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August 4, 2017

Mr. Ken Bruno Gas Safety and Reliability Branch Safety and Enforcement Division California Public Utilities Commission 505 Van Ness Avenue San Francisco, CA 94102

Re: State of California – Public Utilities Commission General Order 112 Audit – PG&E's DIMP Program Audit

Dear Mr. Bruno:

The Safety and Enforcement Division (SED) of the CPUC conducted a General Order 112 audit of PG&E's DIMP Program Audit from April 17, 2017 to April 21 and May 23, 2017 to May 25 2017. On July 5, 2017, the SED submitted their audit report, identifying findings. PG&E agrees with many of the recommendations and in this spirit has created a Corrective Action Program (CAP) Notification (112780109) to track resolution or response to each recommendation. The notification has a task for each recommendation which restates the recommendation and provides a statement of PG&E's planned action. A summary of the CAP the notification is provided as Attachment 1 for your reference.

Several recommendations requested additional information or updated responses which we are providing with this letter:

- In response to CPUC item 1, PG&E has provided an updated response in Attachment 1, Task 1.
- In response to CPUC item 12, PG&E is providing Attachment 2: Cause Analysis Report, RCA Report No. 2012-04.
- In response to CPUC item 14, PG&E has provided an updated response in Attachment 1, Task 14.
- In response to CPUC item 23, PG&E has provided the requested information in Attachment 1, Task 23.

Please contact Enza Barbato at (925) 357-7889 or E1Bo@pge.com for any questions you may have regarding this response.

Sincerely,

/**S**/ Mike Bradley

cc: Durga Shrestha, CPUC Aimee Cauguiran, CPUC Dennis Lee, CPUC Terence Eng, CPUC Susie Richmond, PG&E



Title: 2017 DIMP Audit This notification was created to track improvements identified during the CPUC Audit of the DIMP.

Task 1: Update T&D definitions in procedure. CPUC Recommendation:

PG&E has made changes to the definition of 'transmission' and 'distribution' assets (reference: TD 4125P-10) resulting in transfer of some assets from DIMP to TIMP program. However, DIMP documents, for example, TD-4850P-01, page 28, has the definitions for "distribution > 60 psig" and 'Distribution pipe'. DIMP program should make the necessary changes in relevant documents to reflect the new definition and its implementation, as needed.

### PG&E Response:

PG&E agrees to update the TD-4850P-01 to make the "distribution" definition consistent with TD-4125P-10 at the time the new definition takes effect. The transition of integrity management responsibility associated with the change in asset definition will be coordinated between TIMP and DIMP to ensure all assets are accounted for between the two programs.

Task 2: Request to update GSR with Welder CPUC Recommendation

SED reviewed the "Gas Service Record" form and recommends that PG&E to capture any additional data/activities performed in the field such as welder/joiner information and other useful information that may be relevant/critical to its DIMP program to track and mitigate an event of a welding/jointing failure or any other on its distribution system.

#### PG&E Initial Response:

PG&E agrees with capturing important information on it gas service records; however, we feel improvements should be made in conjunction with the tracking and traceability requirements by PHMSA to ensure our activities are in line with PHMSA's requirements. PG&E has a Pilot project to demonstrate electronic as-built records. Key elements of this project include developing processes to capture materials used on a project (using bar codes) and locations of pipeline components (using GPS data capture). This project will eventually develop processes to capture pipe joiner data. PG&E does have the ability to identify which projects employees have worked on or to identify which employees worked on a project. This is done by using PG&E's time reporting system and PG&E's work management system. Each PG&E employee has a unique employee identification numbers. When employees work on a project, they charge their time to the project order number. By correlating the time reporting system data to the SAP work management data, we can identify what projects an employee worked on in a



specific time period. Based on PHMSA's proposed rulemaking and PG&E's development efforts around electronic as-builts, no action will be taken at this time for this recommendation.

Update: CPUC issued the audit report on 7/6/2017. The CPUC provided the following additional comments:

SED understands the steps PG&E is taking steps, for example digitizing the records which is currently focused on capturing plastic pipe information and may later evolve on capturing welder/joiner information for the joints they make. Also the current method of identifying employees who worked on a project through time sheets and logs is insufficient as it does not lead to find employee who made a particular joint. Therefore, SED strongly recommends that until digitizing projects are fully implemented, PG&E should capture information of welders and joiners for each joint they make for traceability purposes.

SED has requested an updated response to this audit recommendation.

### PG&E's Updated Response:

PG&E has given additional consideration to this recommendation. We have checked with other gas utilities to understand their practices in this regard. Most of these utilities are not currently tracking the joiner information. Most of these utilities have plans to implement joiner tracking; however, they intend to implement this functionality in conjunction with information system deployment. Given the significant changes this would require including additional manual controls on existing processes for documentation on Gas Service Records and As-built

Job Files, PG&E cannot implement this recommendation at this time. As discussed during the audit, PG&E agrees with the objective of having the ability for joiner tracking and traceability. PG&E has been conducting a pilot program for electronic as-built records. PG&E believes that the successful implementation of pipe joiner tracking will require a technology solution on a mobile platform that allows capture of this data in near real time.

Task 3: Update potential threat definition. CPUC Recommendation:

Existing threats and Potential threats (PHMSA FAQ's C4.b.9; §192.1007(b)) Identify threats requires operator to consider reasonably available information to identify existing and potential threats (include threats that are known potential threats that the operator has not experienced yet as well as threats that have not resulted in a leak (e.g., near misses; GO112-F Section 105 Definitions). PG&E document TD-4850P-01 on page 29 defines "potential threat" as an 'A threat to a system component or system process that has not yet resulted in a leak'. PG&E should review its procedure to address definition of Potential threats (PHMSA FAQ's C4.b.9; §192.1007(b), GO-112-F) guideline and implement accordingly.

PG&E's Response:



PG&E will review the PHMSA FAQ on potential threats and will update its procedure to include potential threats as appropriate.

Task 4: Define "Near-miss" term. CPUC Recommendation:

General Order 112-F, Section 105 provides definition of 'Near-miss events'. PG&E DIMP Program did not define "Near-miss" and therefore should include and implement GO112-F definition in its DIMP Program.

### PG&E's Response:

PG&E will review the definition of near misses in GO112-F and will update its procedure to include near misses and potential threats as appropriate.

Task 5:	
Available Patrolling Recor	ds.
CPUC Recommendations:	

49 CFR, Part §192, Section §192.1007(b) identifies 'patrolling' as a source of gathering the information. During DIMP Program review, PG &E indicated that the DIMP team used patrolling records as a data resource during the early years of the DIMP program only. PG&E should continue to use the available patrolling records to identify existing and potential threats; such as new landslide areas, missing supports for span and others.

#### PG&E's Response:

PG&E agrees with this recommendation and will continue to use the available patrol records to identify existing and potential threats as available.

Task 6: GPTC Guidance Review CPUC Recommendation:

To ensure continuous improvement of PG&E DIMP Program, SED recommends that PG&E review the GPTC guidance, ASME B31.8S-2004, and industry practices to ensure integrity management program maturity. For example, PG&E can perform an exercise on suggested threat sub-categories in GPTC and B31.8S and make a determination that how these can be applied into PG&E and record the reasons for their inclusion or otherwise.

PG&E's Response:



PG&E will review the GPTC guidance with respect to sub-divisional risk results to determine if any change to our methodology is needed. PG&E will also review ASME B31.8S-2016 for threat and sub-threat categories.

## Task 7: Update Scrub process in Attachment J. CPUC Recommendation:

§192.1007(b) defines primary threat categories for a distribution system. SED reviewed PG&E primary threat categories and found that the "Other" ranked high on the list. SED recommends that PG&E's DIMP team update the existing field forms and have the field personnel trained to ensure incoming data are accurate to reduce the threats going to 'other' category. An example is that 'others' category had "no dope/deteriorated dope' which can be accommodated under material failure or equipment.

### PG&E's Response:

PG&E will review the threat categories and reassign leaks to the appropriate category. PG&E will review what remains in the "Other" category and will assess whether or not any training or form changes are required. PG&E will update the scrub process in Attachment J accordingly.

## Task 8: Interactive Threats in Risk Score CPUC Recommendation:

PG&E defines interactive threats in TD-4850P-0, section 5.2(3). However, during the audit PG&E did not demonstrate whether they are considering any interactive threat for calculating the risk. One examples of Interactive Threats (interaction of multiple threats) can be a potential threat (rock impingement for plastic) to prioritize replacement. PG&E should look to its leak and incident history and operations and maintenance history to identify interactive threats specific to its system. Examples are:

- Slow crack growth in older plastics where pipeline was pinched during
- operational event or where over-squeeze occurred due to improper tools
- or procedure
- Slow crack growth in older plastics where non-modern construction
- practices were used
- Water main leakage areas or areas of soil subsidence with cast iron
- mains
- Installation of mechanical fittings without restraint in soils or
- conditions (excavation damage) that cause pipe to pull out of fitting

### PG&E's Response:

PG&E accounts for interactive threats in risk assessment through Likelihood of Failure factors. For example, the interaction of pipe squeezing and slow crack growth is taken into account through the



Squeeze Point factor for Material Failure Plastic Crack sub-threat (See Attachment N - Rev 1 Appendix A, SME Adjustment and CoF, row 20). PG&E will perform a review of its existing processes for modeling interactive threats to see if there are opportunities to improve.

Task 9: Risk algorithm CPUC Recommendations:

SED reviewed PG&E's Attachment N -Risk Algorithm and found that PG &E considers the following factors affecting consequence: population density (2.2.2.2), migration (2.2.2.3), severity (2.2.2.1), and pressure.

• 2.2.2.1 Severity factor -Table 1: Severity factor value. Highest value is 1. Unknown was given 0.5 factor value in this category.

PG&E should consider that "unknown" should carry a weighting factor value of the worst case scenario which is 1 in this category

- 2.2.2.2 Population Density Factor includes:
  - Public Assembly locations
  - Large customer meters (customer type = residential or commercial
  - o complexes, or large industrial or commercial)
  - o Inside meter sets
  - Overbuilds

Where assets are within 100 feet of one of these locations, the Population Density factor is assigned a value of 1.0. For Above Ground Facility features, this factor only uses statuses for large customer meters and inside meter from the feature being scored. What factors will PG&E assign if there are multiple situations at a location? For example, public assembly location in high population density area etc.

- 2.2.2.3 Migration factor, Table 3-Migration factor values under "other" the assigned value is 0.5. PG&E did not define "other" in its Mitigation Factor.
- 2.2.2.4 Pressure factor-The Pressure factor uses the pressure classification of the asset to gauge the release rate of gas in the event of a failure. A higher pressure class results in a higher release rate and potentially affects a larger area. When pressure is not available, the Pressure Class is assumed to be HP and the factor defaults to 0.1. PG&E did not include interactive threat of an adjacent facility on its pipelines. PG&E should consider including the railroad facilities located in proximity to its pipeline when calculating the consequence of failure for evaluating the risk. PG&E should consider applicable operating and environmental factors affecting consequence (e.g., paved areas and hard to evacuate institutions). These are considered to be operating environment factors and must be considered as additional factors relating to consequence of failure when evaluating risk. PG&E should consider including pipe diameter as additional factor relating to consequence of failure when evaluating risk-larger diameters will create situations where there may be greater consequence in the event any threat manifests a failure. Thus the larger diameters have higher consequence factors.



#### PG&E's Response:

Regarding 2.2.2.1: PG&E will update its algorithm and procedure to conservatively assign factors for "unknown" categories. Regarding 2.2.2.2: As described in Attachment N, Section 2.2.2.2, the maximum value for the population density factor is 1. This maximum value is applied when there is a high consequence location in order to treat high consequence locations as areas of high population density, regardless of actual population density. No action is required in response to this recommendation.

Regarding 2.2.2.3: PG&E will assign the "Other" value for Surface Over Pipe Calc. a factor value of 1. PG&E will clarify "all other values" as the value applied when no applicable leak data is available for the feature; PG&E will also change this value to be 1 (worst case). Regarding 2.2.2.4: PG&E will update the factor value for HP to be 1.

Regarding adjacent facilities: DIMP does assess the risk of threats related to adjacent facilities, namely cross-bore and joint trench (failure of a gas asset related to co-location of other underground facilities). See Attachment H, page 4. No action is required in response to this recommendation.

Regarding railroad facilities: DIMP will consider railroad facilities located in proximity to a pipeline as a consequence factor in its risk assessment.

Regarding environmental factors: As described in Attachment N, pages 9 and 10, DIMP considers operating and environmental factors, including surface over pipe (i.e., paved areas), wall-to-wall paving, and public assembly locations. No action is required in response to this recommendation.

Regarding Pipe Diameter: DIMP will review historical distribution system events to consider whether or how diameter should be accounted for as a consequence factor.

Att N, rev 2 and the Uptime models have been updated as follows: For CoF Severity, the value has been changed for "Unknown" from 0.5 to 1.0. For CoF Migration, the value for Surface Over PipeCalc when it is "Other" is now 1.0.

For CoF Population Density, Rail facilities have been incorporated into the Special impact locations factor.

These changes are currently drafted and awaiting review and approval from the DIMP SC.

In addition to the above note, in the CoF Pressure factor, the value of pressure class of HP is now 1.0.

Task 10: Steering Committee Experts CPUC Recommendations:



PG&E has information on Steering Committee (SC) in attachment E of the procedure TD-4850P-01. SED would like to emphasize that if SC members are required to provide an expert opinion on a technical matter for decision making, then they should meet the definition of "subject matter expert" as outlined in PHMSA DIMP FAQ C.4.a.3. "Subject matter experts are simply people who have specific knowledge of topics and/or facilities under consideration. This includes the operator's operations and maintenance personnel - the people who construct, inspect, maintain and oversee it distribution facilities day-to-day."

#### PG&E's Response:

PG&E agrees with this recommendation and will update attachment E to include the information from the PHMSA FAQ.

Task 11: Risk Algorithm Validation CPUC Recommendations:

PG&E procedure TD-4850P-01, section 6.8 talks about validation including comparison to previous years and adjustment to risk logarithm, if needed. PG&E should consider also validation against:

- industry averages
- to expectations based on knowledge of the system and mitigation activities

### PG&E's Initial Response:

Regarding industry averages: PG&E does not agree with this recommendation as there are no industry averages available for distribution risk. Regarding expectations: This is conducted in our field review process as indicated in Attachment L.

### Update: CPUC issued the audit report on 7/6/2017 with the following clarification:

"PG&E should continue to perform validation against the expectations based on knowledge of the system and mitigation activities and other resources as available."

#### PG&E's Updated Response:

PG&E will continue to validate risk results with its subject matter experts during the DIMP Steering Committee review as well as during the field review process.

Task 12: Attachment A leak validation CPUC Recommendation:

Attachment A-Mitigation activities, 4.0 Attachment A-mitigation Activities for DIMP cycle 2012 showed that Permasert and Kerotest curb valves leaks were considered under incorrect operation threat. In 2015 the same valves were classified under incorrect operation, equipment failure, material or welds.



SED requests that PG&E provide additional information regarding these valves to verify if the cause of the leak is related to incorrect operation, equipment failure, material or welds?

PG&E's Initial Response:

Curb valve leaks were previously categorized into primary threats Incorrect Operation, Equipment Failure, or Material or Weld based on leak information. PG&E considers Permasert valve leaks to be Incorrect Operation associated with installation of the mechanical fitting. PG&E considers Kerotest valve leaks to be Equipment related as the leak is a result of the valve design. PG&E will review its scrub procedure to consistently categorize these types of leaks.

Update: CPUC issued the audit report on 7/6/2017 with the following additional request:

"SED requests that PG&E provide additional information regarding these valves to verify if the cause of the leak is related to incorrect operation, equipment failure, material or welds?

### PG&E's Updated Response:

See attached cause analysis report (RCA Report No. 2012-04, Table 1) for details on the rationale for categorizing these leaks.

Task 13: Rerunning risk model after change. CPUC Recommendation:

SED recommends that when a change in weighting factors, algorithm etc. is made for risk model, the modified model should be re-run on previous data. The model results with new parameters should be compared with previous model results and the observations made through mitigation measures/field observation for validation purposes, and to make sure that the changes are driving the model in right direction.

#### PG&E's Response:

PG&E understands the recommendation and agrees on developing a method to evaluate the model changes to confirm the results are reasonable and as expected.

Task 14: Discovery Bay incident CPUC Recommendation:

SED discussed with DIMP team the Discovery Bay incident that occurred in December, 2015. Due to this incident, wet gas entered into the system. SED would like to know that if any other PG&E team studied the risk of moisture intrusion into the distribution system. If it was studied, please let us know the details of steps/measures taken and what the conclusion was. The DIMP team should make an



evaluation of the steps taken and determine that were those steps sufficient, and provide SED their analysis. If there is a need for further analysis, please provide the plan for the same and update us when the results are available.

### PG&E's Initial Response:

No evidence was found during the root cause investigation to establish the fact that free liquids went through the regulator station. Considering the high moisture event that happened simultaneously with the regulator problems and the cold temperatures that day, the team performed calculations to determine the potential for hydrate formation. The calculation revealed that the operating conditions were appropriate for formation of gas hydrates. Hydrate were found within the pressure pilot throttling valve by the gas technicians." There is no evidence that free liquids in two phase flow regime passed through the regulators. Considering this, it is most likely that the formation of hydrates began with moisture condensation in the top portion of the regulator and pressure pilot." Reference Discovery Bay Root Cause Analysis. Following the overpressure event, the distribution system was shut down and then safety checks and relights were conducted for all customers. Had liquids been carried over into the distribution system to the extent it could impact supply to customers, it would have been identified during the re-light process and rectified. If some moisture was carried into the distribution system during the incident, it would have gradually dissipated once the flow of dry gas resumed. No action is required in response to this recommendation.

## Update: CPUC issued the audit report on July 6, 2017. The report noted the following additional information:

During the audit, the DIMP team further stated that the pipeline system in Discovery Bay area is plastic and therefore there is no concern about the internal corrosion. "

SED has requested confirmation of this additional information.

#### PG&E's Updated Response:

The Discovery Bay distribution system has approximately 65 miles of mains with 10 miles of steel and the remaining 55 miles made of plastic (see attached map for reference). The Discovery Bay Root Cause Analysis concluded that "There is no evidence that free liquids in two phase flow regime passed through the regulators. Considering this, it is most likely that the formation of hydrates began with moisture condensation in the top portion of the regulator and pressure pilot." To further validate the findings of the root cause analysis, PG&E will consider working with its Gas Quality Department to sample moisture vapor content at points along the steel pipelines to ensure the vapor content is below the maximum allowable limit.

Task 15: Report trend monitoring. CPUC Recommendations:



§192.1007(g) Report results requires operator on an annual basis to report the four measures listed in paragraphs (e)(1)(i) through (e)(1)(iv). In addition to reporting these measures, PG&E should monitor the trends on these performance measures and perform a root cause analysis triggered by the determination of high risk, if applicable.

### PG&E's Response:

Although not required by regulation, PG&E will evaluate whether trending at this high level provides insights in addition to what is currently identified for monitoring performance in the DIMP.

Task 16: Update procedure with Riskfinder <60 CPUC Recommendation (2nd Week):

PG&E explained that currently it uses Riskfinder model for the Assets which operate at < 60psig. For assets greater than 60 psig, PG &E uses previous leak based model. We understand that PG&E's Document "2016 Known Threats Risk Assessment Results" has information on this, but PG&E procedures do not specify that which methods will be used for two types of assets. Therefore, PG&E should make this clear in their relevant procedures.

### PG&E's Response:

PG&E agrees with this recommendation and will update the documents to identify the risk models being used for above and below 60 psig.

Task 17: Pipe Dope category CPUC Recommendation 2nd Week:

Attachment N, table 1 has severity factor values. It has severity factor values for Other - Pipe Dope. SED discussed with PG&E and it has been agreed that these issues identified as Pipe Dope -others should be re-classified under Material Failure or as appropriate. SED reviewed PG&E Cause Analysis Report for pipe dope, "CA 2016-03 Pipe Dope", which states on page 5, "The reason behind this type of leak could be associated with lack of riser thread quality and the quality of the pipe dope itself". Therefore, SED recommends that the severity factor values for Pipe Dope should be moved under another appropriate Primary Threat Category.

#### PG&E's Response:

PG&E agrees with this recommendation and will move Pipe Dope Severity factors from "Other" to "Material and Weld" primary threat category.

PG&E will update Attachment N accordingly.



The sub-threat Pipe Dope has been moved from primary threat category of "Other" to "Material and Weld" in Attachment N, H, and in the Uptime risk models. Attachments are currently in draft status and need to be reviewed for approval.

Task 18: Leak Cause and Leak Source threat CPUC Recommendation 2nd Week:

PG&E's A-from have information on 'leak cause' and 'leak source'.

SED recommends that the listing under these two headings should be aligned with DIMP threat categories for capturing better information and thus reducing data being categorized under 'others'. In addition, as far as possible, the threat categories should be sub-categorized to finer level to capture detailed information for proper categorization.

#### PG&E's Response:

PG&E will review the A form Leak Cause and Leak Source categories and compare them with the threat categories and if appropriate, reassign them to the appropriate threat category.

PG&E will assess whether or not it is possible for the current sub-threats to be categorized to a finer level.

## Task 19: New Construction Data in RiskFinder CPUC Recommendation 2nd Week:

TD-4150P-01, section 4.6 talks about the 'new construction data' collection. Currently, RiskFinder model treat this the same way as the existing pipeline assets, however, it should be recognized that some vintage data such as previous leaks data may not be applicable to it. Therefore, it is suggested that possibly these be assessed separately, however still considering all kinds of threats.

### PG&E's Response:

PG&E will review the current risk model and historic leak data being used to assess the risk on new construction assets. If appropriate, PG&E will update the risk model to address new facilities with the appropriate data associated to those facilities.

Task 20: DIMP Manual language in procedure CPUC Recommendation 2nd Week:

PG&E procedure TD-4850P-01 often refers to the term "DIMP manual". It was discussed that what is included in this? It appears that standard, procedure and all attachments are part of it. However, the language in the procedure sometime is confusing. One example is section 1.4 of TD-4850P-01 which



states: "This utility procedure and the attachments to the DIMP Manual will be reviewed and updated as necessary to implement annual and periodic reviews."

SED suggests that it should be made clearer in the next revision of the procedure.

#### PG&E's Response:

PG&E agrees with this suggestion. The DIMP Manual will be clarified in the next revision of TD-4850P-01.

Task 21: Population Density Factors CPUC Recommendations 2nd Week:

PG&E's model RiskFinder is defined in Attachment N. In this document, the section 2.2.2.2 Population Density Factors has two items 'Inside Meter Sets' and 'overbuilds'. SED discussed and PG&E indicated that these will be moved to section 2.2.2.3 Migration Factor. 06/14/2017 10:16:16 PST Gene Muse (EEM6) Phone 925-328-5865 PG&E agrees with this recommendation and will move "Inside Meter Sets" and "Overbuilds" factors from Population Density factors to Migration Factors.

#### PG&E's Response:

PG&E will update Attachment N accordingly.

Attachment N and Uptime risk models have been updated to use inside Meter Sets and Overbuilds information in Migration factor. Attachments are currently in draft status and awaiting review and approval.

Task 22: A-Form validation. CPUC Recommendation 2nd week:

There is a lot of information captured by field personnel on A-form; this includes internal corrosion, external corrosion, soil type, pipe condition and others. SED suggests that this information can be used for validation purposes when needed.

#### PG&E's Response:

PG&E agrees with this recommendation and currently uses this Information as part of the mitigation process. TD4850P-01, Attachment K Cause Analysis Process specifies that during the data analysis process that Mitigation engineers use the raw version of the normalized leak data set to gather data elements from the A-form that are useful for the evaluation. No action will be taken in response to this observation.



## Task 23: Status of CA No. 2016-06

PG&E provided Cause Analysis Report, "2016 DIMP Cycle, CA No. 2016-06 October 2016". One of the items in this report under Mitigation Activities is "2016-06-04: Submit CAP to identify gap in leak reporting process. Station leaks are not fully captured under the normal leak program. SED requests an update on this CAP item

### PG&E's Response:

Reference: CAPN 7031976, Task 4; Codes and Standards. PG&E's Codes and Standards will review appropriate leak survey procedures and regulator station maintenance standard to determine if there is a gap in leak reporting at regulator stations during compliance maintenance activities. PG&E scheduled this review in October, 2017. Please see CAP Notification 7031976, task 4 for follow-on deliverables.