California Public Utilities Commission Risk Assessment Unit

Hazard Database Project

Report on Status and Initial Recommendations

March 14, 2012

I. Introduction

The California Public Utilities Commission's (CPUC) Risk Assessment Unit (RAU) within the Consumer Protection and Safety Division (CPSD), was formed to improve the CPUC's ability to prevent high-profile accidents and incidents before they happen by developing a system of risk identification, risk analysis, and risk management. The RAU will review all regulated utilities, but the immediate need now is to focus on gas pipeline safety matters. The RAU will look at best practices throughout the nation and around the world, as well as review how ratemaking and safety efforts interact.

As an initial project, the RAU developed a Natural Gas System Hazard Database. Project tasks underway include identifying the "universe of what's out there now" by reviewing gas system public safety hazards, populating the database, and performing related analysis. Through surveying other states, researching the Pipeline and Hazardous Material Safety Administration (PHMSA) safety advisories, interviewing internal and external subject matter experts, and reviewing emerging risks (cyber-security, physical security, etc.), the RAU identified more than 550 potential hazards. By removing duplicates and combining categories, the number of potential hazards was reduced to just over 100. After further rescreening, the RAU identified **17 potential hazards that impact public safety** for which the RAU recommends current and continuing CPUC attention.

In addition to reviewing hazards, the RAU also discuss recommendations at the end of this report relative to two additional issues internal to the CPUC.

This report is a project status report and a discussion of initial recommendations. These recommendations are being made now for the following reasons: the need to include new or expanded safety-related issues into the CPUC's current Rulemaking on gas safety (Order Instituting Rulemaking (OIR) R.11-02-019); focus attention on, and possibly mitigate, known risks; and, to assist in identifying areas where best to dedicate staff resources.

II. Hazard Database

The Hazard Database by itself is not a "risk assessment," but it will serve to help ensure CPUC and utility action on unmitigated public safety concerns, increase situational awareness of public safety, and develop ongoing communication and dialogue on risk management topics. The database also may be used as an information source to enhance our regulatory oversight..

The database has been populated, but should be viewed as a "living document," constantly being updated. The initial data-entry step was limited to hazard identification and did not identify the probability of occurrence nor the consequences, and therefore does not quantify nor prioritize the risks. Further work in these areas will be performed in subsequent project phases.

III. 17 Hazards That Impact Public Safety

In the RAU's initial analysis, through a survey and interviews, **17 hazards that impact public safety** were identified and the RAU recommends some type of action be taken. The RAU considered both the pervasiveness of the hazard and the potential harm. By spotlighting these 17 hazards, it is not the intention of the RAU to rule out consideration of any others; rather, it is to ensure action is prioritized on these issues as they pose potential blind-spots or are issues that may not be fully mitigated at present. Some of these concerns are being addressed in the various pipeline safety proceedings now before the CPUC, and elsewhere, but are included here to ensure that none are overlooked.

These 17 hazards are described below in the following three categories:
A) Issues that should be addressed now, or included in R.11-02-019;
B) Issues now being addressed in the Rulemaking, or elsewhere; and,
C) Issues regarding jurisdictional matters/regulatory lag.

A. Issues That Should be Addressed Now, or Included in R.11-02-019

1. Susceptibility of older plastic pipe to premature brittle-like cracking.
"Aldyl-A" – a type of polyethylene plastic pipe now in use manufactured in the 1970s – is susceptible to premature brittle-like cracking. Other types of plastic lines manufactured prior to the mid-1980s are also susceptible to the same condition, particularly those developed by certain manufacturers and/or using certain resins. PHMSA has issued advisories to gas system operators regarding the use of these plastic pipes, but responses vary. The hazard associated with these plastic pipes will be examined by the CPUC's Gas Safety and Reliability Branch (GSRB) through its audit review of the operators' Distribution Integrity Management Plans. The RAU is now are preparing data requests to all gas utilities listed on the Service List of the OIR on the use of these types of plastic pipes, as well as steel pipe with certain weld seams. The RAU will report findings once the data requests are analyzed.

2. Grandfathering provisions in 49 CFR Part 192.
Recent CPUC action removed the hydrostatic test requirement exemption to establish Maximum Allowable Operating Pressure (MAOP) on pre-1970 transmission pipelines, but other exceptions and exemptions related to construction vintage in Part 192 are unaffected. As examples, Sections 192.455 and 192.457 do not require pipe coating or cathodic protection on underground steel pipelines installed before August 1, 1971.

3. Excavation damage by third-parties (dig-ins).
Dig-ins remain the primary cause of pipeline incidents. Dig-ins can be caused by improper marking/locating of underground pipelines by gas operators, but more commonly it is caused by third-parties operating powered excavation equipment too close to underground pipelines or ignoring the legal requirement to notify the one-call centers (811) to request the utilities to mark and locate the facilities before commencing with excavation activities. This hazard can also be considered as a jurisdictional concern since the CPUC lacks authority to fine third-parties who violate the One-call law and damage gas pipelines. This regulatory gap is, in part, currently being addressed by Assembly Bill 1514, sponsored by the CPUC, and R.11-02-019.

4. Operators unaware of the location and specification of the pipe in the ground.
Gas operators' records do not always reflect the location and specification of the pipe in the ground. This issue is partially being addressed by recent CPUC directives requiring gas operators to validate the MAOP and other conditions of their transmission pipelines using verifiable and traceable records. However, the problem remains for many distribution lines. To further enhance pipeline identification, gas system operators also should consider developing a program to identify each segment of their respective transmission lines using Global Positioning System coordinates (longitude and latitude).

5. Unmonitored class location change.
Changing land use or development and other pipeline encroachment (class location) impacts a pipe segment's MAOP determination and its maintenance requirements. This issue is being addressed in I.11-11-009, but only as it applies to Pacific Gas and Electric Company, the respondent in that proceeding. Other gas pipeline operators are not subject to this proceeding. Here, the RAU recommends determining if current regulations are sufficient for all utilities and reviewing existing definitions.

6. Aging infrastructure and interacting threats.
Present regulations only require MAOP to be established by a hydrostatic test at the time of installation. Interacting threats affecting pipeline integrity can gradually weaken a line over many years, reducing the safety margin reflected in the MAOP. Such damaging cumulative effects can go undetected. Liquid pipelines are generally subject to 5-year repeat hydrostatic tests. Gas operators could be required to revalidate MAOP in a similar fashion, with repeat hydrostatic tests at determined intervals (e.g., 10, 15, or 20 years).

7. Infrastructure, maintenance, and parts.
This refers to issues such as good work planning, the need for material traceability of spare parts and material to ensure that the correct spare parts are being used, the need for critical equipment redundancy (e.g., pressure safety valves, power supplies, etc.), and the need to ensure that pressure regulators and safety valve set points are correct.

8. Utility resource management and workforce development.
Understaffing, succession planning, and an aging workforce within the utilities also cause concern. Due to hiring practices, some of California's large gas utilities now have two large groups of employees separated by approximately 10 years in age. As the more mature group retires, a significant experience/knowledge gap will develop, potentially leading to deficiencies in operations.

9. Ineffective or inadequate gas leak identification and response.
Proper leak detection and accurate leak grading are key defensive and protective measures important for ensuring public safety from hazardous gas leaks. Potential public safety risks may exist since Part 192 does not specify leak grading standards. It instead leaves to the discretion of the operator to define leak grades and their corresponding remedial measures. Inaccurate/inconsistent leak grading is also a concern. Enforcement activity in this area in ongoing, but technical change is constant and vigilance is required on refinements. Other potential concerns include operator response to customer "odor in the air" complaints with no access to the property, and complaints during night/weekend hours. The RAU notes that "The Pipeline Safety Act of 2011" (H.R. 2845, Shuster) orders the Secretary of Transportation

to analyze the technical limitations of current leak detection systems. A report to the Senate and House transportation committees is due in January 2013.

10. Pipe with mechanical/strength characteristics susceptible to failure.
Steel pipes manufactured before 1970 that contain low frequency electric resistance welds are susceptible to selective corrosion at the weld seams. Oxyacetylene welds are also susceptible to brittle fracture. The failure hazard associated with these types of pipe likely will remain even after the hydrostatic tests have been performed.

11. Lack of protection redundancy.
Certain pipeline elements, especially those that lack sufficient protection redundancy, are vulnerable to vandalism and sabotage. Pressure regulation and overpressure protection frequently do not have sufficient redundancy or geographical independence of protection backup. Some cathodic protection systems also are susceptible.

B) Issues Currently Being Addressed

12. Lines unable to accommodate in-line inspection tools, such as smart pigs.
Although new and replacement pipelines are required to be constructed to accommodate in-line inspection (ILI) tools (or "smart pigs"), operators are not required to update older lines to allow passage. This also is a form of grandfathering, as present regulations do not require gas operators to run smart pigs. Regulatory changes are under consideration by PHMSA in a proposed Rulemaking, issued August 2011, that will consider requiring ILI assessment, as well as expanding modification to transmission pipelines to accommodate ILI tools.

13. Utility management deficiencies.
Effective utility management controls and safety culture, and a lack of "safety first" culture can lead to a focus on profits rather than safety. For example, the Independent Review Panel report states, "As a result of our investigation, the Panel concludes the explosion of the pipeline at San Bruno was a consequence of multiple weaknesses in PG&E's management and oversight of the safety of its gas transmission system." And, "Spirit of Regulatory Compliance - PG&E appears to target its efforts to comply with pipeline safety regulations. But the goals it sets for management compensation purposes, its investments and its practices do not suggest its focus is on achieving an industry leading pipeline safety and integrity program."

14. Remote-controlled and automatic shutoff valves.
Remote-controlled and automatic shut off valves should be required in High Consequence Areas. This issue is being addressed on several fronts, including the CPUC and the legislature.

C) Issues Regarding Jurisdiction/Regulatory Lag

15. Customer-owned or operated lines.
Neither PHMSA nor the CPUC has jurisdiction on most customer-owned or operated service lines. Most of these are small gas piping systems. Examples include motels, shopping centers, university

campuses, and industrial complexes. Despite the requirement in Part 192.16 (Customer Notification) that the gas operator must inform customers that the customer/owner is responsible for maintaining these systems, it remains a safety concern as the customers/owners are not required to comply with federal or state gas safety regulations.

16. Master-metered systems not in mobilehome parks.
Master-metered systems not in mobilehome parks fall under PHMSA jurisdiction, but are outside CPUC jurisdiction. Examples include shopping centers, strip malls, and large apartment complexes. PHMSA has urged the CPUC to accept oversight responsibility for these systems.

17. Inadequate regulation.
This issue refers to holes or blind-spots in regulations where new legislation/rules may be necessary. For example, federal regulations and audit scope are too narrow to identify all threats to the pipeline. As examples, the National Transportation Safety Board (NTSB) report identifies numerous shortcomings in various areas. These include PHMSA regulations, inadequate audit scope, and failure to use performance based criteria in audits. Below are examples from the NTSB report:

> "…the PHMSA integrity management audit protocol does not formally call for a check of the completeness and accuracy of information contained in the operator's pipeline attribute database."
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> "…PHMSA regulations do not require an operator to supply missing data or assumed values within any time frame. This allows incomplete or erroneous information to continue in an operator's records indefinitely, …. PHMSA should require operators to correct data deficiencies within a specific time frame."
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> "The PHMSA integrity management inspection protocol includes inspection item C.03.c for inspectors to verify that the operator uses a feedback mechanism to ensure that its risk model is subject to continuous validation and improvement. However, the PHMSA inspection protocol placed insufficient emphasis on continuous validation and improvement of risk models."
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> "… PHMSA should develop an oversight model that allows auditors to more accurately measure the success of a performance-based pipeline integrity management program. ….. Such metrics would allow a comparison of current performance against previous performance."
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> "… PHMSA integrity management inspection protocols are inadequate. Therefore, the NTSB recommends that PHMSA revise its integrity management inspection protocol to (1) incorporate a review of meaningful metrics; (2) require auditors to verify that the operator has a procedure in place for ensuring the completeness and accuracy of underlying information; (3) require auditors to review all integrity management performance measures reported to PHMSA and compare the leak, failure, and incident measures to the operator's risk model; and (4) require setting performance goals for pipeline operators at each audit and follow up on those goals at subsequent audits."

IV. Issues Internal to CPUC

In addition to analyzing survey data, the RAU also reviewed issues internal to the CPUC. Two of these issues are discussed below.

"Task Force" Response Team for Future Major Incidents

The RAU reviewed the status of current investigations and other responses related to the PG&E pipeline explosion in San Bruno. In the unfortunate event that any future major incidents occur, the RAU recommends that CPSD consider, initially at the divisional level, or later at an agency level, developing an organizational response different from traditional functional-based organizational units. Creating a 'Task-Force" project team with cross-functional team members from various divisions may benefit the CPUC by eliminating the potential for duplication of efforts, optimizing communication channels, tapping agency-wide additional resources, and improving productivity and a timely CPUC response to actions relevant to public safety and the media.

Similar to a task-force concept, CPSD also should consider establishing a dedicated investigation unit within the division for major gas system incidents. Such unit could take a "lead" role in any major investigations, and coordinate the efforts of staff from other divisions assigned to the investigation.

Internal/External Communications

Throughout the process of collecting and analyzing the data, conducting interviews and researching outside publications, it was evident CPSD should have a better and commonly known communication system in place, both internally and externally, for dissemination of available data and project status information.

CPSD also may benefit from considering enhanced project communications. Under-estimating the importance of effective internal and external communications during a major project or investigation can be a potential risk of project failure. In major investigations and public-interest issues, communication could be improved by assigning a staff person or team to proactively and strategically consider communication needs both inside and outside the CPUC.