

APPENDIX B
CPSD's Final Recommended Remedies

- 4.A.1 PG&E should pay to reimburse CPSD for contracts retaining independent industry experts, chosen by CPSD, for the cost of verification audits and inspections to ensure compliance with the other remedies. PG&E should also pay to reimburse CPSD for contracts retaining independent industry experts, chosen by CPSD in the near term to provide needed technical expertise as PG&E proceeds with its hydrostatic testing program, in order to provide a high level of technical oversight and to assure the opportunity for legacy piping characterization though sampling is not lost in the rush to execute the program.
- 4.A.2 PG&E should reimburse CPUC/CPSD for the cost of conducting all three of the present investigations.
- 4.A.3 RE: Penalty - Refer to CPSD Response Brief
- 4.B.1 PG&E's pipeline construction standards should meet or exceed all legal requirements and industry standards for identifying and correcting pipe deficiencies and strength testing.
- 4.B.2 PG&E should revise its GTRIMPRMP to robustly meet the data gathering requirements of 49 CFR Part 192.917(b) and ASME-B31.8S, and to do so without limiting its data-gathering to only that data which is "readily available, verifiable, or easily obtained" by PG&E.
- 4.B.3 PG&E should perform a complete company-wide record search to populate its GIS database with all identified gas transmission pipeline leak history, including closed leak, information not already transferred to the GIS.
- 4.B.4 PG&E should revise its Integrity Management training to ensure that missing data is represented by conservative assumptions, and that those assumptions are supportable, per the requirements of ASME B31.8S. As required by Ordering Paragraph 1 of D.11-06-017, PG&E should be required to fully document any engineering-based assumption it makes for data that is missing, incomplete or unreliable. Such

assumptions must be clearly identified and justified and, where ambiguities arise, the assumption allowing the greatest safety margin must be adopted.

- 4.B.5 PG&E should revise its GTRIMPRMP and related training, to ensure robust data verification processes are enacted and implemented.
- 4.B.6 PG&E should revise its threat identification and assessment procedures and training, including its Baseline Assessment Plans, to fully incorporate all relevant data for both covered and non-covered segments, including but not limited to potential manufacturing and construction threats, and leak data.
- 4.B.7 PG&E should re-label its system MAOP nomenclature in accordance with 49 CFR Part 192.
- 4.B.8 PG&E should permanently cease the self-suspended practice of regularly increasing pipeline pressure up to a “system MAOP” to eliminate the need to consider manufacturing and construction threats. In addition, PG&E should analyze all segments that were subjected to the planned pressure increases to determine the risk of failure from manufacturing threats under 49 C.F.R. Part 192.917(e)(3), and perform further integrity assessments as warranted. Each assessment should be documented and retained for the life of the facility.
- 4.B.9 PG&E should revise its threat identification and assessment procedures and training to ensure that HCA pipeline segments that have had their MAOP increased are prioritized for a suitable assessment method (e.g., hydro-testing), per the requirements of 49 CFR Part 192.917(e)(3)-(4).
- 4.B.10 PG&E should revise its threat identification and assessment procedures and training to ensure that cyclic fatigue and other loading conditions are incorporated into their segment specific threat assessments and risk ranking algorithm, and that threats that can be exacerbated by cyclic fatigue are assumed to exist per the requirements of 49 CFR Part 192.917(b).
- 4.B.11 PG&E should revise its risk ranking algorithm to ensure that PG&E’s weighting factors in its risk ranking algorithm more accurately reflect PG&E’s actual operating experience along with generally reflected industry experience.

- 4.B.12 PG&E should revise its threat identification and assessment procedures and training to ensure that PG&E's weighing of factors in its risk ranking algorithm and the input of data into that algorithm corrects the various systemic issues identified in the NTSB report and the CPSD/PHMSA 2011 Risk Assessment Audit.
- 4.B.13 PG&E should revise its threat identification and assessment procedures and training to ensure that the proper assessment method is being used to address a pipeline's actual and potential threats.
- 4.B.14 PG&E should make revisions to its equipment retention policy to ensure that integrity of equipment, wiring and documentation and identification of electrical components does not deteriorate to unsafe conditions such as occurred at the Milpitas Terminal, described herein. If PG&E does not have an applicable equipment retention policy then it should formulate one.
- 4.B.15 PG&E should revise its SCADA system to reduce the occurrence of "glitches" and anomalies in the control system that desensitizes operators to the presence of alarms and other inconsistent information.
- 4.B.16 PG&E should reevaluate SCADA alarm criteria with the goal of reducing unnecessary alarm messages.
- 4.B.17 PG&E should revise its control systems, including SCADA, to ensure that all relevant information, including redundant pressure sensors, is considered.
- 4.B.18 PG&E should install more pressure sensors and have them closely spaced and use the additional information to incorporate leak or rupture recognition algorithms in its SCADA system.
- 4.B.19 PG&E should program its PLCs to recognize that negative pressure values are erroneous and require intervention to prevent valves from fully opening.
- 4.B.20 PG&E should replace the three pressure controllers which malfunctioned on September 9, 2010.
- 4.B.21 PG&E should review its work clearance process to ensure that abnormal operating conditions that may arise during the course of work are anticipated and responses to those conditions are detailed. Additionally, PG&E should create a procedure covering

the commission of electrical equipment from one Uninterruptable Power Supply to another. Each project Clearance should include possible scenarios and contingency plans to mitigate any abnormal operating conditions that may arise.

- 4.B.22 PG&E should revisit its Work Clearance procedures and training to ensure that future work will not be authorized unless: all forms and fields therein are comprehensively and accurately populated, and reviewed by a designated clearance supervisor. Additionally, work should not commence until such time as the operator and technician have reviewed the work clearance and have confirmed that understand the actions to take in the event an abnormal condition is encountered. Lastly, PG&E must ensure that proper records showing the specific steps taken, when taken, and by whom, are maintained pursuant to its Record Retention Schedule
- 4.B.23 Training – PG&E should provide training to Gas Service Representatives to recognize the differences between fires of low-pressure natural gas, high-pressure natural gas, gasoline fuel, or jet fuel.
- 4.B.24 Internal coordination – PG&E should revise its procedures to outline each individual Dispatch and Control Room employee’s roles, responsibility, and lines of communication required to be made in the event of an emergency either during or outside normal working hours. This should include assigning specific geographical monitoring responsibilities for Control Room employees.
- 4.B.25 External coordination – CPSD agrees with NTSB recommendation P-11-2, which requests that PHMSA issue guidance to operators of natural gas transmission and distribution pipelines and hazardous liquid pipelines regarding the importance of control room operators immediately and directly notifying the 911 emergency call center(s) for the communities and jurisdiction in which those pipelines are located when a possible rupture of any pipeline is indicated. CPSD further recommends that prior to such PHMSA guidance PG&E should revise their own procedures to allow for the immediate and direct notification of 911 emergency call centers when a possible pipeline rupture is indicated.
- 4.B.26 Decision making authority – PG&E should revise its emergency procedures to clarify emergency response responsibilities, especially in regards to authorizing valve shut

offs. PG&E policies should not just delegate authority to act but also detail obligations to act.

- 4.B.27 RCV/ASV – PG&E should perform a study to provide Gas Control with a means of determining and isolating the location of a rupture remotely by installing RCVs, ASVs, and appropriately spaced pressure and flow transmitters on critical transmission line infrastructure and implement the results.
- 4.B.28 Response time – PG&E should review required response times in other utility service territories nationwide and devise appropriate response time requirements to ensure that its Emergency Plan results in a “prompt and effective” response to emergencies. PG&E will provide its analysis and conclusions to CPSD.
- 4.B.29 Emergency Plan Revision – Currently a maintenance supervisor annually reviews SCADA alarm responses and makes revisions as necessary. This process needs to be formalized to ensure a robust feedback loop such that new information is fully analyzed and necessary changes to PG&E’s Emergency Plan and/or other procedures are implemented with a subsequent review of made changes to ensure they are adequate.
- 4.B.30 Public Awareness – CPSD agrees with NTSB recommendation P-11-1, which requests PHMSA issue guidance to operators of natural gas transmission and distribution pipelines and hazardous liquid pipelines regarding the importance of sharing system-specific information, including pipe diameter, operating pressure, product transported, and potential impact radius, about their pipeline systems with the emergency response agencies of the communities and jurisdiction in which those pipelines are located. CPSD further recommends that prior to such PHMSA action PG&E undertake a review of **its gas transmission** public awareness and outreach programs to ensure that system-specific information is appropriately disseminated.
- 4.B.31 PG&E’s business strategies and associated programs should expressly ensure that safety is a higher priority than shareholder returns and be designed to implement that priority, which may include reinvesting operational savings into infrastructure improvements.

- 4.B.32 PG&E should target retained earnings towards safety improvements before providing dividends, especially if the ROE exceeds the level set in a GRC decision.
- 4.B.33 PG&E's incentive plan, should include safety. PG&E should revise its STIP program to make safety performance 40% of the score used to determine the total award. PG&E should require upper management to participate in annual training activities that enhance and expand their knowledge of safety, including exercises in which gas officers will have an opportunity to enhance their knowledge of incident command and will participate in an annual safety leadership workshop.
- 4.B.34 PG&E should not hold joint Company and Corporation Board of Director meetings as the two entities should have different priorities.
- 4.B.35 PG&E should focus on enhancing public safety and operational excellence as a core mission, and should examine whether the time and money it spends on public relations and political campaigns distracts it from this core mission.
- 4.B.36 PG&E should revisit its Pipeline 2020 program, and subsequent variations thereof, to ensure that its implementation is fully flushed out with specific goals, performance criteria, and identified funding sources.
- 4.B.37 PG&E should examine internal communication processes to ensure that all employees understand their job responsibilities and priorities. Goals of PG&E gas employees should describe what is expected of them and their teams.
- 4.B.38 CPSD agrees with the following NTSB recommendations to PG&E (CPSD-9, pages 130-131)
- 4.B.38.a 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)
- 4.B.38.b.1 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 NTSB Pipeline Accident Report 131 control and data acquisition staff and all other potentially involved company employees.

- 4.B.38.b.2 Establish a comprehensive emergency response procedure for responding to large-scale emergencies on transmission lines; the procedure should include the development and use of trouble-shooting protocols and checklists.
- 4.B.38.b.3 Establish a comprehensive emergency response procedure for responding to large-scale emergencies on transmission lines; the procedure should include a requirement for periodic tests and/or drills to demonstrate the procedure can be effectively implemented. (P-11-25).
- 4.B.38.c 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).
- 4.B.38.d 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 Part 192.935(c). (P-11-27).
- 4.B.38.e Revise your post-accident toxicological testing program to ensure that testing is timely and complete. (P-11-28).
- 4.B.38.f 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 the PG&E Company's actual 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).

- 4.B.38.g 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 Commission and the Pipeline and Hazardous Materials Safety Administration. (P-11-30).
- 4.B.38.h 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).
- 4.C.1 PG&E's gas transmission organization should be required to achieve at least a Level 3 information maturity score under the Generally Accepted Records Keeping Principles within 3 years. (CPSD Exhibit 6, Appendix 4).
- 4.C.2 PG&E should be required to achieve International Organization Standard (ISO) certification against ISO 30300 for its Management System for Records (MSR) within five years of the ISO 30300 audit standard being finalized and published.
- 4.C.3.a., b, and c. PG&E should issue a corporate policy and standard that will:
 - (a) Communicate recordkeeping expectations that underlie its post-2010 Corporate Records and Information Management Policy and Standard for all departments and divisions across PG&E. These expectations should be incorporated into procedures specific to meet the needs of every Line of Business.
 - (b) The IM Compliance Department should design a governance controls catalog for recordkeeping practices to assess compliance with the corporate policy and standard, consistency of behavior with official records being stored in approved systems of record, and timeliness of addressing records during their lifecycle.
 - (c) The retention schedule will support the policy by providing retention length for all identified official records to meet legal and regulatory mandates.
- 4.C.4 PG&E should develop and implement an education and training program for the gas transmission organization in Records and Information Management principles and practices within an information governance framework
- 4.C.5 PG&E should develop and deploy the systems necessary to manage, maintain, access and preserve both records and documents (physical and electronic, in all formats and

- media types); their related data, metadata, and geographic location and geospatial content in accordance with legal and business mandated rules, utilizing technology that includes appropriate aids to help improve data and metadata quality, including but not limited to validation, verification and referential integrity.
- 4.C.6 PG&E should establish accountability for development and implementation of a PG&E governance strategy across gas transmission that should rest with PG&E Senior Management and a method of accountability should be developed and implemented.
 - 4.C.7 PG&E should identify and document the employees responsible for implementing the Records and Information Management program for gas transmission.
 - 4.C.8 PG&E should develop consistent standard practices that include gas transmission records management linked to corporate policies on information governance.
 - 4.C.9 PG&E should implement mandated retention periods for all records relevant to gas transmission.
 - 4.C.10 PG&E should ensure that each gas transmission standard conforms with Records and Information Management (RIM) policies for gas transmission.
 - 4.C.11 PG&E should include the treatment of active and inactive records in its Records and Information Management (RIM) Policy for gas transmission.
 - 4.C.12 PG&E's records management processes should be managed and maintained in accordance with the traceable,-verifiable and complete standard, including retention of physical and digital pipeline records for the 'life of the asset.'
 - 4.C.13 The accuracy and completeness of data within gas transmission records should be traceable, verifiable and complete and when errors are discovered, the record should be corrected as soon as correct information is available and the reason(s) for each change should be documented and kept with the record. For example, when discrepancies are discovered in GIS 3.0, GIS 3.0 should be updated as soon as the new information is available and reflected in the audit change log.
 - 4.C.14 PG&E should create a standard format for the organization of a job file so that PG&E personnel will know exactly where to look in a file folder, or set of file folders, to

find each type of document associated with a job file. At a minimum, a job file will contain traceable, verifiable and complete records to support the MAOP of the pipeline segment installed; design documentation; purchase documentation showing the sources and specifications of equipment purchased; permits; environmental documents; field notes; design, construction and as-built drawings; x-ray reports and weld maps; pressure test records; correspondence with the CPUC; and inspection reports and correspondence.

- 4.C.15 Job file data, including drawings, for all parts of the active PG&E gas transmission system should be immediately accessible from multiple locations. The development of a complete and accurate catalog of job files that can be searched immediately should be included within this objective.
- 4.C.16.a, b., and c The information that was contained in PG&E's historic records and documents, and that has been identified as 'missing or disposed of,' and is necessary to be retained for the safe operation of the pipelines, pursuant to laws, regulations and standards and the PG&E retention schedule, should be recovered. This recovery should include but not be limited to:
- a. updating and verification of data in engineering databases, such as the leak database, GIS and the integrity management model,
 - b. updating plat sheets and other engineering drawings, and
 - c. updating and organizing job files.
- 4.C.17 PG&E should document adoption of, and changes and amendments to policies and standard practices and the reasons for their adoption, amendment or cancellation. An audit trail of changes should be maintained, retained and preserved permanently, taking heed of potential changes in technology that may render documents unreadable in the future.
- 4.C.18 PG&E will identify each section of pipe that has been salvaged and reused within the PG&E gas transmission system. For each section of pipe identified, PG&E will change the installed date in its GIS and its IM model to the date the pipe was originally installed in the PG&E pipeline system.

- 4.C.19 PG&E will create a system to track reused pipe installed within its operating gas transmission pipeline system and will maintain these records so long as there are sections of reused pipe in the PG&E operating gas transmission pipeline system and identify pipeline characteristics along with where the pipe segments originated from, medium transported previously, and justification of the usage of it in its system.
- PG&E will maintain these records so long as there are sections of reused pipe in the PG&E operating gas transmission pipeline system.
- 4.C.20 PG&E should implement the recommendations included in the final Pricewaterhouse Coopers (PwC) audit report. (TURN Exhibit 16, Appendix B)
- 4.C.21 Using independent auditors, CPSD will undertake audits of PG&E’s recordkeeping practices within the Gas Transmission Division on an annual basis for a minimum of ten years after the final decision is issued in I.11-02-016.
- 4.C.22 PG&E will correct deficiencies in recordkeeping discovered as a result of each CPSD audit and will report to CPSD when such deficiencies have been corrected.
- 4.D.1 Systems: Utilize industry-standard software for electronic storage of class location information. Devise a process to capture new PG&E service hook-ups especially in proximity to transmission lines and incorporate into the class location analysis.
- 4.D.2 Procedures: Update procedures, patrolling process instructions, and related OQ training to require written confirmation to Patrol Supervisors that follow up has been performed on all new construction that the patroller has previously observed and documented.
- 4.D.3 Procedure 6.3 (3) should be rewritten as “List all new observations regardless if it is believed that the ground crew has already investigated the observation.”
- 4.D.4 TD-4412-07 section 6.1 (2) should include specific language for the pilot to recommended increased patrolling to the Aerial Patrol Program Manager.
- 4.D.5 Ensure that the Report of New Construction forms are completed.
- 4.D.6 Increase the duties of the Aerial Patrol Program Manager (APPM) to include oversight and review of the quality and accuracy of patrol reports.

- 4.D.7 Create a detailed procedures manual containing the APPM's duties to ensure quality control of aerial patrol responsibilities.
- 4.D.8 Training: Utilize varied training exams for patrolling.
- 4.D.9 The new training exams for patrolling should include questions with greater detail and complexity than the current exam and shall use aerial photos as exam exhibits where pilots indicate which structures are approximately 660 feet from the right of way and would require reporting. Training materials and associated tests should be reviewed and updated to enhance employee competency, utilize aerial photos and other aids, and reflect field conditions to approximate buildings' key distances from lines.
- 4.D.10 Improve Aerial Patrol Pilot training. PG&E should consider pilot training using aerial photographs taken at an altitude of 750 feet, which replicates what the pilots see on patrol, and include a number of structures both within and outside of the 660 foot standard. Use the photos as exam exhibits where the pilots indicate which structures are approximately 660 feet from the right of way and would require reporting. Training should also include a Well-Defined Area (WDA) in the exhibit as well. PG&E should also consider using in its training photographs, video or other aids to reflect expected views to be seen from typical patrol altitudes.
- 4.D.11 Audits the patrolling process should include a comparison of new construction observations with new gas/electrical hook ups near the line to ensure that new construction has not been missed.
- 4.D.12 A new item "All Sections of Document Completed" should be added to the audit checklist when reviewing Reports of New Construction.
- 4.D.13 Audits should make sure that copies of completed Reports of New Construction are being provided to local supervisors as required by standard procedure TD-4127P-01 section 3.8 (5).