BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking on the Commission's Own Motion to Adopt New Safety and Reliability Regulations for Natural Gas Transmission and Distribution Pipelines and Related Ratemaking Mechanisms.	Rulemaking 11-02-019 (Filed February 24, 2011)

PREPARED DIRECT TESTIMONY OF PAUL WOOD

ON BEHALF OF

THE CITY OF SAN BRUNO

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I. INTRODUCTION

In compliance with California Public Utilities Commission (CPUC) Decision 11-02-019, Pacific Gas and Electric Company (PG&E) issued its Pipeline Safety Enhancement Plan (PSEP) on August 26, 2011. Most of this testimony is focused on a review of the PSEP, but first an important aside. Although not addressed in the PSEP, effective emergency response is essential to public safety. The "confusion within PG&E as both its Gas Control Operations and its Gas Dispatch organization sought to identify the source and location of the incident[1]" are strong evidence of the need for improvements in emergency response. It is critical that the CPUC examine the need for rules, regulations and changes in practice addressing emergency response and its impact on public safety, including first responder issues and communication between PG&E and public officials. This examination should include a formal CPUC proceeding carried out on a timely basis. The City of San Bruno (City) has participated in workshops relating to public safety and emergency response, but the CPUC has yet to determine in what formal forum it will address these important issues. It is vitally important that the City of San Bruno and its

[1] Report of the Independent Review Panel, San Bruno Explosion, prepared for the California Public Utilities Commission, June 24, 2011.

staff have an opportunity to comment on any action that the CPUC plans relating to emergency response so the City of San Bruno can share the knowledge it acquired under fire while responding to the PG&E pipeline explosion in San Bruno.

Implementing the PSEP will be a massive and costly undertaking whose successful completion is fundamental to the safety and peace of mind of those living and working in the City of San Bruno and other communities near PG&E pipelines. The fact that initiation of this monumental project required an explosion that took the lives of eight residents of San Bruno and caused numerous injuries and significant property damage is very disturbing. The discomfort and indeed fear experienced by the residents of San Bruno and other communities near PG&E pipelines requires local government to do everything in its power to assure that the answers to the following questions are clear and satisfactory:

- Is PG&E's Pipeline Safety Enhancement Plan (PSEP) reasonable and technically sound?
- Does the PSEP provide appropriate assurance of the safety of pipes near San Bruno, both in the interim and in the longer term?
- What assurance does the City have that the PSEP will be implemented effectively?
- How will the City know the plan has been implemented effectively?
- How will PG&E work to improve City and County emergency response capability?
- Are other actions needed to ensure the City is protected from pipeline explosions?
- How does PG&E's response address the NTSB recommendations?

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This testimony, based on review of available documentation supporting the PSEP[2], is intended to identify more detailed safety-related concerns that PG&E needs to address before and during implementation of the PSEP. It remains the City's goal to ensure that the CPUC follow the National Transportation Safety Board's (NSTB) recommendations issued to PG&E in its final accident report adopted on August 30, 2011 as addressed below.

II. OVERVIEW

A. Is PG&E's Pipeline Safety Enhancement Plan (PSEP) reasonable and technically sound?

The structure of the PSEP is logical, including selection of the pipeline segments on which to focus in Phase 1, and actions proposed to ensure safety of our community. Assurance is increased by PG&E's decision to bring in outside experts to supplement its staff in developing the details of the plan, including decision models used to identify needed actions to assure safety. I do, however, have some concerns, both about changes that are likely to occur during implementation of the plan and about the details of the decision trees. These concerns are outlined below.

1. Dealing with Changing Information about Pipelines

The process described in the PSEP involves pipeline characterization (including MAOP validation), pipeline segmentation, and the use of decision trees to identify appropriate safety assurance actions. These three basic steps are being undertaken in parallel. The Integrated San Bruno Response Plan status report issued by PG&E on December 15, 2011 indicates that the first step (pipeline characterization) is still in progress. This implies that pipeline segmentation decisions and identification of actions needed to ensure the safety of pipeline segments using the decision models may change as the characterization is completed. This changing knowledge base adds a layer of

[2] PG&E Company's Natural Gas Transmission Pipeline Replacement or Testing Implementation Plan (the Pipeline Safety Enhancement Plan – PSEP), testimony before the CPUC, Manheim & Klein, August 26, 2011.

complexity to an already quite complex project. How is PG&E dealing with these continuing changes in its understanding of pipeline characteristics in revising its PSEP, and in communicating to interested parties the implications to planned work?

2. Decision Trees and Related Concerns

The decision trees developed to determine which actions should be taken on each pipe segment and in which phase of the PSEP these actions should be taken seem generally well thought out. However, I have a few concerns, discussed below, that require clarification. In addition, the trees include many decisions for which no criteria are stipulated (e.g., Figure 2-1 in the PSEP, decision box M3 - reduce pressure and/or remaining fatigue life analysis; also Figure 2-2 decision box F1 - replace Phase 1 & 2). In practice, the bases for these decisions need to be communicated to interested parties. I have the following additional concerns related to structure of the decision trees:

- In Figure 2-1 of the PSEP, the initial decision point is whether or not the segment is "Pre-1970 vintage?" If "no," the entire Manufacturing Threats decision tree is bypassed. While use of term "pre-1970" is commonplace, some low frequency ERW pipe was manufactured as late as 1978. Therefore, an operator's claim that its ERW pipe is not susceptible to seam failures solely because it was manufactured after 1970 is not, by itself, compelling.
- In Figure 2-2 of the PSEP, the initial decision point is "Is the pipe Pre-1960 vintage?" If" no," the entire Fabrication & Construction Threats decision tree is bypassed. It is not necessarily a good assumption that all of the practices evaluated in the decision tree, such as wrinkle bends, entirely disappeared by the end of 1959. 1960 is not a definitive cutoff for poor construction (as evidenced by the spate of recent construction problems PHMSA is seeing on current pipeline construction projects, including wrinkle bends).
- Figure 2-3 box C5 of the PSEP seems to indicate that in-line inspection (ILI), strength testing (e.g., hydrostatic testing), and close interval surveys (CIS) combined with direct current voltage gradient (DCVG) provide equivalent assurance of safety for pipelines operating at stress levels below 30% specified minimum yield strength (SMYS). What is the basis for this judgment?

3. Seismic Threat

The threats enumerated in and addressed by the PSEP deal with the seismic threat by two means: (a) identifying locations where pipes cross known fault lines and placing

automatic shut-off valves (ASV) on the lines near these crossings, and (b) identifying pipe segments requiring engineering condition assessment (ECA) which seems to include characterization of pipe segment susceptibility to potential seismic events. PG&E has noted in the PSEP that following the 1989 Loma Prieta earthquake it carefully evaluated, identified and mitigated potential seismic weak points. The remaining vulnerabilities are located at fault crossings. Therefore the seismic threat should be effectively addressed through a combination of automatic shutoff valve (ASV) installation and any follow-up actions needed to address the results of ECAs. ECA results and follow-up actions should be included in information made available by PG&E to interested parties.

4. Annual Plan Revision

Footnote 4 on page 16 and the text on page 17 of the PSEP notes that "the schedule of work within any given year will be determined by operational needs, other planned work, environmental and other considerations." This approach to planning seems completely reasonable, but leads to a situation in which interested parties (e.g., cities, counties, regulators) will need access to annual plans to be able both to evaluate the appropriateness of the planned work and to monitor PG&E implementation of its planned work. How will this information be provided in a way that allows interested parties to monitor PG&E progress in implementing its plan, and to evaluate the appropriateness of any changes in scope of the plan dictated by practical (including funding) considerations?

5. Valve Automation Program

The ability of PG&E to quickly and reliably terminate the flow of gas through a ruptured pipeline is critical to effective emergency response in the affected community. I believe the use of remote control valves (RCV) and automatic shut-off valves (ASV) is the best way to address this need. In spite of the well documented concerns regarding the reliability of ASVs, which are discussed below, these valves are capable of providing the most rapid response to a pipeline rupture and of eliminating potential errors associated with operator response. Therefore, safety will benefit by addressing potential reliability issues and judiciously deploying ASVs.

A major stated uncertainty in the PG&E valve automation program is the basis for deciding where to install needed valves, and whether to employ RCVs or ASVs. While ASVs provide more rapid response to pipeline rupture than do RCVs, the industry concern seems to be their potential for unplanned closure, leading to gas supply interruptions potentially at the time when gas is most needed by affected users. Missing from the PG&E decision process seems to be information on the risk of false closure of ASVs, and information on the pressure history at points where valve placement is being considered (to support better understanding of the potential for false closure). I support the recommendation in the study by Jacobs Consultancy[3] that PG&E should research high false closure rates purportedly experienced by ASVs and identify means to minimize the risk of false closure. Means used by other industries to minimize the risk of false valve closure (such as by use of redundant sensors with diverse designs to signal the need for valve closure) should also be considered. Also it is clear that for additional valves, whether ASVs or RCVs, to be effective in reducing the time following a pipe rupture in which gas flow is uncontrolled, a significant amount of work is needed. This work includes understanding historic line pressure variations, and upgrading the instrumentation, procedures and training in operation of the Supervisory Control and Data Acquisition (SCADA) system. PG&E has explicitly included these activities in the PSEP. Since all funds for program planning and development are shown for 2011, it appears that additional valves will not be installed or existing valves automated until these activities have been completed.

The PSEP discussion of RCV installation criteria includes a threshold potential impact radius (PIR) of greater than 100 feet in Class 4 locations. Analysis shows that pipelines of ten inches in diameter operating at 200 psi have a PIR of less than 100 feet, as

[3] Assessment of Pacific Gas and Electric Company's Pipeline Safety Enhancement Program, prepared by Jacobs Consultancy for the Consumer Protection and Safety Division (CPSD) of the California Public Utilities Commission (CPUC), December 23, 2011.

do pipelines of twenty inches diameter operating at 50 psi. Given the definition of a Class 4 location - any class location unit where buildings with four or more stories above ground are prevalent – this approach does not seem appropriate. It seems reasonable that all Category 4 piping should be included in considering where to place RCVs.

6. Interim Safety Enhancement Measure Effectiveness

Pipeline pressure reduction is an effective interim safety enhancement measure. While information in the PG&E working papers specifies in which segments pressure reductions have been taken, the segments are identified by mile post. Associating the mile post indication with proximity to San Bruno (or other cities) requires information the cities typically do not possess. Furthermore, the PSEP notes on page 36 that "PG&E has already implemented certain interim pressure reductions and will complete its implementation of pressure reductions called for in the pipeline modernization program decision trees no later than 30 days after final CPUC approval of the Implementation Plan." At this point it is unclear why pressure reductions considered by PG&E to be prudent are being delayed. This issue needs to be addressed as part of a strengthened communication effort with cities and counties through which PG&E transmission pipelines pass, including San Bruno. The CPUC should continue to evaluate and make the important decision to restore operating pressure in public hearings.

B. Does the PSEP provide appropriate assurance of the safety of pipes near San Bruno, both in the interim and in the longer term?

The PSEP documentation is extremely voluminous, and likely to grow considerable during CPUC deliberations preceding approval, as well as throughout implementation of the plan. The magnitude of documentation together with the plan's structure as an integrated project plan significantly undermine the ability of the 273 cities whose citizens' safety will be affected by careful implementation of the plan to understand how the plan will affect them. Questions from local residents such as:

- What pipelines lie near my home, job and the schools my children attend?
- What assurance do I have these pipelines are safe now or being made safe?

- Is it necessary to implement interim safety measures on these lines? What measures?
- Is higher pressure being maintained in any of these lines to prevent supply interruptions elsewhere in the system? Why is this safe?
- When will characterization, testing or replacement of these lines be completed?
- How will I know when these lines have been characterized, tested or replaced - that is "made safe" - for the long term?

Questions such as these, when posed by residents of the 273 communities, can now be answered only through government officials' meeting with knowledgeable PG&E project officials. Even officials from the City of San Bruno have had to meet with PG&E managers to develop a reasonable understanding of the answers to these questions for their community. Such meetings can be difficult to arrange and may be inefficient for both the city officials and the PG&E managers. The PSEP does include a commitment by PG&E to use various means to provide project information to interested parties, but it is not clear that this information will allow local officials and residents to answer the types of questions listed above. This need deserves strong consideration by those responsible for communications both within PG&E and within the CPUC.

C. What assurance does the City have that the PSEP will be implemented effectively?

Effective project management and strong project oversight are fundamental to effective implementation. Chapter 7 of the PSEP discusses the PG&E approach to managing the plan. Three major components are called out: plan *execution*, implementation *oversight*, and *assurance* of implementation effectiveness. The plan identifies a comprehensive management structure for plan execution. Oversight and assurance are provided by three groups: the Executive Steering Committee (which also has project coordination functions), the internal PG&E audit group (which must be independent of the program management office), and the External Program Advisory Board. Assuming the External Program Advisory Board remains independent of program implementation and communication (I will address the point on this independence later),

this structure seems to provide the needed assurance the program will be implemented effectively. Although it is important that the External Program Advisory Board remain independent, it is equally important that any oversight group have direct communication with the City and public agencies to increase their assurance of the effectiveness of the program.

1. PSEP is a PG&E Management Commitment

I expect that, once it has been approved by the CPUC, the PSEP represents a commitment by PG&E management and that operating consistent with this commitment will be viewed by the Consumer Protection and Safety Division (CPSD) as part of PG&E's compliance obligation. One implication of this expectation is that PG&E implementation will be overseen by the CPSD, leading to an increase in public assurance. Additionally, PG&E would need to request a waiver from the CPSD if it desired to deviate from significant commitments in the plan, such as meet gas demand by increasing the pressure in a line whose pressure had been decreased as a result of commitments in the PSEP. Of course, when the MAOP of a line has been verified by the means described in the PSEP, and that verification has been approved by the CPSD, PG&E will be able to operate at a consistent pressure without a waiver.

Long-term effectiveness of PG&E's safety management efforts will require not only implementation of the set of actions described in the PSEP, but also development and reinforcement of a safety culture capable of sustaining a high level of performance in the future. PG&E recognizes this fact and has committed to important actions such as "structuring incentives that align with these (safety and environmental) goals, (and) measuring progress using established metrics." Identifying means for PG&E management both to evaluate the effectiveness of these changes and to communicate process and performance improvement information will represent a large step in restoring public confidence.

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D. How will the City know the plan has been implemented effectively?

1. Communication

While the approach to customer outreach is explicitly described in the PSEP, it is unclear whether the mechanisms identified represent practical ways to assure interested parties are fully informed of progress in dealing with issues of concern. The following ideas are worth consideration by PG&E in its efforts to communicate effectively.

- Full implementation of the PSEP will represent a huge step for PG&E first, in capturing and developing adequate information on the characteristics of its transmission pipeline system to understand and manage safety risks, and second, ultimately in restoring public confidence in the company's ability to operate its facilities safely. Full implementation, however, depends on CPUC acceptance of the Plan together with its provisions for recovery of most of the costs needed to implement. Because numerous uncertainties affecting the details of implementation currently exist, effective communication both by PG&E and by the CPUC will be needed so governmental officials and the people whose interests they represent can understand project status, any changes to the initial plan and their justification, and resulting improvements in safety performance. Effective communication here implies providing information in a form so the various interest groups, including municipalities and counties, can understand the impact on their specific interests as the Plan is implemented.
- In communicating to interested parties progress on implementation of the PSEP, PG&E should describe not only how much work has been accomplished during the reporting period, but also how that work relates to the complete set of actions it committed to complete in the PSEP.
- PG&E has commissioned several groups to oversee implementation of PSEP. The reports from these groups seem to be an important part of the public record of PG&E accomplishments and should therefore be made public.
- PG&E has committed to provide updates on work completed, work in progress, and forecast of future work on March 1 and September 1 of each year during implementation of the PSEP. The format of this report should allow individual municipalities and counties to understand progress and plans affecting the assurance of safety of pipelines within their boundaries.
- One "finding" in the Jacobs Consultancy report that is important to effective communication, and for which there is no recommendation, relates to the potential conflict of the principle role of the External Program Advisory Board resulting from PG&E's suggestion that this Board might coordinate the information and document flow between the Project Management Office (PMO) and external parties. I believe this is a very important role which, if it were assigned to an advisory group, would undermine the independence of that group.

It is equally important that any oversight group have direct communication with the City and public agencies to improve the quality of communication.

- On page 1 of the PSEP, PG&E states "Ultimately, when the Pipeline Safety Enhancement Plan is completed, PG&E will have comprehensively assessed all 5,786 miles of its natural gas transmission pipelines." In this and other statements in the PSEP, PG&E uses the term "assess" differently from PHMSA meaning in the IMP regulations, where "assess" means to conduct an in-line inspection, or a hydro test, or direct assessment. It appears that in PG&E parlance the above statement does not really mean they will conduct a physical integrity examination of their system, but merely that they will use the decision trees to screen all segment to identify specific prudent actions. This source of confusion should be eliminated in future communication.

2. CPUC Actions to Improve Oversight

The primary external oversight of implementation of the PSEP will be by the CPSD of the CPUC. In response to recommendations in the Report of the Independent Review Panel on the San Bruno Explosion, the CPUC has begun serious efforts to strengthen its internal capabilities. The following actions in progress are evidence of this effort.

- The CPUC has restructured the CPSD to create separate natural gas safety and electric safety programs. Staff within this program will be dedicated to integrity management, to the analytical processes involved in identifying and responding to risk, and to the application and development of preventative and mitigative measures.
- The CPUC has increased its gas safety staff from 9 positions at the time of the San Bruno explosion, to 17.5 positions. The CPUC is also increasing staff opportunities for continuing education, and meetings allow working together to compare performance of operators and to develop best practices statewide.
- The CPUC created a new Risk Assessment Unit to improve its ability to conduct state□of□the-art risk management work. The first four members of the Risk Assessment Unit have been hired. Outside expert support is also being sought for this unit.
- The focus of the CPSD oversight at PG&E will be application of the decision trees and complete implementation of resultant actions.

With these organizational changes and staffing additions, CPSD should be able to provide the needed oversight of PG&E's implementation of the PSEP. However, nearly

doubling the CPSD staff size and integrating new staff into the agency will represent a significant challenge.

3. Importance of Program Reporting

The time required to implement provisions in the PSEP will be affected both by the specifics of CPUC approval of costs included in the PSEP, and by PG&E cost performance in managing the activities. Uncertainties associated with these factors, and therefore in the time required to complete implementation of the PSEP, underline the importance of project reporting that is meaningful to the municipalities and counties whose citizen's safety is affected by timely completion of the work.

4. Safety versus Reliability of Service

The "Integrated San Bruno Response Plan" status report dated December 15, 2011 indicates that "Any interim pressure reduction will also consider the potential safety impacts of uncontrolled customer outages along with pipeline integrity safety margins." Adding the risk of customer outages to decisions on pressure reductions has the potential to undermine the interim safety measures. Therefore, all specific instances in which supply interruption considerations change a decision to reduce pressure should be reported to local public safety officials in the affected area. This reporting should assure that customer outages will not be used arbitrarily to allow potentially unsafe pressure limits to be established.

E. How will PG&E work to improve City and County emergency response capability?

PG&E is implementing an enhanced prevention, preparedness and response program which is outside the scope of the PSEP. Specific activities include: education activities related to pipeline damage prevention; developing, training to and exercising emergency response plans; and working with public safety first responders to deal with gas pipeline explosions. In addition, SCADA upgrades are expected to provide emergency responders with better, timelier information on rupture location and estimated time required to terminate gas flow through a ruptured line. As I discussed earlier, CPUC

actions in establishing new requirements and practices must be undertaken in an open environment, accessible to and involving affected cities and counties.

F. Are other actions needed to ensure the City is protected from pipeline explosions?

1. PG&E Scope and Accountability

Many of the recommendations described in the study by Jacobs Consultancy[4] commissioned by the CPSD of the CPUC, especially those related to safety or knowledge improvements rather than cost saving opportunities, have merit. Therefore, in addition to communicating information on implementation of the PSEP, PG&E together with the CPSD should consider how best to communicate resolution of the issues raised in the Jacobs report and progress in implementing changes to the PSEP resulting from resolution of these issues. An initial report addressing PG&E's position on many of the Jacobs recommendations has been submitted[5]. In this report PG&E typically accepts safety-related recommendations while rejecting recommendations related to project cost or cost sharing.

2. Safety Assurance Beyond Transmission Pipelines

The PSEP addresses PG&E's transmission pipeline system. PG&E is implementing an integrity management program (IMP) for its distribution system. The first and most fundamental step in this program is for PG&E to "understand its system." How will the City be assured the PG&E distribution IMP is being implemented more effectively than was its transmission IMP?

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[4] Assessment of Pacific Gas and Electric Company's Pipeline Safety Enhancement Program, prepared by Jacobs Consultancy for the Consumer Protection and Safety Division (CPDC) of the California Public Utilities Commission (CPUC), December 23, 2011.

[5] PG&E Company's Response to Technical Report of the CPSD Regarding PG&E's PSEP, Manheim and Kline, January 13, 2012.

3. Enterprise Risk Management

The PG&E description of improvements to its risk management program outlined in the Integrated San Bruno Response Plan status report issued by PG&E on December 15, 2011 states that "PG&E is enhancing its policies and processes governing Enterprise Risk Management (ERM)." While this certainly seems to be a constructive set of actions and is definitely needed, a major element of ERM is determining the "risk appetite"[6] of the organization. For pipeline operators the concept of "risk appetite" might best translate to "risk tolerance." This seems to imply PG&E is in the process of developing the criteria against which future risk mitigation decisions will be made. If this is the case, the public should have access to these criteria along with sufficient information on their application to be able to judge the practical implications to pipeline safety of PG&E's ERM.

4. Risk Assessment

PG&E's use of decision trees in the PSEP has a significant advantage over historic risk index models in that the basis for decisions is clear rather than being obscured by judgment-based quantification decisions imbedded within index models. Another potential improvement in risk characterization suggested in the PSEP is a process of querying the data in the GIS using questions designed to inform decisions contained in the decision trees. Investigating the broader application of decision trees drawing on higher quality data on pipeline segment characteristics to satisfy the requirements of risk modeling in the IMP regulations appears to have merit. However, the current version of the decision trees in the PSEP are not sufficiently complete to be applied in supporting the full range of risk characterization decisions required by IMP (e.g., risk ranking segments for assessment, selection of preventive and mitigative measures, evaluating the presence of several risk-influencing factors that, in combination, contribute more to risk than the sum of their individual contributions).

[6] Enterprise Risk Management - Integrated Framework, Committee of Sponsoring Organizations of the Treadway Commission, 2004.

5. Personnel Qualification Involved in Construction Activities

As PG&E notes, work to be carried out in the PSEP will require a significant increase in contract work force. Much of the work carried out by these new people might be characterized as "new construction." At present the operator qualification regulations focus on operation and maintenance tasks, excluding new construction tasks. The PSEP clearly states that work carried out in its implementation will be done in compliance with applicable requirements. Does PG&E intend to apply its operator qualification program in qualifying individuals working on new construction activities?

6. Quality Assurance and Quality Control

The PSEP describes in general terms how PG&E will carry out quality assurance (QA) and quality control (QC). While the description in the Plan is not comprehensive, it seems to imply that the purpose of QA is narrowly restricted to assuring QC methods are effective in ensuring compliance. This stated purpose, while possibly incomplete in defining how PG&E QA program is structured, misses the point of QA, which is to assure that the *systems and processes* under which work is carried out are designed to assure the quality of the work. QA is about before-the-fact development of solid processes to carry out work effectively, while QC is about after-the-fact verification the product of that work is sound.

G. How does PG&E's response address the NTSB recommendations?

The following recommendations have been made by the National Transportation Safety Board (NTSB) following the explosion at San Bruno. For each recommendation, I have briefly characterized my current understanding of the status of the PG&E response contained in the PSEP.

Search for all as-built drawings, alignment sheets, and specifications, and all design, construction, inspection, testing, maintenance, and other related records relating to pipeline system components, such as pipe segments, valves, fittings, and weld seams for Pacific Gas and Electric Company natural gas transmission lines in class 3 and class 4 locations and class 1 and class 2 high consequence areas that have not had a maximum

allowable operating pressure established through prior hydrostatic testing. These records should be traceable, verifiable, and complete. (P-10-2) (Urgent)

Use the records located by implementation of Safety Recommendation P-10-2 (Urgent) to determine the valid maximum allowable operating pressure, based on the weakest section of the pipeline or component to ensure safe operation of specified pipe segments that have not had a maximum allowable operating pressure established through prior hydrostatic testing. (P-10-3) (Urgent)

If you are unable to comply with Safety Recommendations P-10-2 (Urgent) and P-10-3 (Urgent), determine the maximum allowable operating pressure with a spike test followed by a hydrostatic pressure test. (P-10-4)

Addressing this set of recommendations has been the focus of the initial PG&E response to the explosion. Completion of these recommendations for the entire PG&E system, not just segments specified by the NTSB, is a major objective of the PSEP.

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Require your control room operators to notify, immediately and directly, the 911 emergency call center(s) for the communities and jurisdictions in which your transmission and/or distribution pipelines are located, when a possible rupture of any pipeline is indicated. (P-11-3)

Status is not addressed in the PSEP; it is quite important that the CPUC address this important safety issue.

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Revise your work clearance procedures to include requirements for identifying the likelihood and consequence of failure associated with the planned work and for developing contingency plans. (P-11-24) AND

Revise your post-accident toxicological testing program to ensure that testing is timely and complete. (P-11-28)

Status is not addressed in the PSEP; it is quite important that the CPUC address these important safety issues, including through new rules as appropriate.

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Establish a comprehensive emergency response procedure for responding to large-scale emergencies on transmission lines; the procedure should (1) identify a single person to assume command and designate specific duties for supervisory control and data acquisition staff and all other potentially involved company employees; (2) include the development and use of trouble-shooting protocols and checklists; and (3) include a requirement for periodic tests and/or drills to demonstrate the procedure can be effectively implemented. (P-11-25)

Status unknown, but as described earlier, PG&E is implementing an enhanced prevention, preparedness and response program which is outside the scope of the PSEP. Specific activities include: education activities related to pipeline damage prevention; developing, training to and exercising emergency response plans; and working with public safety first responders to deal with gas pipeline explosions. In addition, SCADA upgrades are expected to provide emergency responders with better, timelier information on rupture location and estimated time required to terminate gas flow through a ruptured line.

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Equip your supervisory control and data acquisition system with tools to assist in recognizing and pinpointing the location of leaks, including line breaks; such tools could include a real-time leak detection system and appropriately spaced flow and pressure transmitters along covered transmission lines. (P-11-26)

An effort to satisfy this recommendation is underway as part of the PSEP.

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Expedite the installation of automatic shutoff valves and remote control valves on transmission lines in high consequence areas and in class 3 and 4 locations, and space them at intervals that consider the factors listed in Title 49 Code of Federal Regulations 192.935(c). (P-11-27)

The PSEP both includes a decision tree for determining where valves should be placed or existing valves automated, and identifies the location of automatic valves

resulting from the application of the decision trees. A commitment to install or automate these valves awaits CPUC approval of the PSEP. The specific determination of whether RCVs or ASVs should be used appears to require additional data gathering and determination of how best to instrument the valves and to integrate the instrument signals into the SCADA.

* * * * * * * * * *

Assess every aspect of your integrity management program, paying particular attention to the areas identified in this investigation, and implement a revised program that includes, at a minimum, (1) a revised risk model to reflect PG&E's recent experience data on leaks, failures, and incidents; (2) consideration of all defect and leak data for the life of each pipeline, including its construction, in risk analysis for similar or related segments to ensure that all applicable threats are adequately addressed; (3) a revised risk analysis methodology to ensure that assessment methods are selected for each pipeline segment that address all applicable integrity threats, with particular emphasis on design/material and construction threats; and (4) an improved self-assessment that adequately measures whether the program is effectively assessing and evaluating the integrity of each covered pipeline segment. (P-11-29)

This comprehensive upgrade of PG&E's integrity management program has been initiated through the PSEP, including development of necessary decision tree models to inform safety decisions and to rank resulting action. Additional development, including upgrading risk models and integrating pipeline characteristics developed and verified during implementation of the PSEP are underway.

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Conduct threat assessments using the revised risk analysis methodology incorporated in your integrity management program, as recommended in Safety Recommendation P-11-29, and report the results of those assessments to the California Public Utilities Commission and the Pipeline and Hazardous Materials Safety Administration. (P-11-30)

Status unknown, but necessarily incomplete until pipeline characterization data have been gathered and validated, and the associated risk models have been developed.

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Develop, and incorporate into your public awareness program, written performance measurements and guidelines for evaluating the plan and for continuous program improvement. (P-11-31)

Status unknown; PG&E has committed in the PSEP to measuring progress using established metrics.

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It bears repeating that the Commission needs to ensure satisfactory completion of the NTSB recommendations focused on PG&E, especially those that relate to public awareness and emergency response which are not addressed in the PSEP. These significant emergency response and public awareness issues should be addressed in a formal CPUC proceeding that, as appropriate, results in new regulations. Specifically, it would be prudent for the Commission to require PG&E to conduct a comprehensive audit of "all aspects" of its operations, including emergency planning and PG&E's public awareness programs, as directed to the Commission by the NTSB.[7] As well, as recommended by the NTSB, 1) the Commission should require PG&E to establish a comprehensive emergency response procedure for responding to large-scale emergencies;[8] and 2) PG&E should develop and incorporate in its public awareness program "written performance measurements and guidelines for evaluating the plan and for continuous program improvement." [9]

Although PG&E has indicated that it is attempting to remedy the deficiencies in its

[7] See NTSB recommendation #19, NTSB Pipeline Accident Report issued on September 26, 2011.

[8] See NTSB recommendation #22, NTSB Pipeline Accident Report issued on September 26, 2011.

[9] See NTSB recommendation #29, NTSB Pipeline Accident Report issued on September 26, 2011.

public awareness program, CPUC should promulgate and implement rules addressing these critical safety issues, thereby improving public safety for the residents of California.

III. WITNESS QUALIFICATIONS

My name is Paul Wood. My business address is 713 S. Union Street; Alexandria, VA 22314. I have been a principal in Cycla Corporation since 1990. I have over 35 years of experience in developing risk management and process safety programs for industrial facilities ranging from nuclear power and nuclear fuel processing plants to pipeline facilities. I have worked with regulators and operators to identify common goals as the basis for implementing mutually agreeable approached to managing health and safety risk. I have been a task manager for multi-year prime contracts with Department of Energy and Department of Transportation.

I received a ScD in Nuclear Engineering in 1973 and a S.M. in Nuclear Engineering and Chemical Engineering in 1968 from the Massachusetts Institute of Technology in Cambridge, MA. I received a B.S. in Chemical Engineering in 1966 from Purdue University.

At the Pipeline and Hazardous Materials Safety Administration, I have over twelve years experience in supporting the development and implementation of a risk-based regulatory program for the pipeline industry, including supporting development of Integrity Management regulations for the natural gas transmission and distribution pipeline industries, development of standards for evaluating the qualifications of pipeline operators, and expansion of the pipeline R&D program. I also participated in developing the technical approach for the NACE recommended practice on external corrosion direct assessment; and consulted with the Alaska Department of Environmental Conservation in determining how to characterize the risk of Alaska's pipelines.

At the Department of Energy, I supported development and implementation of a risk-based resource management systems used to gain regulatory acceptance for resumption of operation of a research reactor in an environment of great political uncertainty. The systems were later expanded to support a Department-wide strengthening

of safety management practices. I also managed the process leading to acceptance by the US Nuclear Regulatory Commission of the operational readiness of the uranium enrichment complex following decades of less-than-effective internal regulation.

At the United States Nuclear Power Industry, I managed application-oriented probabilistic risk assessments at several nuclear facilities, both in design and in operation, and developed and implemented risk-based resource management systems at numerous commercial nuclear power plants. These systems were instrumental in guiding a more orderly safety improvement process following the accident at the Three Mile Island nuclear plant.

This is the first time I have testified before the Commission.

This concludes my prepared direct testimony.

Respectfully submitted,

/s/ Steven R. Meyers

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