facility. Exact wording TBD by the company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training, IM Crossover | Storage facilities contain large volumes of methane. An uncontrolled release will negate the methane reductions of other utilities, increase greenhouse gases and endanger public health by releasing large amounts of odorant and other toxic natural gas by-products. | December 15, 2016 |

| Mandatory | Method 1 Category | Logic | Deadline |
|---|--|---|-------------------|
| Records | | | |
| Written Company Policy directing the gas business unit to maintain records of all emissions and leaks, including the calculations used to derive the volume of methane released. Records are to be maintained in accordance with G.O. 112 F and succeeding revisions, and 49 CFR 192. Currently, the record retention time in G.O. 112 F is at least 75 years for the transmission system. 49 CFR 192.1011 requires a record retention time of at least 10 years for the distribution system. Exact wording TBD by the company and approved by the CPUC, in consultation with CARB. | Regulatory Issue | It is impossible to accurately report methane releases without this information. It will also be used by regulators during audits to ensure compliance. | December 15, 2016 |
| Training | | | |
| Training to ensure that personnel know how to use company emergency procedures which describe the actions staff shall take to prevent and/or stop the uncontrolled release of methane from the gas system or storage facility. Training programs to be designed by the Company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training, IM Crossover | Storage facilities contain large volumes of methane. An uncontrolled release will negate the methane reductions of other utilities, increase greenhouse gases and endanger public health by releasing large amounts of odorant and other toxic natural gas by-products. | December 15, 2016 |
| Ensure that training programs educate workers as to why it is necessary to reduce, eliminate and/or prevent methane emissions and leaks. Training programs to be designed by the Company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training | Training programs are necessary to help employees understand why it is important to reduce methane emissions and leaks. If they understand the issues, they are more likely to comply with the company's policies and procedures. | December 15, 2016 |

| Mandatory | Method 1 Category | Logic | Deadline |
|---|--|---|------------------|
| Training | | | |
| Training / Mentoring /Knowledge Transfer Programs to ensure knowledge continuity as workers leave and new workers are hired. Training, mentoring and knowledge transfer programs to be designed by the Company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training | Alleviates knowledge gaps and improves safety. New workers MUST be trained for safety reasons, in addition to limiting methane emissions. Knowledge transfer programs keep knowledge and important information flowing through generations of employees. | January 31, 2017 |
| Create and implement training programs to instruct workers on how to perform the BPs chosen, efficiently and safely. Training, mentoring and knowledge transfer programs to be designed by the Company and approved by the CPUC, in consultation with CARB. | Process and Program Development & Training | Training programs are necessary for the safety of workers and the public. | January 31, 2017 |
| Experienced, Trained Personnel | | | |
| Experienced, qualified people with field experience are needed. This is a general comment for all BPs. Create new formal job classifications for apprentices, journeyman, specialists, etc. where needed. Implement this practice in cooperation with the Unions. The CPUC, in consultation with CARB will review the number and experience of employees in the field, as well as training and mentoring programs, during audits. The audit process will be developed later in this proceeding. | Process and Program Development & Training | According to the Unions, there is a significant need for experienced, qualified people working in the field, and also for participation in the evaluation of existing practices and development of better (best) practices. Experienced gas system workers have first-hand knowledge of how gas system equipment operates, what the operation and maintenance problems are and how to fix them resulting in less methane leaks. These are not entirely hardware issues. Experienced workers are needed to help train, improve procedures, maintain and operate equipment and in the process, how to minimize methane leaks and emissions. | January 31, 2017 |

| Mandatory | Method 1 Category | Logic | Deadline |
|---|--------------------------|---|--|
| Leak Detection | | | |
| <p>Conduct leak surveys of the gas distribution system outside business districts, every 3 years instead of every 5 years, using modern, digital data acquisition equipment (e.g. digital data loggers), which can be downloaded to a central database.</p> | Monitoring | <p>Transition from 5 year leak surveys to 3 year leak surveys for the following parts of the gas system: 49 CFR 192.723 – Distribution systems: Leakage-surveys (b)(2)states, “A leakage survey with leak detector equipment must be conducted outside business districts as frequently as necessary, but at least once every 5 calendar years at intervals not exceeding 63 months.” Further, research cited by both Colorado Air Quality Control Commission and the EPA indicates that more frequent inspections result in greater reductions of methane emissions¹⁴. Leaks are found sooner and have less time to emit natural gas. The large gas utilities all appeared to be in favor of this change. More frequent leak surveys are permitted by the CFRs.</p> | Begin surveys on 3 year schedule by January 31, 2017 |
| <p>Special Leak Surveys Vintage Pipe, Distribution Integrity Management Program Surveys – conducted at least once per year and up to 4 times per year, depending on specific criteria. Leak surveys to be conducted using modern, digital data acquisition equipment (e.g. digital data loggers), which can be downloaded to a central database. Pipe materials that are more susceptible to leaks should be replaced or modified to make safe (e.g., cast iron or certain type of plastic pipe, unprotected steel.</p> | Monitoring | <p>Vintage Pipe is determined by material and date manufactured. The intent is to find leaks on problematic infrastructure and components such as Aldyl “A” piping.</p> | Begin surveys by January 31, 2017 |

¹⁴ In the ICF International Report, *The Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries*, pages 3-9 thru 3-11

| Mandatory | Method 1 Category | Logic | Deadline |
|--|-------------------|--|----------------------------------|
| <p>Leak Detection</p> | | | |
| <p>Mobile methane mapping technology.</p> <p>Strategic Mobile Methane Mapping Leveraging Existing Vehicle Fleet and/or use of mobile gas leak detection. Vehicles used for this purpose should be chosen in the most cost effective way. Vehicles that are rarely used are obviously not candidates for this technology.</p> <p>Mobile mapping equipment must be capable of automatically downloading leak data to a central database.</p> <p>Leak maps shall be publicly available with leaks displayed by zip code or other metric (number and type of leaks per zip code)</p> <p>Note: PG&E uses Picarro to find and alert for leaks. If Picarro’s equipment senses methane concentration above 5 ppm, a survey is conducted on foot to determine the source of the leak. This methodology would be similar for all mobile gas leak detection technology.</p> | <p>Monitoring</p> | <p>Note: We are not requiring this technology to be used until January, 2018, to allow time for the technology to be perfected. It is very close to becoming commercially available. Technology costs can also be considered in strategic implementation. .</p> <p>Pros: - Able to identify more leaks in a given area, enabling the “Super Crew” method of fixing leaks en masse, resulting in lower cost per repair.</p> <ul style="list-style-type: none"> - Increase the number of leaks found in a very cost-efficient way. This new technology is more sensitive and therefore finds more leaks. -Leverage miles already being driven by Company vehicles. -No incremental vehicle cost or vehicle emissions. - For SCG, 4,000 Company vehicles driving 7,000 mi/yr = 28 million miles driven annually. -Develop an approach that is seamless to the vehicle operator. - Use sensors on vehicle to gather and communicate all data automatically - Develop methane/odorant detector to differentiate Pipeline gas. -Perform data analysis in centralized location. -Large data volume may allow modeling of atmospheric methane levels across entire service territory. -Company vehicles usually drive in areas the companies have facilities . -Centrally coordinate standard work orders for Operations to investigate locations of concern. -Synergistic between Company operations. <p>Cons: - Algorithms and methods are still being improved to make the equipment more accurate and efficient.</p> | <p>Begin by January 31, 2018</p> |

| Mandatory | Method 1 Category | Logic | Deadline |
|--|---|--|-------------------|
| Leak Detection | | | |
| Stationary Methane Detectors for Compressor Stations, Terminals, Gas Storage Facilities, or large concentrations of equipment or piping. These are especially useful at unmanned facilities. Methane detectors must alarm in manned control rooms or manned facilities. For underground storage facilities, requirements would be harmonized with other monitoring requirements. | Monitoring | Early warning is essential to reducing the amount of methane emitted or leaked, especially at gas storage facilities which are unmanned. This is also a safety issue. Recent research conducted for the Environmental Defense Fund (EDF) has identified inexpensive (<\$10000), reliable stationary methane detectors. Although they are still considered in R&D, it is anticipated that they will be commercially available by Feb. 2018. | February 28, 2018 |
| More frequent periodic, possibly quarterly, leak detection and repair (LDAR) inspections at above ground transmission facilities with repair dates determined by leak size. Schedule and scope to be determined. Use EPA Method 21, optical gas imaging, or other methods for above ground facilities/leaks. | Monitoring | Transmission facilities with a high concentration of equipment and other components are more prone to leaks and vented emissions. In addition, since they are in a more concentrated area it is easier to perform leak surveys. Quarterly leak detection and repair inspections are reasonable and most likely will be cost-effective. | February 28, 2018 |
| Use of hand-held detection devices to identify & quantify the sources of leaks. | Monitoring, Existing / Standard Practices | The most sensitive equipment finds the most leaks. There are many devices available. Refer to the March 18, 2015 Best Practices Report, Appendix A on the Risk Assessment website under Recent Documents: http://www.cpuc.ca.gov/riskassessment/ . For example, a tunable laser spectrometer is under development by NASA. It is expected to be commercially available for <\$5000. It will have a measuring sensitivity in the parts per billion (ppb) range. The newest equipment will be more reliable, lower maintenance and more sensitive compared to older technologies. | February 28, 2018 |

| Mandatory | Method 1 Category | Logic | Deadline |
|--|---|---|------------------------|
| Leak Repairs | | | |
| <p>Repairing Grade 2 and Grade 3 leaks within certain timeframe (TBD), rather than keep monitoring.</p> <p>“Find It Fix It Policy”: Leak Repair Timeline and Backlogs</p> <p>The Leak repair time for Grade 2 and Grade 3 leaks above a certain size threshold (TBD) are repaired on an accelerated timeline, within one year from discovery, meaning the utilities have one year from when they detect a Grade 2 or above ground Grade 3 leak to fix it. This would apply to all leaks found after December 15, 2016.</p> <p>Note: In no case shall the time to repair a leak exceed the repair times specified in G.O. 112 F and succeeding revisions, or as ordered by the CPUC Gas Safety and Reliability Branch.</p> <p>Backlogs – Utilities will be allowed until October 1, 2018 to eliminate their backlog of <u>above ground</u> Grade 3 leaks found prior to December 15, 2016.</p> <p>Note: Grading terminology varies between utilities. Grade can also be referred to as Code. Some utilities may also have Grade 2+ leaks. Grade 2+ leaks shall be repaired within the same time limit as Grade 2 leaks unless required by the CFRs, G.O. 112F, or the CPUC Gas Safety and Reliability Branch to be repaired sooner.</p> | <p>Monitoring and Maintenance Practices</p> | <p>PG&E is already repairing these within the first 15 month cycle. PG&E has found this practice to be cost-effective.</p> <p>*There will be initial costs, however once the program is in place, costs are expected to decrease because less leaks will be found to fix, and less leaks will have to be monitored</p> <p>*Potential increase in capital for repairs and expense for labor.</p> <p>Note: Extended time is allowed for those leaks which cannot be fixed on time due to permitting problems or other problems beyond the utility’s control.</p> | <p>October 1, 2018</p> |

| Mandatory | Method 1 Category | Logic | Deadline |
|--|--|---|-------------------|
| Leak Prevention | | | |
| Revise pipe fitting specifications to require tighter tolerance/better quality pipe threads. | Design | <p>This is being added as a mandatory practice because of the very large number of threaded fittings and their known propensity to develop leaks.</p> <p>This is being recommended as a mandatory BP, provided that further research proves this to be a cost-effective. If so, utilities will not be required to replace all threaded connections immediately, but rather replace them as incidental work is required to be performed on them.</p> <p>This particular practice will be to use ANPT pipe threads instead of NPT. However, other types of threads or connections may prove better. Leaks from threaded connections are usually not a result of initial installation. Leaks are usually a result of what happens later (corrosion, things bumping into the MSAs, customer abuse, etc.). Most likely this practice will result in an incremental reduction of emissions.</p> | February 28, 2017 |
| <p>Methods, systems and components used to prevent and/or stop the uncontrolled flow of methane from a gas system or storage facility.</p> <p>This requirement should not be duplicative to the DOGGR's or CARB's Oil & Gas Regulations.</p> | Design, Process and Program Development & Training, IM Crossover | Storage facilities contain large volumes of methane. An uncontrolled release will negate the methane reductions of other utilities, increase greenhouse gases and endanger public health by releasing large amounts of odorant and other toxic natural gas by-products. | February 28, 2017 |
| Dig-Ins – Public education program to alert the public and contractors to the Call Before You Dig – 811 program. In addition, utilities must provide procedures for contractors to follow when excavating to prevent damaging or rupturing a gas line. | Existing Practice, Process and Program Development & Training | Dig-Ins are the major cause of gas line ruptures. | Now. |

| | | | |
|---|--------------------------------------|---|------------|
| <p>Dig-Ins – Utilities must provide company monitors to witness all excavations near gas transmission lines to ensure that contractors are following utility procedures to properly excavate and backfill around transmission lines.</p> | <p>Monitoring, Existing Practice</p> | <p>This is necessary to ensure that people excavating around the line do not damage it or rupture it. It is possible to have an excavator nick or damage a transmission line causing it to rupture years later.</p> | <p>Now</p> |
| <p>Dig-In Repeat Offenders – Contractors found to be at fault more than once by a CPUC investigation, for rupturing a gas line, must be labelled Repeat Offenders. They must be forbidden from excavating near gas lines in the future. In addition, the utility must be report them to the California Contractor’s State License Board. The Board has the authority to investigate and punish dishonest or negligent contractors. Punishment can include suspension of their contractor’s license.</p> | <p>Regulatory</p> | <p>Repeat offenders of the 811 laws are common. This must not be tolerated.</p> | <p>Now</p> |

(End of Attachment 1)

ATTACHMENT A

ATTACHMENTS

Attachment A - Best Practices Consolidated Spreadsheet

The Excel spreadsheet in Attachment A, found on the Risk Assessment website at <http://www.cpuc.ca.gov/riskassessment/> is the work product from the Best Practices Working Group. All spreadsheets submitted by the parties have been merged together (consolidated) and notes from all of the meetings have been added in Red into the column titled "Additional Comments from Meeting." PG&E participants agreed to categorize the BPs for us, using the categories found in Method 1 and Method 2. The spreadsheet that they developed was circulated by PG&E to the Service List. The staff of the CPUC prefers Method 1; however parties are free to use whatever method they choose to help them organize and categorize BPs for their purposes.

The staff of the CPUC modified Method 1 slightly. We have added two categories to the Method 1 list. The categories are "Design" and "Regulatory Issue." The category "Design" is needed because some BPs require design changes to gas system infrastructure. In addition, the staff of the CPUC has color-coded, in light green, BPs which are also recommended by the EPA Gas Star Program and added the list of BPs meeting topics, in the yellow box, in the upper right-hand corner of the spreadsheet.

-END-

(End of Attachment A)