

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Investigation on the Commission's Own Motion into the Operations and Practices of Pacific Gas and Electric Company to Determine Violations of Public Utilities Code Section 451, General Order 112, and Other Applicable Standards, Laws, Rules and Regulations in Connection with the San Bruno Explosion and Fire on September 9, 2010.

I.12-01-007
(Filed January 12, 2012)

REPLY BRIEF OF THE UTILITY REFORM NETWORK



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April 25, 2013

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The Utility Reform Network (“TURN”) hereby submits this reply brief in this Investigation into the conduct and practices of Pacific Gas and Electric Company (“PG&E”) related to the San Bruno explosion and fire.

I. INTRODUCTION AND SUMMARY

PG&E’s opening brief demonstrates all too disturbingly that, notwithstanding the managerial changes and (yet another) company reorganization it has undertaken since the San Bruno explosion, PG&E still fails to comprehend that its primary responsibility as a California public utility is – and always has been -- to ensure the safety of the facilities it operates. PG&E professes to accept responsibility for installing the defective pipe in Segment 180 that ruptured and exploded. But PG&E refuses to acknowledge a single violation of law with respect to installing that dangerous pipe and allowing it to remain in its transmission system – like a ticking time bomb – for 54 years before the defective pipe exploded, with lethal and catastrophic consequences.¹

To arrive at this astounding and indefensible conclusion, PG&E is required to resort to numerous distortions of the law and facts, including:

- Claiming that California Public Utilities Code Section 451² is not a safety provision;
- Contending that California utilities have lacked notice under Section 451 that it is a violation of law to install defective gas transmission pipe that is dangerously unfit for its intended purpose;

¹ PG&E only acknowledges two violations unrelated to Segment 180: (1) failure to properly complete a “clearance form” for electrical work at the Milpitas Terminal; and (2) failure to promptly administer employee tests for alcohol consumption.

² Statutory references are to the California Public Utilities Code unless otherwise indicated.

- Contending that California utilities have lacked notice under Section 451 that it is a violation of law to fail to ensure that installed gas transmission pipe meets the company’s specifications; and
- Contending that, once the defective pipe in Segment 180 was installed, PG&E had no ongoing responsibility to assess the safety of that segment, even though PG&E had numerous reasons to examine the integrity of the seam welds on Segment 180, including:
 - PG&E records showing that Segment 180 was made from pipe that was more than 50 years old when PG&E first began implementing federal integrity management requirements – and hence should have been identified as having a manufacturing threat;
 - An internal report of a 1988 leak caused by “pre-service defects” in the longitudinal weld of a section of Line 132 that was of the same characteristics as the pipe that PG&E (erroneously) believed comprised Segment 180 -- which should have caused PG&E to examine whether other similar pipe had such defects;
 - Radiography records from the 1948 construction of Line 132 showing several seam weld defects in the very small percentage of welds that were examined -- which should have raised questions about seam weld defects in pipe of the same characteristics including Segment 180;
 - An industry (INGAA) study showing that DSAW pipe of the same vintage and manufacturer as (PG&E believed) in Segment 180 was susceptible to seam-weld defects; and
 - The absence of any documentation of a post-installation pressure test.

Throughout this proceeding, PG&E has paid lip service to “accepting responsibility” -- for *what* is unclear -- but actions speak louder than words. In choosing to submit its opening brief with hyper-technical legal arguments that defy the clear letter and spirit of pipeline safety regulation, PG&E sends a disturbing message – that, in order to protect its bottom line, the company will argue that it need only strive for minimal, check-the-box compliance.

In contrast to PG&E’s cramped view of regulatory authority, the California legislature and the Commission have long recognized that utilities engage in hazardous activities – none

more hazardous than the transport of flammable and explosive natural gas – and that the Commission has broad authority under Section 451 to ensure that gas utilities fulfill their “primary obligation” to operate their pipelines safely.³ The Commission made abundantly clear when it first adopted General Order (“GO”) 112 that no code of safety rules could reasonably address all safety issues that may arise and that the CPUC was continuing to require utilities to “be ever conscious of the importance of safe operating practices and facilities and of their obligation to the public in that respect.”⁴

PG&E’s opening brief treats these words as meaningless. In PG&E’s view, its legal responsibilities begin and end with minimal compliance only with specific and detailed regulations; even then, it will carefully parse those regulations to find an interpretation to exonerate itself from any allegation of any import. TURN is confident that the Commission will recognize that California law has never left the CPUC as powerless to enforce safety obligations as PG&E claims.

Consistent with PG&E’s abdication of responsibility for its violations of applicable law, PG&E also attempts to sidestep its responsibility to ratepayers not to impose costs that result from PG&E’s legal violations and imprudent behavior. As TURN discussed in its opening brief⁵ and in Section III.B below, this proceeding and the other enforcement proceedings have developed an important record of PG&E’s past conduct, and these proceedings are therefore highly relevant to the high stakes issue of whether ratepayers or shareholders are responsible for the billions of dollars of costs PG&E will need to incur to make its pipeline system safe.

³ D.61629 (1960 Order adopting GO 112), p. 12, Finding 8.

⁴ *Id.* In that same Order, Finding 7, the Commission stated: “Public utilities serving or transferring gas bear a great responsibility to the public respecting the safety of their facilities and operating practices.”

⁵ TURN Opening Brief (“Op. Br.”), pp. 6-8

In the remainder of this brief, TURN responds in more detail to certain arguments in PG&E's opening brief, consistent with TURN's supplementary role in this case. TURN's lack of a response to PG&E on a particular issue should in no way be construed as either an agreement or concession with respect to such issue.

II. BACKGROUND (PROCEDURE/FACTS)

A. In Claiming that Segment 180 Was Not Re-Used Pipe, PG&E Ignores Its Own Witness's Testimony that the Company Does Not Know Whether the Pipe Was Re-Used

PG&E's summary of facts misstates the record on PG&E's understanding of whether Segment 180 may have been previously used pipe. Although PG&E's brief asserts that the pipe had not been used before,⁶ in fact, Mr. Harrison testified in response to questions from ALJ Yip-Kikugawa that PG&E *did not know* whether the Segment 180 pipe was re-used pipe.⁷

This misstatement of the record may not necessarily be significant for determining PG&E's violations with respect to the installation of Segment 180. As TURN showed in its opening brief, the key undisputed point in this case is that, at a minimum, Segment 180 needed to be reconditioned before it could be installed.⁸ One of PG&E's clear violations is that it failed to properly recondition the pipe to ensure that it was fit for service.⁹

However, PG&E's misstatement is significant in that it disguises a serious failure of recordkeeping that prevents PG&E from knowing – even after intense searching and scrutiny of its records – whether Segment 180 contained re-used pipe.

⁶ PG&E Op. Br., p. 14 (“PG&E completed the job using pipe previously ordered from Consolidated Western but not used.”)

⁷ Tr., Jt. Vol. 4, p. 599 (Harrison/PG&E) (“Q: So for Segment 180 when you said reconditioned pipe, you don't know if it is new or used? A: Right”)

⁸ TURN Op. Br., pp. 10-12.

⁹ *Id.*

III. LEGAL ISSUES OF GENERAL APPLICABILITY

A. PG&E's Arguments Regarding Section 451 Are Completely Without Merit

In an effort to avoid an important part of its legal responsibility for the San Bruno explosion, PG&E offers unsustainable and previously rejected legal arguments regarding Section 451. TURN anticipates that CPSD will rebut each of PG&E's meritless contentions. To supplement CPSD's analysis, TURN highlights certain key fallacies in PG&E's Section 451 arguments.

1. Even PG&E Does Not Believe Its Self-Serving Contention that Section 451 Does Not Impose Safety Requirements

PG&E claims that Section 451 is neither a safety provision nor “a source of pipeline safety requirements.”¹⁰ In PG&E's view, Section 451 is focused on rates, and “safety” is just one word “buried in one dependent clause” in the statute.¹¹

PG&E's view defies a host of Commission decisions – including the order opening this proceeding -- making clear that Section 451 directly imposes on utilities the obligation to maintain safe facilities. In recent years, the Commission has emphasized this point in numerous decisions, including:

- OII 12-01-007, p. 8: “Public Utilities Code Section 451 requires Commission-regulated utilities to operate safely.”
- D.12-12-030, pp. 91-92: After quoting the second paragraph of Section 451, explaining that Section 451 imposes a “duty to furnish and maintain safe equipment and facilities” that is “paramount for all California public utilities, including natural gas transmission operators.”
- D.11-06-017, p.16: Similar language to D.12-12-030.

¹⁰ PG&E Op. Br., pp. 4, 28.

¹¹ *Id.*, pp. 28-29.

- D.11-09-006, p. 6: The Section 451 “duty to furnish and maintain safe equipment and facilities falls squarely on California public utilities, including PG&E.”

To the best of TURN’s knowledge, PG&E had never previously challenged any of these statements in previous Commission decisions indicating that Section 451 imposes enforceable safety obligations. PG&E’s newfound, self-serving interpretation is directly contrary to the consistent and longstanding interpretation of Section 451 by the agency charged with enforcing the statute.

Nevertheless, in Section II.B of its brief, PG&E contends, contrary to the plain words of the second paragraph of Section 451, that the statute intends to balance the goal of safety against other goals, particularly reasonable rates. This reading finds no support in the plain words of Section 451 and, in fact, would render the second paragraph meaningless. PG&E does not, and cannot explain, how the clear and absolute language of that paragraph (Every public utility “shall” furnish such facilities as are necessary to promote safety) can be converted into a balancing test. Nor can PG&E explain what, if any, utility conduct or deficiencies would be prohibited under its interpretation. In fact, when utilities have attempted to argue that they should be able to curtail service when they perceive their revenues as insufficient, the Commission has made clear that such service curtailment would violate Section 451 and is impermissible.¹²

Tellingly, on page 142 of its brief, PG&E forgets the specious Section 451 argument it made 114 pages earlier and acknowledges that, in fact, Section 451 does impose safety obligations. Specifically, in the “safety culture” discussion comparing PG&E’s actual gas spending to imputed adopted amounts, PG&E’s brief plainly and accurately states that “PG&E

¹² D.01-03-029, slip. op., pp. 31-38 (in the Energy Crisis, ordering PG&E and Southern California Edison to halt layoffs that would degrade service, notwithstanding financial difficulties of the utilities)

was obligated to spend what is necessary to maintain a safe and reliable system . . .”¹³ The clear source of this “obligation” has to be Section 451.

2. PG&E’s Argument That Section 451 Is Too Vague to Create Enforceable Obligations Has Been Rejected by The CPUC and Reviewing Courts and Leads to Absurd Results

PG&E claims that Section 451 is too vague to form the basis of any violations, a contention that the Commission and a reviewing court have clearly and specifically rejected, as shown in the opening briefs of TURN and CPSD.¹⁴ PG&E’s argument would lead to the absurd result that, prior to the effective date of GO 112 in 1961, California had no laws mandating the safe operation of gas (and electric) facilities – meaning that for the prior 50 years that PG&E operated gas facilities, it could engage in unsafe practices with impunity. It would further mean that, since the adoption of GO 112 to the present time, if PG&E engaged in a dangerous practice in the operation of its gas system that was not specifically proscribed by GO 112 or federal regulations, the Commission would be powerless to find a violation. So, for example, if PG&E condoned the igniting of matches in the presence of suspected gas leaks, in the absence of a particular regulation barring such a dangerous practice, the Commission could not impose any fines on PG&E for allowing such a serious threat to public and worker safety. PG&E cannot credibly claim that it has lacked notice that such unsafe practices constitute violations under Section 451.

¹³ PG&E Op. Br., p. 142 (emphasis added).

¹⁴ TURN Op. Br., pp. 3-5; CPSD Op. Br., pp. 29-31.

3. Section 451 and the GO 112 Series of Regulations Serve Complementary Roles in Ensuring Pipeline Safety

PG&E argues that GO 112 was superfluous and unnecessary if Section 451 already obligated gas utilities to meet the standards in ASME B31.8.¹⁵ This argument is completely without merit.

First, PG&E's argument presumes that GO 112 and the prevailing version of ASME B31.8 were identical. In fact, GO 112, Sections 101-107, 201-215, 301-303 and 401-402 all established additional or stricter requirements than ASME B31.1.8-1958.¹⁶

In addition, PG&E fails to recognize that specific safety regulations serve an important purpose even when there is a more general, backstop safety obligation imposed by statute. GO 112 and its successors were efforts by the Commission to establish clear "minimum requirements" for transmission pipeline safety,¹⁷ as much as could reasonably be expressed in a code of safety rules.¹⁸ Furthermore, GO 112 explicitly did not address requirements for "abnormal or unusual conditions" and did not prescribe "all details of engineering and construction."¹⁹ In this regard, the decision adopting GO 112 articulated the point that no code of safety rules could address all safety issues that may arise and that utilities retained the "primary obligation" to "provide safe service and facilities."²⁰ Section 451 embodied (and continues to embody) the backstop, primary obligation of which the Commission spoke, and the CPUC made explicit that GO 112 did not relieve utilities of such statutory obligations.²¹ In sum,

¹⁵ PG&E Op. Br., p. 39.

¹⁶ This is readily apparent from D. 61269, Attachment A, the text of GO 112, which essentially itemizes the many respects in which the GO imposes different and additional requirements than the ASME code.

¹⁷ GO 112, Section 102.1.

¹⁸ D.61269 (order adopting GO 112), p. 12, Finding 8.

¹⁹ GO 112, Section 104.1.

²⁰ D.61269 (order adopting GO 112), p. 12, Finding 8.

²¹ GO 112, Section 104.4.

Section 451 and the GO 112 series of regulations are complementary efforts designed to ensure that utilities promote safety in every aspect of their gas operations.

B. To the Extent that Particular PG&E Conduct Is Found Not to Violate a Legal Requirement, the Commission Should Determine Whether the Conduct Was Prudent

PG&E attempts to divert attention from the fact that the Commission's sole focus in this and the other enforcement proceedings is *not* just adjudicating violations.²² When PG&E's brief summarizes D.12-12-030 (from R.11-02-019), PG&E notes that the decision made an initial determination of the sharing of pipeline safety Implementation Plan costs between PG&E shareholders and ratepayers.²³ But PG&E *fails to note* that the decision also made the apportionment of costs to ratepayers subject to other "ratemaking adjustments" that may be adopted in this and the other enforcement proceedings.²⁴

In their opening briefs, TURN and DRA demonstrated that the prudence of PG&E's conduct is indeed a potential issue in this case.²⁵ These enforcement proceedings may be the only cases in which the Commission examines the nature of PG&E's past pipeline safety practices; certainly, TURN expects PG&E to strongly resist any further examination of its past safety practices in future proceedings.²⁶ From the standpoint of efficient use of Commission resources, it would make sense for the Commission to use the record developed in this and the

²² PG&E Op. Br., p. 1 (arguing that the sole purpose of this case is to determine if PG&E violated laws, and not to otherwise determine the prudence of PG&E's conduct).

²³ PG&E Op. Br., p. 23.

²⁴ D.12-12-030, p. 4. The other enforcement proceedings are I.11-02-016 (recordkeeping) and I.11-11-009 (class location issues).

²⁵ TURN Op. Br., pp. 6-8; DRA Op. Br., pp. 9-11.

²⁶ However, TURN is not ruling out the potential need in future cost recovery proceedings for other examinations of PG&E's past conduct for purposes of determining of whether disallowances are warranted, particularly if such conduct has not been examined in these proceeding and has a bearing on cost recovery related to activities for which PG&E seeks cost recovery.

other enforcement cases as much as possible to reach conclusions about whether PG&E errors or imprudence are responsible for costs that PG&E seeks to impose on ratepayers.

C. PG&E’s Claimed Ignorance of the Defective Pup Sections is No Defense

PG&E contends that its professed ignorance of the defective pup sections excuses it from not taking action to remedy the defective pipe in Segment 180 after it was installed.²⁷ However, as discussed above, PG&E had abundant reasons to question the integrity of the seam weld in Segment 180, even based on the information that PG&E admits it had.

Assuming for the sake of argument that PG&E was indeed ignorant of the pups and had no information warranting an assessment of the safety of the Segment 180 seam weld, such ignorance cannot serve as a defense to violations. The implication of PG&E’s argument is that its legal responsibility ended once it unknowingly put the dangerous pipe in the ground and that it had no further responsibility to discover its dangerous error in the subsequent 54 years. PG&E’s view would create dangerous incentives, in that utilities would not be held to account for the consequences of their unsafe actions. Moreover, PG&E’s argument is contrary to the law. As CPSD pointed out, the laws PG&E is alleged to have violated in this case, including Section 451, are strict liability offenses.²⁸ Especially when regulating the transport of extremely hazardous commodities such as natural gas, regulators are required to insist upon the highest standard of care in order to protect the public health and safety.

²⁷ PG&E Op. Br., pp 8-9. In another example of desperate overreach, PG&E cites a passage from the book, *The Signal and the Noise*, for the point that, after events such as the Japanese invasion of Pearl Harbor, it is always easier “to sort the relevant from irrelevant signals.” It is ludicrous to suggest that the safe operation of a gas transmission line – an everyday event for gas utilities -- is analogous to the efforts of the United States intelligence community in World War II to intercept plans for an attack on the United States.

²⁸ CPSD Op. Br., p. 132, citing D.

IV. OTHER ISSUES OF GENERAL APPLICABILITY

A. PG&E Witness Zurcher’s Opinions Were Biased and Unreliable and Are Not Entitled to Any Weight

PG&E relies heavily on the supposedly expert opinions of its witness, John Zurcher. However, the record clearly shows that Mr. Zurcher’s opinions were so patently biased toward PG&E as to be completely unreliable.

The opening briefs of DRA²⁹ and the City and County of San Francisco (“CCSF”), as well as testimony by Mr. Zurcher in response to TURN’s cross examination, present numerous reasons to distrust the opinions of Mr. Zurcher, including:

- Mr. Zurcher rendered opinions that show no regard for the accuracy of records in integrity management, including disagreeing with the NTSB that an effective integrity management program needs accurate data;³⁰
- He based his testimony on PG&E’s professed policies and procedures rather than a review of PG&E’s actual practices;³¹
- Even though Mr. Zurcher had been the lead on an eight-month outside audit of PG&E’s integrity management practices in 2011, Mr. Zurcher refused to (or was directed not to) bring any of the information from that audit to bear on his testimony in these CPUC cases;³²
- He expressed patently incorrect views that manifest a hostility to regulatory authority – namely that, notwithstanding Section 301.1 of GO 112 (and successor provisions), California utilities had no obligation to produce to CPUC staff records showing how utilities calculated design pressure and that CPUC staff were required to trust the representations of utility employees;³³

²⁹ DRA Op. Br., pp. 17-25; CCSF Op. Br., pp. 9-11.

³⁰ Tr., Jt. Vol. 7, pp. 658-659 (Zurcher/PG&E). DRA provides more examples in its opening brief at pages 18 to 19.

³¹ DRA Op. Br., pp. 18, 21-22.

³² CCSF Op. Br., pp. 9-11; DRA Op. Br., p. 24.

³³ Tr., Vol. 12 (I.11-02-016), pp. 1828-1829 (Zurcher/PG&E).

- Mr. Zurcher has close ties to the gas pipeline industry and is dependent on gas pipeline operators as his clients;³⁴ and
- PG&E handsomely compensated Mr. Zurcher for his testimony, paying him \$390 per hour and total compensation in the three enforcement cases exceeding \$135,000.³⁵

For all these reasons, the Commission should not give any weight to the extremely biased and unreliable opinions of Mr. Zurcher.

V. CPSD ALLEGATIONS

A. Construction of Segment 180

1. PG&E's Claim That Its Admittedly Negligent Installation of Defective Pipe Violated No Laws Is Absurd On Its Face

Nowhere is the absurdity of PG&E's interpretation of Section 451 more evident than in its discussion of the alleged violations relating to the construction of Segment 180. PG&E admits that it negligently installed pipe that never should have been placed in the ground; that act of negligence ultimately led to the San Bruno explosion 54 years later.³⁶ Yet, because PG&E deems Section 451 to not impose any enforceable safety obligations, PG&E believes its actions did not violate any law.

This argument highlights the absurdity of PG&E's interpretation of Section 451. As PG&E well knows, gas transmission pipes have specifications for good reasons – to ensure that they are fit for their intended use and to enable the calculation of a safe design pressure used for determining maximum allowable operating pressure (“MAOP”). As TURN showed in its opening brief, PG&E committed at least two extremely dangerous errors of omission at the time it installed Segment 180: (1) PG&E failed to ensure that the installed pipe met the intended

³⁴ DRA Op. Br., p. 18.

³⁵ DRA Op. Br., p. 18; Tr., Jt. Vol, 7, p. 651 (Zurcher/PG&E).

³⁶ PG&E Op. Br., p. 48.

specifications; and (2) PG&E failed to ensure that the several-years-old pipe that was being used for Segment 180 was properly reconditioned and inspected before installation.³⁷ These errors created an extremely unsafe condition in a residential neighborhood that directly violated Section 451's clear requirement that utilities "shall furnish and maintain such adequate, efficient, just and reasonable . . . equipment and facilities . . . as are necessary to promote the safety . . . of its patrons, employees, and the public." PG&E had ample notice in 1956 that it would violate Section 451 by failing to confirm the specifications of installed pipe and by allowing defective pipe to go into service, and PG&E cannot credibly argue to the contrary.

PG&E's apparent strategy in its opening brief was to attempt to divert attention from these obvious violations through careful parsing of the allegations against it.³⁸ This analysis epitomizes failing to see the forest for the trees, and the Commission must not lost sight of the big picture: PG&E committed egregious errors that put the public safety at risk for 54 years.

2. Post-Installation Pressure Test of Segment 180

a. The ASME B31 Standards Established Minimum Safety Standards That Operators Needed to Satisfy In Order to Meet Their Section 451 Obligations

PG&E's opening brief does not dispute that the company viewed the ASME B31.1.8 standards – including those relating to post-installation pressure tests -- as establishing reasonable safety practices in 1956. Accordingly, the Commission should not hesitate to find that the ASME standards established minimum standards that PG&E was required to meet in order to operate safe gas pipeline facilities as required by Section 451.

³⁷ TURN Op. Br., pp. 9-12.

³⁸ TURN expects that CPSD will address the various errors in Section V.A.1 (pp. 48-57) of PG&E's Opening Brief.

Based on PG&E's opening brief in I.11-02-016, TURN expects PG&E to argue that, until the Commission implemented GO 112 in 1961, the ASME standards were not legally enforceable under Section 451. This argument is another desperate attempt by PG&E to neuter Section 451. The statute obligated PG&E to furnish and maintain safe gas facilities in 1956, and PG&E acknowledges that ASME set accepted standards for safety. It follows that PG&E was obligated to meet those standards, as the minimum safety requirements of the time. The fact that, in GO 112, the Commission adopted much of the 1958 ASME standards – albeit with modifications that imposed additional and stricter requirements³⁹ -- does not make the ASME standards legally irrelevant prior to 1961. As shown in Section III.A.3 above, Section 451 and GO 112 have always been complementary efforts to safeguard pipeline safety in California.

Accordingly, in 1956, by virtue of the 1955 ASME safety standards enforced by Section 451, PG&E was obligated to perform a post-installation pressure test⁴⁰ and to document such test for the life of the pipeline.⁴¹

**b. Dr. Caligiuri's Analysis Does Not Support the Conclusion
PG&E Hydrotested Segment 180 in 1956**

PG&E claims that the record supports the conclusion that PG&E performed a post-installation hydro test on Segment 180 based on the testimony of a former PG&E employee, the purchase order for certain materials, and the analysis of burst pressures performed by Dr.

³⁹ GO 112, Sections 101-107, 201-215, 301-303 and 401-402 all established additional or stricter requirements than ASME B31.1.8-1958. Thus, contrary to PG&E's claim in I.11-02-016, GO 112 did not simply incorporate the prevailing ASME standards.

⁴⁰ ASME B31.1.8-1955, Section 841.41.

⁴¹ ASME B31.1.8-1955, Section 841.417.

Caligiuri.⁴² As this section will show, Dr. Caligiuri's analysis is not credible and should not be accepted by the Commission.⁴³

Dr. Caligiuri's analysis starts with the NTSB's finding that there was a ductile tear on pup 1 which grew to rupture through fatigue crack growth.⁴⁴ The NTSB Report did not identify the cause of the ductile tear. Dr. Caligiuri's analysis is predicated on the assumption that the ductile tear required a "single-loading event" that exceeded normal pipeline operating pressure.⁴⁵

Dr. Caligiuri conducted a burst pressure analysis and concluded that an initial hydro test at 500 to 560 psi would have caused the ductile tear on pup 1 without rupturing the pipe.⁴⁶ Dr. Caligiuri emphasized his view that there is no other explanation for the ductile tear on pup 1, and claimed that the NTSB staff has found his explanation "credible."⁴⁷

But Dr. Caligiuri's burst pressure analysis conflicts with the results of the NTSB burst pressure analysis that used a more appropriate methodology. That analysis showed that pup 3 could not have withstood pressure above 430 psig. And Dr. Caligiuri's own cyclic fatigue analysis shows that fatigue crack growth occurred in less than a decade. Either the intentional pressure spiking in 2003 or any other pressure excursion, which cannot be identified due to PG&E's lack of pressure history data, could have caused the ductile tearing and resulted in rupture within a much shorter period of time.

⁴² PG&E Opening Brief, p. 53. Dr. Caligiuri is an outside expert in materials science and mechanical engineering. Dr. Caligiuri's firm, Exponent, charged PG&E \$495/hour for his work and had billed for approximately 150-200 hours of work. 12 RT 1160-1161.

⁴³ TURN anticipates that CPSD will rebut the other aspects of PG&E's contention.

⁴⁴ PG&E Opening Brief, p. 54.

⁴⁵ Exh. PG&E-1, p. 3-14:9-12 (Caligiuri/PG&E).

⁴⁶ PG&E Opening Brief, p. 54; Exh. PG&E-1, p. 3-14:7-9 (Caligiuri/PG&E).

⁴⁷ 12 RT 1165-66. When pressed, Dr. Caligiuri explained that unidentified NTSB staff, present on a phone call arranged by PG&E, informally found his explanation "credible." There is no formal or written confirmation of this from NTSB. The Commission should give no weight to this unsubstantiated hearsay regarding informal staff opinions expressed on a phone call.

The Commission should find that: (1) Dr. Caligiuri's analysis does not support a finding that a hydrotest was performed in 1956 and (2) PG&E violated § 451 by failing to conduct a pre-service hydrotest on Segment 180 pursuant to industry standards adopted in 1955 in ASME B31.1.8.⁴⁸

i. Dr. Caligiuri Misrepresents the NTSB Burst Pressure Analysis and Uses the Incorrect Method to Calculate the Burst Pressure of Pups 1, 2 and 3

Dr. Caligiuri's conclusions rest on the calculation of the "burst pressure" of the defective pups, the internal pipe pressure which would cause the metal to rupture.⁴⁹ Dr. Caligiuri concludes that an initial hydrotest at 500 or even 560 psi would have been sufficient to cause the ductile tear but *not high enough* to cause any of the defective pups to rupture.

Dr. Caligiuri used the ASME B31G analysis for "the remaining strength of corroded pipelines,"⁵⁰ and thus calculated a minimum burst pressures of 487 psi for the weakest pup 3.⁵¹

The NTSB used two different methods to calculate the burst pressure – the B31G method for determining the remaining strength of corroded pipe, and the API 579 method for determining the propagation of a crack-like defect.⁵² The NTSB found that the API 579 method produced lower results and showed that pup 3 could have ruptured at any pressure above 430 psi.⁵³ The NTSB also explained that this pressure was probably too high, since the analyses did not take into account the angular misalignment of the metal weld in pup 1. Such angular

⁴⁸ See, CPSD Opening Brief, Appendix C, p. 1.

⁴⁹ Exh. PG&E-1, p. 3-12:21, (Caligiuri/PG&E).

⁵⁰ See, Exh. CPSD-9 (NTSB Report), p. 49. The title of ASME document B31G is "Manual for Determining the Remaining Strength of Corroded Pipelines."

⁵¹ Exh. PG&E-1, p. 3-12:21 to 3-13:22, (Caligiuri/PG&E).

⁵² Exh. CPSD-9, NTSB Report, p. 49.

⁵³ Exh. CPSD-9, NTSB Report, p. 49.

misalignment would have concentrated the force of any internal pressure and resulted in rupture at a lower pressure.⁵⁴

Dr. Caligiuri claims, however, that the lower pressures calculated using API 579 are too conservative because there was no “sharp tip crack” present in the ductile tear that would result in the propagation of a crack-like defect.⁵⁵ Dr. Caligiuri claims that the NTSB considered the API 579 analysis to be “overly conservative and a worst-case scenario,”⁵⁶ and from this concludes that that B31G analysis is more accurate.

The Commission should find that Dr. Caligiuri’s explanation lacks credibility because Dr. Caligiuri misinterpreted the NTSB analyses and conclusions. During cross examination concerning the NTSB’s findings in the Materials Laboratory Study Report No. 11-057, Dr. Caligiuri explained that, in step 2 of the modeling process, the NTSB assumed an “infinite longitudinal crack” and called this assumption “an overly conservative worst-case scenario.”⁵⁷ From this, Dr. Caligiuri incorrectly concludes that the resulting burst pressure calculation performed in step 3 of the analysis is “overly conservative” in the NTSB’s own opinion.⁵⁸

Dr. Caligiuri’s characterization of the NTSB conclusions ignores the fact that the NTSB used *two different* crack geometries in step 2 of the analysis to back calculate the fracture toughness. The NTSB used the “overly conservative” assumption of an “infinite crack” to calculate “an upper bound estimate of the K_{IC} ,” which resulted in a K_{IC} estimate of 96.6.⁵⁹ But

⁵⁴ Exh. CPSD-9, NTSB Report, p. 49.

⁵⁵ 12 RT 1124:18-28 and 1125:16-28, Caligiuri/PG&E.

⁵⁶ 12 RT 1140:5-16, Caligiuri/PG&E.

⁵⁷ 12 RT 1142:10-28, Caligiuri/PG&E. See, NTSB Report 11-057, p. 3. If this NTSB Report is not in the record in this proceeding, TURN hereby requests that the Commission take official notice of the NTSB Materials Laboratory Study Report No. 11-057, dated May 19, 2011, and available at <http://dms.nts.gov/pubdms/search/document.cfm?docID=351269&docketID=49896&mkey=77250>.

⁵⁸ 12 RT 1142:20-1143:9, Caligiuri/PG&E.

⁵⁹ NTSB 11-057, p. 5.

the NTSB likewise used a second assumption of “an elliptical crack” to calculate a much lower K_{IC} estimate of 41.0.⁶⁰ This lower value corresponded to the “lower bound fracture toughness” and was the value that the NTSB used to calculate the actual burst pressures of 430 psig for pup 3 and 515 psig for pup 1.⁶¹ In other words, the NTSB actually used the lower K_{IC} results from the “elliptical crack” geometry to calculate burst pressures, and *did not rely* on the “infinite crack” results from step 2a to calculate the lower burst pressures in step 3. Dr. Caligiuri’s concern about the infinite crack assumption in step 2a is thus unwarranted.

In his oral testimony, Dr. Caligiuri claimed that step 3 was “overly conservative,”⁶² but that claim is a misinterpretation of the NTSB Report. The “worst-case” assumption from the NTSB’s perspective was one that produced “an upper bound estimate of K_{IC} , as the crack at the initiation site was 2.4 inch in length and not of infinite length.”⁶³ An “infinite crack” would produce a higher burst pressure since there would be no “notch” point to concentrate stress. In reality, any finite crack results in a stress concentration and a lower burst pressure. It appears that the NTSB viewed “worst-case” as one producing a higher burst pressure than would actually cause the pipe to rupture, while Dr. Caligiuri assumed “worst-case” meant a lower burst pressure than would cause the pipe to rupture.⁶⁴

The API 579 calculation is clearly more appropriate, irrespective of whether one characterizes the seam weld defect as a “sharp-tipped crack,” a “crack-like notch” or just a “notch-like indication.”⁶⁵ B31G is a method designed to evaluate the burst pressure of pipe

⁶⁰ NTSB 11-057, p. 6.

⁶¹ NTSB 11-057, p. 6.

⁶² 12 RT 1142:10-28 (Caligiuri/PG&E).

⁶³ NTSB 11-057, p. 4.

⁶⁴ 12 RT 1147:18-27 (“So it is a lower bound, but it’s an unrealistic overly conservative worst case scenario lower bound.”)

⁶⁵ See, for example, 12 RT 1144:15-21, 1148:16-18, 1149:5-12 (Caligiuri/PG&E).

whose metal thickness was reduced, generally by corrosion, and it in no way considers the impact of crack-like defects in the metal.⁶⁶ Any crack-like defect causes stresses to concentrate at a notch, thus significantly weakening the metal and resulting in lower burst pressures.⁶⁷ Indeed, the NTSB implies that the 430 psig burst pressure calculated with API 579 may still be too high because it “does not account for weld misalignment effects.”⁶⁸ The actual burst pressure could be even lower.

A burst pressure of 430 psig would mean that a ductile tear could have been caused by any pressure increase in Segment 180 above 391 psig.⁶⁹ We know that the pressure during the spiking event of 2003 exceeded this amount. The ductile tear could have been caused by the intentional pressure spiking, or by any other pressure excursion that is not documented in PG&E’s records, which go back only to the year 2000.

ii. Dr. Caligiuri’s Own Analysis Shows that Cyclic Fatigue Would Have Caused a Rupture in Less than a Decade

Dr. Caligiuri’s conclusion assumes that an initial hydrotest caused the ductile tear, and that cyclic fatigue resulted in the growth of the ductile tear until rupture. Dr. Caligiuri claimed in his written testimony that cyclic fatigue would have taken “decades” and likely required “the entire 54-year life” of the pipeline to grow to failure.⁷⁰

⁶⁶ 12 RT 1124:12-20, Caligiuri/PG&E. TURN requests that the Commission take official notice of page 1 of B31G-2009, which specifies in Section 1.3 that the document “does not apply” to “crack-like defects or mechanical surface damage.”

⁶⁷ Exh. CPSD-9, NTSB Report, p. 49.

⁶⁸ NTSB 11-057, p. 6.

⁶⁹ Exh. PG&E-1, p. 3-14:4-5 (Caligiuri/PG&E). During cross examination, Dr. Caligiuri insisted that the ductile tear required pressures above 500 psig. But the 500 psig number results directly from his burst pressure calculations. Dr. Caligiuri explained in written testimony that the ductile tear could be produced by a pressure as low as 91% of the burst pressure. Thus, if pup 3 had a much lower burst pressure of 430 psig, the pressure necessary to produce the ductile tear would be only 391 psig.

⁷⁰ Exh. PG&E-1, pp. 3-15:26 and 3-17:2 (Caligiuri/PG&E).

However, the results of the cyclic fatigue analysis that Dr. Caligiuri performed using PG&E's actual pressure data from 2000-2010 on Line 132 contradict his written testimony, which did not rely on the analysis. During cross examination, Dr. Caligiuri acknowledged that the fatigue crack growth analysis showed that rupture would have occurred in "less than ten years" using actual Line 132 pressure data.⁷¹

Taken together, Dr. Caligiuri's burst pressure and cyclic fatigue analyses do not support the conclusion that the ductile tear was caused by a hydrotest conducted in 1956 and that slow cyclic fatigue resulted in rupture over fifty years later. Dr. Caligiuri claims that a pressure excursion of about 500 psi was needed to cause the ductile tear, but the NTSB analysis shows that pup 3 could have burst at pressures above 430 psig, and thus a pressure excursion of about 390 psi could have caused the ductile tear. The NTSB analyses show that a pressure of about 390 psig occurring any time up to and including 2003 could have created the ductile tear, and Dr. Caligiuri's analysis shows cyclic fatigue could have caused rupture seven years later. While this proceeding may not have uncovered the technical "truth" concerning the ductile tear and the role of cyclic fatigue, the Commission should find that the evidence does not support PG&E's defense that it conducted a hydrotest of Segment 180 after installation in 1956, particularly in light of PG&E's inability to produce supporting documentation. The Commission should also find that Dr. Caligiuri's burst pressure calculations rely on an inappropriate method and fail to demonstrate that the pups would have withstood an initial hydrotest conducted at a pressure above 500 psig.

⁷¹ 12 RT 1151:20-23, 1154:3-15, Caligiuri/PG&E.

c. In Any Event, PG&E's Inability to Document the Required Pressure Test Violates Section 451

Assuming for the sake of argument that PG&E actually conducted a pressure test on Segment 180 in 1956, as noted above, the ASME standards of the time also called for PG&E to retain documentation of the pressure test for the life of the pipeline. PG&E admits that it has no documentation of such a test.⁷² Failure to satisfy this accepted industry safety requirement is a violation of Section 451.⁷³

3. PG&E Operated Segment 180 at Pressures In Excess of the Safe Operating Pressure

As TURN pointed out in its opening brief, the 1955 ASME standards required PG&E to establish the MAOP for Segment 180 based on the lower of: (1) the design pressure of the weakest element, and (2) the pressure dictated by the pressure test divided by the appropriate factor for the class location.⁷⁴ The design pressure, in turn, is derived from a calculation based on the actual characteristics of the pipe in the ground. Had PG&E used accurate values for the weakest element of Segment 180, the design pressure should have been lower than 172 psig,⁷⁵ which is much less than the pressures of 375 psig (or higher) at which PG&E operated Line

⁷² PG&E Op. Br., p. 51 (admitting that records of a post-installation hydro test for Segment 180 have not been located).

⁷³ This is also a violation in I.11-02-016. The Commission may prefer to address this violation in that docket which is obviously more focused on recordkeeping issues. In addition, CPSD's brief in I.11-02-016 addresses the important issues related to the duration of this violation.

⁷⁴ TURN Op. Br., pp. 14-15.

⁷⁵ In its opening brief (p. 56), PG&E makes the patently false claim that, if the actual characteristics of the pup segments were used to calculate design pressure, the design pressure would be no lower than 400 psig. PG&E arrives at this incorrect conclusion by only correcting the value for SMYS and not correcting other values in the design pressure formula, such as seam weld (joint) factor, wall thickness, and class location. Mr. Harrison admitted, given the weld flaws, that a reduced joint factor would be appropriate in the proper calculation of Segment 180's design pressure. (Tr., Jt. Vol. 3, pp. 421-422). Regarding class location, the record shows that PG&E admitted that, because of the Crestmoor development that was then under construction, Segment 180 should have been treated as Class 3, not Class 2 as PG&E uses in its calculation. Ex. 5 (Stepanian Rebuttal), pp. 8-9; Tr., Jt. Vol. 4, pp. 520-522 (Harrison/PG&E).

132.⁷⁶ Accordingly, PG&E operated Segment 180 at pressures far above safe levels under the applicable requirements for establishing MAOP.

In its opening brief, PG&E contends that it is not “legitimate” to charge PG&E with a violation based on the actual characteristics of Segment 180 because such violations would be based on knowledge “no one had in 1956.”⁷⁷ This argument is striking for the abdication of responsibility it reflects. PG&E treats its ignorance of the actual characteristics of Segment 180 as some sort of *fait accompli* over which it had no control. In fact, PG&E’s ignorance was because, at a fundamental level, PG&E did not fulfill its safety obligations. PG&E had the ultimate responsibility to know the characteristics of the pipe it was installing and PG&E is responsible for the consequences of its failure to do so. It is deeply disturbing that PG&E finds it appropriate to argue for such a constrained view of corporate responsibility.

B. PG&E’s Integrity Management Program

1. PG&E Relied on Inaccurate Data in Violation of Integrity Management Requirements

a. PG&E Failed to Take Adequate Steps to Ensure the Accuracy of the GIS Data on Which Its Integrity Management Program Depended

Focusing just on pipeline related to the San Bruno accident, the National Transportation Safety Board found that PG&E’s GIS included “many obvious errors in key pipeline parameters, including but not limited to seam type, SMYS, and depth of cover.”⁷⁸ PG&E’s opening brief does not challenge these findings, but rather seeks to portray such errors as business as usual. To counter the CPSD allegation that PG&E failed to verify the accuracy of the GIS data upon which

⁷⁶ TURN Op. Br., p. 15

⁷⁷ PG&E Op. Br., p. 56.

⁷⁸ Ex. CPSD-9 (NTSB Accident Report), p. 108.

its integrity management program relied, PG&E claims it was entitled to “accept the accuracy of preexisting pipeline data collections,” including its GIS.⁷⁹

Once again, PG&E sets a disturbingly low bar for itself. The data in PG&E’s GIS was transferred from its original job files to GIS in a two-step process: (1) a transfer from the job files to pipeline survey sheets and (2) a later transfer from the pipeline survey sheets to GIS.⁸⁰ Both steps were an opportunity to introduce errors, unless with each transfer of data, PG&E implemented quality control procedures to detect and correct mistakes.⁸¹ Unfortunately, the record⁸² shows PG&E is unaware of any quality control effort with respect to the first step and has no written documentation of any quality control effort regarding the second step.⁸³ Under these circumstances, merely accepting the accuracy of data that lacked the requisite quality control shows a disregard both for data quality and for the importance of reliable data to a sound integrity management program.

PG&E relies heavily on the opinion of its witness Mr. Zurcher to the effect that it was “common industry practice” to accept the accuracy of preexisting data.⁸⁴ However, Mr. Zurcher completely undermined the probative value of this opinion when he acknowledged two important facts: (1) that the accuracy of PG&E’s two-step data transfer from its job files to its GIS

⁷⁹ PG&E Op. Br., p. 70.

⁸⁰ Tr., Jt. Vol. 7, p. 657 (Zurcher/PG&E).

⁸¹ Tr., Jt. Vol. 7, pp. 657-658 (Zurcher/PG&E).

⁸² Because the written and oral testimony of PG&E’s witness Cowsert-Chapman is not in the record of this proceeding, I.11-02-016 has a more complete record regarding PG&E’s inability to document reliable quality control measures.

⁸³ Tr., Jt. Vol. 7, pp. 674-675 (Zurcher/PG&E). Mr. Zurcher was PG&E’s witness in this case regarding how data came to populate PG&E GIS database and the accuracy of that GIS data. As noted in the previous footnote, Ms. Cowsert-Chapman addressed this issue in more detail (highlighting PG&E’s lack of credible evidence of any quality control process for either step), making the record on this issue clearer in I.11-02-016.

⁸⁴ PG&E Op. Br., p. 70.

database depended on whatever quality control processes PG&E used;⁸⁵ (2) he made no effort to ascertain whether PG&E used any quality control process for either step;⁸⁶ and (3) lacking such efforts, he had formed no opinion of how PG&E's quality control efforts compared to industry norms.⁸⁷ Thus, Mr. Zurcher lacked the necessary information to render an informed opinion whether PG&E had a reasonable basis to conclude that its GIS data were accurate and whether PG&E had followed accepted industry practice regarding quality control for transfer of data. In other words, Mr. Zurcher was offering a strongly pro-PG&E opinion without having sought or considered highly relevant facts. In this regard, Mr. Zurcher's testimony on GIS errors was consistent with the rest of his biased and unreliable testimony, as shown in Section IV.A above.

b. PG&E's GIS Errors Led to Errors in Threat Identification

Through distortion of the record, PG&E attempts to suggest that its failure to verify the accuracy of its GIS data had no impact on its integrity management analysis. In particular, PG&E suggests that it would correct any initial integrity management errors resulting from inaccurate GIS data when it reviewed other non-GIS data in subsequent steps of the integrity management analysis.⁸⁸ The record does not support this contention.

PG&E acknowledged that it used GIS data for the first step of the integrity management process, threat identification.⁸⁹ At hearing, when PG&E's witness Ms. Keas was asked whether

⁸⁵ Tr. Jt. Vol. 7, p. 658 (Zurcher/PG&E)

⁸⁶ Ex. Jt. 29 (TURN cross exhibit – PG&E response to TURN Data Request 2-21, admitting that Mr. Zurcher had not reviewed PG&E's operating practices regarding quality control for either step of the data transfer and had formed no opinion of how PG&E's quality control efforts compared to industry norms). Before Mr. Zurcher was reminded about this data request response, he gave oral testimony that directly conflicted with it, in which Mr. Zurcher claimed that he had indeed asked whether PG&E engaged a quality control process for the transfer of data in step two from pipeline survey sheets to GIS. (Tr., Jt. Vol. 7, p. 674.) He later admitted that his data request response was correct. (Tr., Jt. Vol. 7, p. 675.)

⁸⁷ Ex. Joint 29 (PG&E response to TURN Data Request 2-21); Tr. Jt. Vol. 7, p. 675 (Zurcher/PG&E).

⁸⁸ PG&E Op. Br., pp. 63-64.

⁸⁹ Tr. Jt. Vol. 11, p. 1157 (Keas/PG&E).

inaccurate GIS data could cause PG&E to fail to identify threats that would be identified if the data were accurate, she responded, “Honestly, I would have to answer yes . . .”⁹⁰ She further admitted that, if no threat were identified for a particular segment, then PG&E would take no action on that segment in that integrity management cycle.⁹¹ In other words, a GIS error that prevented a threat (say a manufacturing threat) from being identified on a particular segment would also prevent that threat from being assessed or otherwise addressed.

Even if such a segment were identified with another threat (say an external corrosion threat), the additional non-GIS records that might be consulted in order to assess that corrosion threat would be focused on corrosion and not the unidentified (because of the GIS error) manufacturing threat.⁹² As a result, there is no guarantee that, even in this situation, PG&E would catch its GIS error and properly assess the manufacturing threat on the segment.

Segment 180 is a good case in point. Even though Segment 180, like all segments in PG&E’s system, was identified as having an external corrosion threat,⁹³ PG&E’s records search and assessment for that threat did not disclose the serious GIS errors that failed to reflect the existence of the pup segments⁹⁴ or even the erroneous GIS record showing that Segment 180 used seamless pipe.⁹⁵

⁹⁰ Tr. Jt. Vol. 11, p. 1167 (Keas/PG&E).

⁹¹ Tr. Jt. Vol. 11, pp. 1161, 1230 (Keas/PG&E)

⁹² Ms. Keas testified that the data gathering from other sources in the “pre-assessment” step would be focused on confirming the information that was used to identify the threat and determining the proper assessment tool. (Tr. Jt. Vol. 11, p. 1177 (Keas/PG&E)). As shown in ASME B31.8S, Appendix A, the data that would be gathered and reviewed differs according to the identified threat. For example, the data required to assess an external corrosion threat (Section A1.2) does not include data about manufacturing process, seam type, joint factor, and operating history, as would be required to assess an identified manufacturing threat (Section A4.2).

⁹³ Tr. Jt. Vol. 11, p. 1178 (Keas/PG&E).

⁹⁴ Tr. Jt. Vol. 11, pp. 1233-1234 (Keas/PG&E); Ex. CPSD-9 (NTSB Report), p. 61.

⁹⁵ Ex. CPSD-1 (CPSD Report), p. 65; Ex. CPSD-9 (NTSB Report), p. 61.

In sum, while PG&E may like to think that its GIS errors did not compromise its integrity management analysis, the record shows that, in fact, GIS errors fundamentally undermined the reliability of PG&E's integrity management results.

2. PG&E Violated the Data Integration and Threat Identification Requirements of the Integrity Management Regulations

The CPSD Opening Brief summarizes how PG&E's integrity management program violated the requirements for data gathering and integration in Part 192.917(b) and associated Section 4 of ASME B31.8S, and also the requirements for identifying all threats as stated in Part 192.917(a) and associated Section 2.2 of AMSE B31.8S.⁹⁶ As summarized in the opening briefs of TURN⁹⁷ and CCSF,⁹⁸ if PG&E had considered the relevant evidence concerning weld defects and leaks on both Line 132 as well as similar pipe (Lines 101 and 109) in its system, PG&E should have considered Segment 180 to have had an unstable seam threat which warranted assessment via hydrotesting or in-line inspection.

a. PG&E Violated Part 192.917(b) by Not Properly Integrating Relevant Data Concerning Leaks and Weld Defects

In its opening brief, PG&E first argues that Section A4.2 of Appendix A of ASME B31.8S did not require PG&E "to review leak records for purposes of determining the potential for a manufacturing threat" so that its failure to identify leak records does not constitute a violation.⁹⁹ PG&E concludes that "leak records are only tangentially-related to the manufacturing threat identification process."¹⁰⁰

⁹⁶ CPSD Opening Brief, pp. 41-43 and 43-47.

⁹⁷ See, TURN Opening Brief, Sec. V.B.1 and V.B.4.a, pp. 16-18 and 23-25.

⁹⁸ See, CCSF Opening Brief, Sec. V.B.2-3, p. 17-32.

⁹⁹ PG&E Opening Brief, p. 81-82. See, also, Exh. PG&E-1, p. 4-14:13-20, Keas.

¹⁰⁰ PG&E Opening Brief, p. 81-82.

PG&E’s argument inappropriately relies on a narrow interpretation of just one portion – Section A4.2 - of the B31.8S Appendix A. Section A4.2 of Appendix A is not the complete listing of data gathering and integration requirements. To the contrary, Section 4.2.1 of the main portion of B31.8S specifically identifies “leak/failure history” as one of the data sets that should be evaluated by the operator as part of a prescriptive integrity management program.¹⁰¹ Moreover, Part 192.917(b) of the federal regulations specifies that Appendix A of ASME B31.8S provides the “minimum” data that the operator should gather and evaluate. PG&E ignores the mandate under Section 912.917(b) to “gather and integrate” all data “that could be relevant to the covered segment.” PG&E’s conclusion that the regulations did not require review of leak records is myopic, and this defense typifies PG&E’s willful blindness to its historical shortcomings.

b. PG&E Should Have Identified an Unstable Seam Threat After Integrating All Available Data

PG&E also argues that, even if it had considered relevant evidence concerning pipeline characteristics and historical seam problems, it would still not have identified the DSAW pipeline on Line 132 to have any unstable seam defects.¹⁰² However, the evidence shows that PG&E violated the requirements of Part 192.917(a) by not properly classifying Segment 180 as containing an unstable manufacturing threat.

In particular, PG&E argues that the 1989 TES Report concerning the 1988 leak on Line 132 would not have caused it to conclude that any manufacturing threats were unstable.¹⁰³ PG&E claims that pinhole leaks in DSAW pipe represent routine manufacturing imperfections and do

¹⁰¹ Exh. Jt.-28, p. 9.

¹⁰² PG&E Opening Brief, p. 82-89.

¹⁰³ PG&E Opening Brief, p. 82-84. A portion of this section of the original brief was struck pursuant to ALJ Ruling.

not “signal the presence of unstable manufacturing defects.”¹⁰⁴ PG&E contends that the following conclusory sentence in the report warrants ignoring the leak data: “With the leak removed, the remaining pipe should be fully operational again.”

PG&E reads more into this sentence than is warranted. The key point of the TES Report was that the underlying seam welds were “of low quality” and contained a variety of defects.¹⁰⁵ It is not actually clear whether the conclusion quoted by PG&E refers to just the “section” of Line 132 that was removed for testing, or to some other portion of the “Bunker Hill” transmission line portion of Line 132. Regardless, the quoted sentence does not at all negate the more extensive conclusions regarding the “pre-service defects” caused by poor manufacturing welding of the pipe joint.

Similarly, PG&E argues that there was no evidence to suggest that DSAW pipe in general was prone to long seam cracks.¹⁰⁶ However, PG&E again interprets too narrowly the evidence from the *Integrity of Vintage Pipelines* Report, especially when combined (i.e. “integrated”) with other data specific to PG&E’s system. The *Vintage Pipelines* Report shows that Consolidated Western pipeline manufactured in 1947, 1950 and 1954-56 did have seam weld incidents.¹⁰⁷ And, as explained in detail by CCSF, there were sufficient internal reports concerning weld defects and leaks on Lines 101, 109 and 132 that PG&E should have more thoroughly assessed the danger of seam defects on these lines.¹⁰⁸

It may well be the case that none of single specific items of data taken individually would have warranted concern about a seam threat on Segment 180, or on other DSAW pipeline on

¹⁰⁴ PG&E Opening Brief, p. 83.

¹⁰⁵ PG&E Opening Brief, p. 82. See, also, Exh. PG&E-7, Tab 4-16.

¹⁰⁶ PG&E Opening Brief, p. 87-89.

¹⁰⁷ Exh. Jt-49, Table E-6, p. E-7.

¹⁰⁸ See, CCSF Opening Brief, p. 27-31.

PG&E's system. However, it is precisely the purpose of the data gathering and integration requirements of Part 192.917 that an operator consider *all* the "relevant" data in order to properly identify potential threats on a pipeline. The intent is that the operator be conservative with threat identification so as to select the proper assessment method. Only through proper assessment can the operator conclusively determine whether a threat requires remediation or not.

PG&E repeatedly failed to consider relevant leak and weld defect data in its threat identification process. The fact that it did not consider Segment 180, or really almost any segment at all on its system, as having unstable seam defects led to the erroneous and tragic decision to rely on ECDA as the primary assessment method.

3. PG&E Should Have Evaluated the Cyclic Fatigue Threat on Pipelines with No Post-Installation Hydrotests

PG&E argues that industry data supported the assumption that cyclic fatigue was not a threat for natural gas pipelines, and that in any case an analysis of PG&E's pipelines would not have identified Line 132 as susceptible to cyclic fatigue.¹⁰⁹

PG&E's analysis in this section relies primarily on the work of Dr. Kiefner. There is a consistent thread running through this portion of PG&E's brief – cyclic fatigue was not a threat *as long as* the pipeline was subject to a pre-service strength test:

“The conclusion of this 2004 paper was that a natural gas pipeline that experienced a pre-service hydrostatic test to at least 1.39 times the maximum operating pressure of the pipeline would not be expected to experience failure from cyclic fatigue over the course of its useful life.”¹¹⁰

¹⁰⁹ PG&E Opening Brief, pp. 74-81.

¹¹⁰ PG&E Opening Brief, p. 75.

The 2007 findings supported those of Dr. Kiefner's 2004 paper – pipe subjected to pre-service strength tests would not be expected to fail from cyclic fatigue within the useful life of the pipeline.¹¹¹

As Dr. Kiefner explained, this baseline can take several forms, one of which is the knowledge that pipe was procured pursuant to an API manufacturing specification, which requires a mill test of specific magnitude.¹¹²

Such a mill test, while of short duration, is considered in Dr. Kiefner's 2007 study as sufficient to ensure that any remaining manufacturing defects would be too small to fail at the maximum operating pressure.¹¹³

As discussed below, there is evidence in the record disputing PG&E's claim that cycling fatigue is not relevant for pipelines subject to a pre-service strength test. However, even if one assumes for the moment that cyclic fatigue is not a threat for most natural gas pipelines that have been subject to a pre-service strength test, the evidence shows that PG&E should not have relied on very short duration mill tests, as opposed to actual post-installation hydrotests, to conclude there was no threat from cyclic fatigue.¹¹⁴

As explained in TURN's Opening Brief,¹¹⁵ a mill test does not provide any assurance that *post-installation* metal defects are stable. Such post-installation defects include “transportation fatigue” caused by contact between loaded pipe and the rail car or other pipe during rail transport.¹¹⁶ Similar fatigue defects could be caused during storage and reconditioning of pipeline. PG&E acknowledges that the pipeline installed in 1956 was purchased for other projects in 1948, 1949, and 1953.¹¹⁷ PG&E lacks records concerning pipe reconditioning

¹¹¹ PG&E Opening Brief, p. 75.

¹¹² PG&E Opening Brief, p. 77.

¹¹³ PG&E Opening Brief, p. 80.

¹¹⁴ PG&E cannot rely on the benefits of an initial hydrotest in cases where it lacks any records of such tests being conducted.

¹¹⁵ TURN Opening Brief, Section V.B.4.e, p. 28-31.

¹¹⁶ Exh. Jt-49, p. E-9.

¹¹⁷ Exh. PG&E-1, p. 2-3:18-19.

work,¹¹⁸ so we do not know the details concerning the procedures and mechanisms of pipe transportation, storage or reconditioning during the 1940's and 1950's.

Moreover, as cogently explained in the opening brief of CCSF,¹¹⁹ PG&E had evidence to consider that cyclic fatigue might be a threat on its system. PG&E lacked any pressure data prior to 2000, and it did not consistently track over-pressurizations prior to 2008. When Kiefner and Associates performed cyclic fatigue analyses of PG&E's peninsula pipelines using pressure data from 2000-2010, it found that some segments had actually passed the expected time to failure.¹²⁰ Tragically, cyclic fatigue was a more important issue for PG&E's pipeline system than PG&E generally assumed.

4. PG&E Violated 49 CFR 192.917(e)(3) and PUC Section 451 by Intentionally Pressure Spiking Pipelines in Order to Evade Requirements to Hydrotest Pipelines

TURN agrees with CPSD that PG&E violated integrity management regulations by not conducting hydrotesting of pipelines it had intentionally "spiked" above the pipeline MAOP. TURN also explained in its Opening Brief that this practice of intentional "pressure spiking" affected over 415 miles of pipeline and is grounds for additional disallowances of PSEP costs due to imprudence.¹²¹

PG&E, on the other hand, argues in its Opening Brief that: a) it did not violate § 192.917(e)(3) because it did not "identify" Line 132 as being within an HCA until after the pressure spiking, and b) the intentional "pressure excursion" did not constitute an "operating pressure increase" under the regulations. The Commission should not condone PG&E's technical

¹¹⁸ See, TURN Opening Brief, p. 12 (citing to 4 Jt. RT 465:17 – 466:2).

¹¹⁹ See, CCSF Opening Brief, p. 33-39.

¹²⁰ See, CCSF Opening Brief, p. 35, 37.

¹²¹ See, TURN Opening Brief Sections V.B.3 and VI.A.

excuses to justify a deliberate and long-term policy meant to evade the requirements of the law. PG&E not only violated 49 CFR 192.917(e)(3) in the case of Segment 180, but its large-scale spiking policy violated Section 451 by engaging in a practice that jeopardized safety purely for the purpose of avoiding legal requirements.

The relevant Part 192.917 of the federal Integrity Management Regulations states in full:

(e) *Actions to address particular threats.* If an operator identifies any of the following threats, the operator must take the following actions to address the threat.

(3) *Manufacturing and construction defects.* If an operator identifies the threat of manufacturing and construction defects (including seam defects) in the covered segment, an operator must analyze the covered segment to determine the risk of failure from these defects. The analysis must consider the results of prior assessments on the covered segment. **An operator may consider manufacturing and construction related defects to be stable defects if the operating pressure on the covered segment has not increased over the maximum operating pressure experienced during the five years preceding identification of the high consequence area.** If any of the following changes occur in the covered segment, an operator must prioritize the covered segment as a high risk segment for the baseline assessment or a subsequent reassessment.

(i) **Operating pressure increases** above the maximum operating pressure experienced during the preceding five years;

(ii) MAOP increases; or

(iii) The stresses leading to cyclic fatigue increase.¹²²

PG&E's technical arguments conflict with the letter of the law, and they certainly violate the spirit of the law. With respect to its second argument – that spiking did not constitute an illegal “operating pressure increase,” PG&E quotes from the preamble to the regulations and from the testimony of Mr. Zurcher to argue that the term “operating pressure” denotes some long-term “normal operating pressure” that is distinct from the MAOP, and that “the fact that

¹²² 49 C.F.R. 192.917(e)(3) (emphasis added).

you had an excursion above the operating pressure or above MAOP does not kick in the need for an assessment for the manufacturing threat.”¹²³

Mr. Zurcher’s interpretation of the term “operating pressure” has no basis in the federal regulations, and, in fact, conflicts with terms as defined in the regulations and interpreted by PHMSA. The regulations define the term “maximum *actual* operating pressure” as the maximum pressure that occurs “during normal operations over a period of one year.”¹²⁴ This meaning appears to be exactly the meaning that Mr. Zurcher imputes to the term “operating pressure.” But Section 192.917(e)(3) specifically uses the term “operating pressure,” not “maximum actual operating pressure.” The Commission should not construe Part 192.917(e)(3) as imputing a different meaning to the term “operating pressure” given that the regulations specifically did not use the defined term “maximum actual operating pressure.”¹²⁵ And indeed, the PHMSA explains that Part 192.917(e)(3) applies to any “operating pressure, *including abnormal operating conditions*, which exceed the maximum operating pressure experienced during the five years preceding identification of the HCA.”¹²⁶ Thus, PHMSA specifically views an “abnormal” pressure condition, which would include a short-term pressure excursion, as included within the meaning of the term “operating pressure” as used in Part 192.917(e)(3). Mr. Zurcher’s *ex post* rationalization that Part 192.917(e)(3) refers only to a “normal operating pressure” is completely inconsistent with PHMSA’s own guidance.

¹²³ PG&E Opening Brief, p. 91 (quoting from Zurcher, Jt. RT 749-50).

¹²⁴ 49 C.F.R. 192.3. The regulations also define “maximum allowable operating pressure (MAOP),” but there is no separate definition of “operating pressure.”

¹²⁵ When interpreting statutes, standard rules of construction dictate that a statutory definition of a term is controlling unless it creates an obvious incongruity, and that every word should be construed so as to avoid rendering any language superfluous. Interpreting “operating pressure” to mean exactly the same as the defined term “maximum actual operating pressure” would violate these rules of statutory interpretation. See, for example, Congressional Research Service, “Statutory Interpretation: General Principles and Recent Trends,” August 31, 2008, pp. 5-6, 12-13.

¹²⁶ PHMSA, FAQ-220, available at <http://primis.phmsa.dot.gov/gasimp/faqs.htm>

PG&E's first argument - that it did not actually "identify" Line 132 as being within an HCA prior to the pressure spiking, is equally contrived. As quoted above, Part 192.917(e)(3) states that a pressure excursion above the maximum pressure experienced "during the five years preceding identification of the high consequence area" requires the operator to consider an identified manufacturing threat as unstable. PG&E's argument is based on the technicality that it filed the Baseline Assessment Plan, which included an identification of all HCAs, in December 2004, *after* the pressure spiking of December 2003.

PG&E claims that it "identified" the HCA only upon filing the BAP in 2004, and thus the pressure spike of December 2003 did not exceed the five-year maximum operating pressure "preceding identification." This explanation ignores the practical reality that PG&E had already effectively "identified" its HCA locations well in advance of "filing" the BAP on December 2004. PG&E did not rebut the factual explanation offered by CPSD that showed that PG&E had already identified the Segments 180 and 181 as contained within an HCA prior to December 2003.¹²⁷

Most importantly, as TURN emphasized in its opening brief,¹²⁸ the Commission should in no way condone these technical defenses due to PG&E's "dirty hands." The increases in pressure on Line 132 were not representative of some "transient pressure excursion," as characterized by Mr. Zurcher. Rather, PG&E spiked multiple pipelines at least fifteen times over the course of seven years with the single purpose of avoiding the possible need to hydrotest pipelines. PG&E spiked pipelines more than 20 pounds above the historical maximum actual operating pressure.¹²⁹ PG&E's goal for pressure spiking was simply to avoid the hassle and cost

¹²⁷ Exh. CPSD-1, p. 43.

¹²⁸ TURN Opening Brief, Section V.B.3.c., p. 21-23.

¹²⁹ Exh. CPSD-1, p. 45.

of hydrotesting, a clear violation of Section 192.917(e)(3) . Even if the Commission does not reach this conclusion, it should find that PG&E’s deliberate increase of pressures to avoid the consequences of federal integrity management regulations violated PG&E’s duty under Section 451 to provide safe utility service. The Commission should not countenance this deliberate attempt to evade the public safety protections in the federal regulations.

C. Recordkeeping Violations

As indicated in its opening brief, TURN continues to believe that PG&E’s recordkeeping violations are best addressed in I.11-02-016 in which there is a more complete record on these issues.

D. PG&E’s SCADA System and the Milpitas Terminal

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E. PG&E’s Emergency Response

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F. PG&E’s Safety Culture and Financial Priorities

1. The Evidence Shows that a Significant Portion of the GT&S Overearnings During 1999-2010 Supported Higher Than Authorized Corporate Profits for the Entire Utility in 2004-2010

The opening briefs of CPSD and PG&E concerning PG&E’s safety culture and financial priorities contain a long explanation of the disagreements underlying the testimonies of Mr. Harpster and Mr. O’Loughlin concerning the estimation of the “imputed adopted amounts” for O&M spending and capital spending included in the various settlements and decisions spanning the “Gas Accord” rate case period from 1997-2010.

While PG&E's underspending of its authorized revenue requirements is disputed, what is *undisputed* is that PG&E's net revenues from its gas transmission and storage business line were significantly higher than needed to earn the authorized rate of return, resulting in average annual overearnings of more than 200 basis points from 1999-2010, so that PG&E's GT&S profits were higher than authorized by \$430 million.¹³⁰ Focusing just on the period 2004-2010, which is most relevant for the entire company, PG&E's excess profits from GT&S were \$247 million.¹³¹

PG&E claims that the mere fact that this line of business generated consistently higher earnings than authorized "does not provide a basis for the Commission to conclude that PG&E emphasized profits over safety or acted improperly in any way."¹³² PG&E argues that the Commission must look to the company's overall returns, since the utility could have used GT&S profits for work in other areas. PG&E then claims that there is "no evidence that PG&E used 'surplus' GT&S revenues for anything other than utility operations."¹³³ PG&E is wrong in this regard. There is undisputed evidence that a significant portion of these excess GT&S profits benefitted shareholders and management.

The record evidence demonstrates that PG&E as a whole overearned in 2004-2010.¹³⁴ TURN showed that PG&E overearned an average of 24 basis points per year in 2004-2010; while PG&E concedes that it overearned an average of 40 basis points per year during a similar time period.¹³⁵ Given that PG&E's annual earnings in 2005-2010 were approximately one billion

¹³⁰ PG&E Opening Brief, p. 138.

¹³¹ Exh. CPSD-168, p. 5-2, Table 5-2 (summing just the actuals for 2004-2010).

¹³² PG&E Opening Brief, p. 140.

¹³³ PG&E Opening Brief, p. 144.

¹³⁴ TURN calculated an average overearning for 2004-2010 of 24 basis points. *See* TURN Opening Brief, p. 33.

¹³⁵ PG&E Opening Brief, p. 143. PG&E concedes that "focusing only on the most recent years (after the energy crisis and PG&E's bankruptcy), the utility's average return of 11.7% was only slightly higher than the average authorized rate of 11.3%." In other proceedings (such as cost of capital), the utilities do not

dollars per year, and given that its authorized ROE was above 10%, a rough conservative estimate is that each basis point was equivalent to about \$1 million in earnings per year in this time period.¹³⁶ Thus, PG&E as a whole overearned between at least \$170 and \$280 million in total during 2004-2010.¹³⁷ This figure is remarkably close to the \$247 in GT&S overearnings during 2004-2010, meaning that almost all of the excess revenues during this time period ended up in the pockets of PG&E shareholders.

PG&E notes that corporate returns were *on average* much lower than authorized during the entire time period 1999-2010. But the comparison of total returns for 1999-2010 is misleading, since the 2000-2003 time period included PG&E's bankruptcy and subsequent bankruptcy settlement, which resulted in a huge artificial decrease in actual ROE. This decrease was caused by wholesale energy prices and was not related to normal operational costs and revenues.¹³⁸ PG&E itself recognizes this fact, since, as detailed above, it concedes that annual returns exceeded authorized ROEs during the period after bankruptcy.

Moreover, as detailed in the Overland Audit Report and discussed in TURN's opening brief,¹³⁹ it is not possible to conclude that the rest of the money went just for "utility operations,"

tend to characterize a 40-basis point difference as "slight." PG&E did not more specifically identify the exact time period used to obtain this annual overearning of 40 basis points.

¹³⁶ Actual earnings depend on rate base, but the \$1 million per basis point figure is a reasonable conservative estimate for the time period 2004-2010. See, for example, D.12-12-034, p. 3, fn. 4 (a 10-basis point change in ROE for PG&E results in a \$17 million change in revenue requirement); See, also, D.07-12-049, p. 2 (a 10-basis point change in ROE for SCE in 2008 results in a \$9.6 million revenue requirement change).

¹³⁷ Using TURN's figures, 24 basis points per year in 2004-2010 results in \$168 million. The \$280 million figure is calculated assuming PG&E's 40 basis point number applied for the seven years 2004-2010 (40*7=280).

¹³⁸ For example, ROE was -65.85% in 2000 and 19.28% in 2001. Exh. PG&E-10, p. 80 (O'Laughlin/PG&E).

¹³⁹ See, TURN Opening Brief, p. 33.

as claimed by PG&E, unless one includes lavish management incentive bonuses and “business transformation” expenses as part of utility operations.

The Commission should find, at a minimum, that a significant portion of the overearnings from GT&S in 2004-2010 were used to boost shareholder profits during this time period.

2. The Record Shows, Based on PG&E’s Own Admissions, that Management Was More Concerned About Profits than Safety

The Overland Audit Report (Exhibit CPSD-168) documented numerous instances where PG&E cut or deferred projects to reduce costs.¹⁴⁰ PG&E’s defense is that the Overland Report “does not identify any specific work whose alleged cancellation or deferral for budget reasons raised safety concerns.”¹⁴¹

It is true that the Overland Report did not conduct an engineering evaluation to determine whether any single PG&E decision to cut or defer projects resulted in reduced safety. However, the Overland Report contains excerpts of several internal PG&E documents that voice a consistent theme of cost cutting, as illustrated by the following quotes from such internal documents:

For Integrity Management, low 2008 funding drove many pigging projects (higher cost) to be changed to ECDA projects (at a lower cost). While ECDA is an approved method of inspection, it provides a much less thorough evaluation of the pipeline via statistical methods rather than by direct inspection. Gas Engineering would strongly prefer to smart pig PG&E’s higher stress pipelines to obtain a much better initial evaluation of the line, but that is not financially viable at current funding rates.¹⁴²

Changes since 2007: Integrity Management accounting rule driving higher mandated program costs combined with 95% of imputed settlement budget has

¹⁴⁰ See, TURN Opening Brief, p. 34-35 for a short summary of these projects.

¹⁴¹ PG&E Opening Brief, p. 145.

¹⁴² Exh. CPSD-168, p. 7-8 (quoting from a 2008 Gas Transmission Expense Program Review document).

reduced reliability (BX) project funding by \$5 million, leaving many high priority reliability projects underfunded/postponed.¹⁴³

As expected we got saddled with a very low 2009 budget. What was unexpected as how low it was; basically equivalent to 2008. Below [is a list of] the IM projects planned for 2009. I am meeting with [the Vice President, Gas Transmission & Distribution] to discuss what can be reduced to make ends meet. I realize you have already significantly scrubbed this list, but I must ask again if there are any reductions that can be made while maintaining compliance. Maintaining compliance needs to be broadened to now include deferring some projects a year or more while still maintaining feasibility to meet the goals in December 2012. That is, if we can fall behind the 2012 pace a little and still retain feasibility to catch up, I ask you to consider that option when looking for reductions.¹⁴⁴

The reduced IM expense budget for 2009 was \$19.0 million.¹⁴⁵ In that same year, earnings from operations exceeded the target by 57%, resulting in a 30% increase in the Short Term Incentive Program (“STIP”) payments to management employees.¹⁴⁶ STIP payouts exceeded \$100 million.

Moreover, there is evidence that PG&E deferred at least one significant project – the planned replacement of a section of Line 132 just north of Segment 180 – due to cost cutting. As TURN explained in detail in its opening brief, PG&E’s claim that this project was deferred due to a change in priority ranking is inconsistent with PG&E’s own explanations submitted in the workpapers in the 2011 GT&S rate case.¹⁴⁷ Both TURN and CPSD provide cogent arguments in opening briefs in response to the extremely limited testimony of PG&E’s witness Martinelli on these issues.¹⁴⁸

¹⁴³ Exh. CPSD-168, p. 7-11 (quoting 2008 gas Transmission Expense Program Review document).

¹⁴⁴ Exh. CPSD-168, p. 8-3 (quoting email of 10/20/2008 from GT&S Expense Program Manager).

¹⁴⁵ *Id.*

¹⁴⁶ Exh. CPSD-3, p. 3.

¹⁴⁷ See, TURN Opening Brief, p. 35-37.

¹⁴⁸ See, TURN Opening Brief, p. 36-37; CPSD Opening Brief, p. 108-111.

In short, PG&E's arguments again rest on technicalities rather than substance. PG&E ignores the breadth of the evidence concerning management priorities during the time period 2004-2010. PG&E refuses to acknowledge that the overriding and consistent focus on earnings during this time period led to cost cutting and reprioritization of projects that, ultimately, rendered PG&E's transmission integrity management program worse than useless, and failed to identify threats on the pipeline system that should have been discovered through proper pigging or hydrotesting of the pipelines.

VI. OTHER ALLEGATIONS RAISED BY TESTIMONY OF TURN

PG&E chose not to address TURN's testimony either in its written testimony or opening brief. Accordingly, TURN's testimony is uncontested and should be accepted in full by the Commission.

VII. OTHER ALLEGATIONS RAISED BY TESTIMONY OF CCSF

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VIII. OTHER ALLEGATIONS RAISED BY TESTIMONY OF CITY OF SAN BRUNO

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IX. CONCLUSION

The record in this proceeding demonstrates numerous and serious PG&E violations of Section 451 and California and federal regulations. It also furnishes an important record of the deficiencies in PG&E pipeline safety that is highly relevant to current and future ratemaking. PG&E's opening brief relies on rejected and specious legal arguments that show disdain for the Commission's regulatory authority and for PG&E's responsibilities as a pipeline operator.

Date: April 25, 2013

Respectfully submitted,

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