California Public Utilities Commission

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INVESTIGATION REPORT OF THE JUNE 19, 2012 FATALITY AT THE KERN POWER PLANT OWNED BY PACIFIC GAS AND ELECTRIC COMPANY

PUBLIC REPORT

PREPARED BY THE SAFETY AND ENFORCEMENT DIVISION
ELECTRIC SAFETY AND RELIABILITY BRANCH

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Appendix A

1. Summary

On June 19, 2012, a contract worker was fatally injured while dismantling an unused fuel oil tank at the Kern Power Plant (Kern), located in Bakersfield, California. The plant is owned by the Pacific Gas and Electric Company (PG&E). The California Occupational Safety and Health Administration (Cal/OSHA) issued a stop-work notice, investigated the incident and cited PG&E's contractor for violations of Cal/OSHA standards. The Electric Safety and Reliability Branch (ESRB)[1] required PG&E to prepare and submit a root cause analysis.

ESRB investigated the incident. Regarding the conduct of PG&E, ESRB found that PG&E failed to actively exercise contractor oversight to optimize worker safety. ESRB found a number of deficiencies in PG&E's contractor selection and incident investigation processes that indicate a systemic failure to take a pro-active approach to safety issues, particularly those that involve contractors. A root cause analysis prepared by a PG&E consultant found similar opportunities to improve PG&E's contractor programs. PG&E provided ESRB with a plan to implement new programs and processes to improve contractor safety.

In mid-June 2013, PG&E demolished the remaining fuel oil tanks without further incident.

On August 3, 2013, prior to completion of this report, at least five members of the public were injured, one critically, during the scheduled implosion of the steam boilers. ESRB and Cal/OSHA are each actively investigating the incident. Immediately after the incident, ESRB directed PG&E to ensure the explosion site is clear of any remaining explosives, undetonated charges or other materials that could harm workers, state, local and private investigators and the public. ESRB further directed PG&E to conduct a comprehensive root cause analysis of the incident. ESRB's investigation of the August 3, 2013 incident continues and is not addressed in this report.

[1] ESRB is in the California Public Utilities Commission's Safety and Enforcement Division (SED), which was called the Consumer Protection and Safety Division prior to January 1, 2013.

2. Plant Description

Kern is located at 2401 Coffee Road in Bakersfield, Kern County, California. The plant operated from 1948 until PG&E closed the plant in 1985.

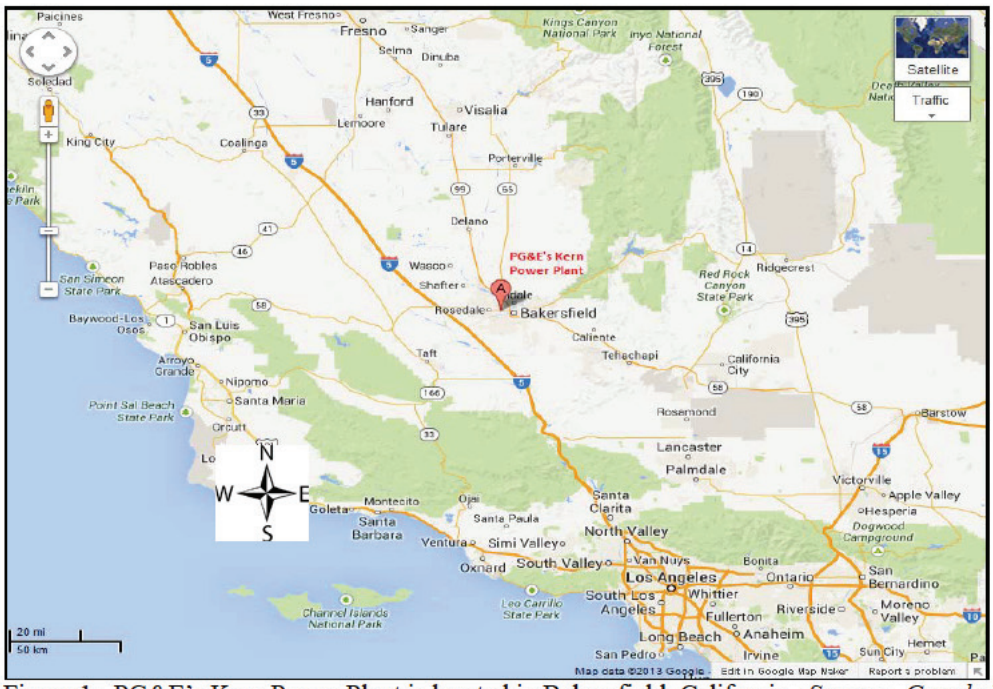

Figure 1: PG&E's Kern Power Plant is located in Bakersfield, California. *Source: Google Maps.*

The plant operated two main units to generate electricity. Turbine and boiler structures, four 140-foot tall exhaust stacks, several large cooling towers, and four fuel oil tanks were located on the site. PG&E has kept the adjacent substation active (Figures 2 and 3).

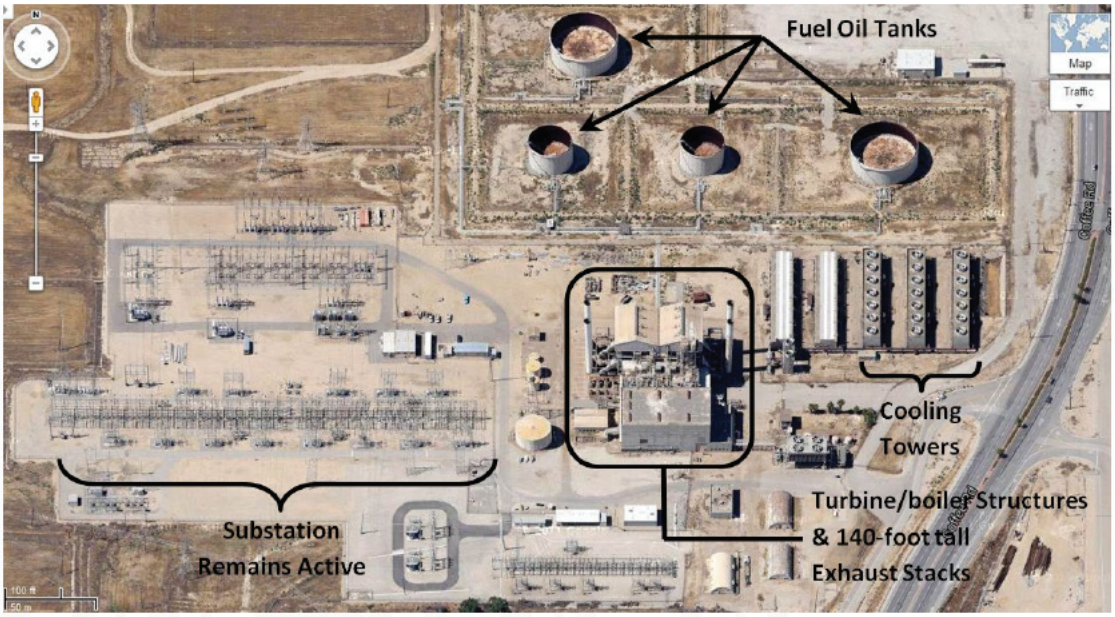

Figure 2: Aerial view of PG&E's Kern Power Plant. *Source: Google Maps*

Figure 3: Kern Power Plant as seen from Coffee Road. *Source: Google Maps.*

3. Incident Description

On Tuesday, June 19, 2012, at about 9:20 am, a worker was fatally injured while dismantling an unused fuel oil tank. The worker was employed by Cleveland Wrecking Company (Cleveland), a local subsidiary of URS Corporation (URS, formerly United Research Services), a much larger entity with projects worldwide.

PG&E hired Cleveland to demolish the retired power plant. The plant demolition included four unused tanks that once stored fuel oil burned to generate power. The tanks' lids floated with the fuel oil level in the tank.

An account of the incident from reports provided by PG&E is summarized below:

Cleveland assigned a four-man crew to dismantle the tanks: a field superintendent, one excavator operator, and two workers to operate cutting torches. The team had worked together on past projects, and utilized the method described below to demolish similar-sized tanks.

On June 18, 2012, workers torch-cut access openings into the side of each tank. The openings allowed the workers to go into the interior of the tanks to dismantle and remove the lids, which sat at the bottom of each tank.

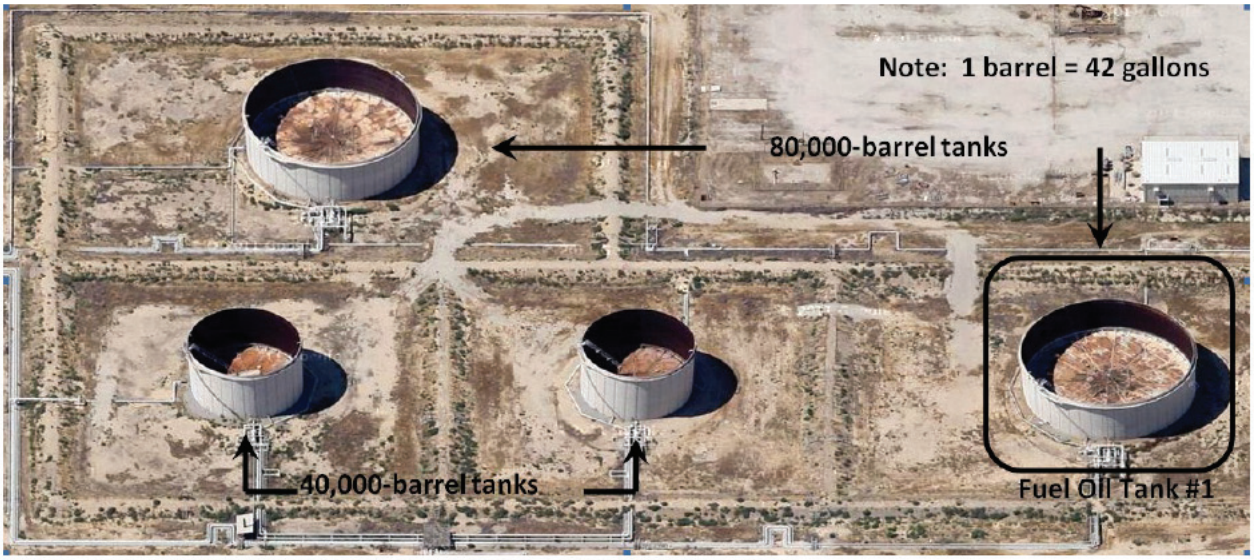

Figure 4: Fuel oil tank farm at Kern Power Plant. *Source: Google Maps.*

On the following day, workers began to demolish Fuel Oil Tank #1 (Figure 4). The 80,000-barrel tank was approximately 40 feet tall and 120 feet in diameter. From inside the tank, two workers stood on elevated man lifts to torch-cut the top half of the 40-feet-high tank wall in 20-feet-high sections. Once the workers finished a vertical section cut, a third worker in an excavator pushed the top wall section from outside the tank to fold it into the tank, reducing the tank section height by half (Figure 5).

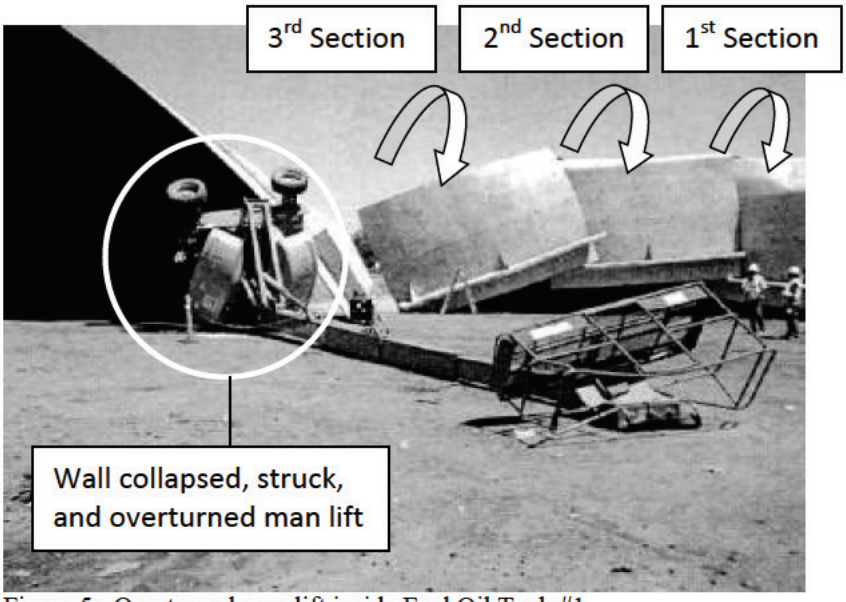

Figure 5: Overturned man lift inside Fuel Oil Tank #1.

The crew used this method to cut down three sections. On the fourth section, the superintendent stepped away and told the torch cutters to rest, expecting the crew would not resume work until his return. The crew resumed work before the superintendent returned. The torch cutter who sustained the fatal injuries made a vertical cut just above the rectangular tank access opening cut the previous day. The torch cutter signaled completion of the cut, and the excavator pushed in. But this time, not only did the newly cut section fold in, but the portion of the tank wall from which the section was

cut collapsed inward as well. The collapsing wall struck the man lift carrying the torch cutter. The lift overturned and fell to the ground. The other workers stopped the project immediately. An ambulance transported the worker to a local hospital. The worker did not survive the injuries.[2] PG&E reported the incident to ESRB on June 19, 2012, at 5:35 pm.[3]

4. ESRB Investigation

ESRB opened a safety incident investigation to (1) identify potential causal factors; (2) ensure that PG&E conducted a thorough root cause analysis; and (3) determine corrective actions that PG&E should take to reduce the risks and the likelihood of similar incidents in the future.

ESRB routinely requires generators and utilities to conduct a comprehensive root cause analysis as part of an incident investigation. A root cause analysis looks beyond the most obvious cause(s) to identify, analyze and prioritize the myriad of causal factors which lead to an incident. A thorough analysis of all causal factors ensures subsequent corrective actions target the specific problems.

On June 28, 2012, ESRB inspected the site and interviewed PG&E and Cleveland staff. Cal/OSHA had shut down tank #1 demolition shortly after the incident.

On June 29, 2012, ESRB sent PG&E the first in a series of written data requests. In the June 29 letter, ESRB directed PG&E to suspend tank demolition, and not begin boiler demolition until PG&E conducted a root cause analysis. ESRB followed up with a second data request on July 6, 2012. On July 25, 2012, ESRB requested the status of PG&E's response to ESRB's June 29 request.

On July 26, 2012, PG&E provided a Preliminary Incident Report from Cleveland, dated June 29, 2012, and Cleveland's demolition "Program Enhancement Plan," dated July 24, 2012.

On August 6, 2012, ESRB again requested the status of PG&E's response to ESRB's June 29 request. Initially, PG&E said that it would not conduct its own root cause analysis for this incident. ESRB staff met and teleconferenced with representatives of URS (Cleveland's parent company) and PG&E on August 22, 2012. ESRB met again with PG&E staff on August 29, 2012.
On October 5, 2012, ESRB sent a letter to PG&E which again requested a root cause analysis of the incident and corrective actions. On October 12, 2012, ESRB issued a third data request to PG&E. PG&E's November 2, 2012, response included a "Why-Tree RCA" diagram prepared by Cleveland and URS. The Why Tree diagram lacked the sufficient rigor, details and analysis of a comprehensive root cause analysis. In several places, it identified the actions of the deceased worker as primary causes of the incident.

On November 14, 2012, PG&E provided ESRB with a report prepared by Cleveland and URS. It was labeled a root cause analysis, and included an updated Demolition Program Enhancement Plan. PG&E also submitted an internal report which proposed corrective actions that PG&E said it would

[2] The fatally injured worker wore proper Personal Protective Equipment, including a safety harness. However, the protection would not have helped, because the entire lift overturned.

[3] Submitted electronically via utility reporting system on the Commission's website.

consider for its Contractor Safety Program Initiative.[4] PG&E referred to this report as PG&E's root cause analysis for the incident; however, the report was narrow in scope and did not contain a rigorous root cause analysis. PG&E also indicated that it would hire an independent consultant to assess PG&E's contractor oversight practices.

PG&E hired Bureau Veritas (BV) to conduct an independent root cause analysis of the incident. On March 17, 2013, PG&E sent ESRB the BV root cause analysis, dated February 6, 2013, as well as written comments prepared by URS. PG&E also submitted comments.

On June 7, 2013, ESRB lifted the stop-work order.

ESRB's investigation found multiple deficiencies in PG&E's processes that are contrary to PG&E's obligations under state Public Utilities Code Section 451.

[4] PG&E Procurement Process Review report, dated November 14, 2012.

5. Incident Causes

ESRB developed a list of potential causes, not to conduct a root cause analysis, but rather to identify areas a comprehensive root cause analysis could evaluate, including but not limited to:

Failure to:

- Research and apply industry best practices and standards.
- Evaluate reasonable, safer alternatives to workers manually torch-cutting unsupported, weakened tank walls from an elevated man lift.
- Verify stability of the tank floor.

Inadequate or lack of:

- Safety management and oversight.
- Risk assessment and hazard mitigation.
- Detailed work plans and review of work plans.
- Written procedures.
- Engineering and site control of the configuration, location and quality of the torch cuts.
- Controls to inhibit deviation from work plan or procedures.
- Communication between PG&E employees, PG&E and contractor, and contractor to workers.
- Training and qualification of safety personnel.
- Change management process.
- Technical and causal analysis training, as appropriate, for line workers, supervisors, managers, investigators and analysts.
- Rigorous contractor selection process.
- Project funding.

Also:

- Inadequate safety culture.
- Inaccurate contractor safety performance data entered in PG&E's contractor evaluation "scorecard."

BV identified a number of deficiencies and areas for improvement in PG&E's contractor safety management systems, although BV substantially restricted the root cause analysis to PG&E's procurement process. Among other findings,[5] BV found that PG&E did not adequately validate bidders' self-reported safety data, which resulted in an inaccurate assessment of the bidders.

[5] Rather than using terms "deficiency" or "finding," BV used terms such as: Proposed Observations, Potential Issues, Potentially Substandard Acts, and Possible Personal Factors.

6. PG&E Corrective Efforts

Although PG&E and URS disagreed with aspects of the BV root cause analysis, PG&E said it believed the report was constructive in suggesting process improvements for PG&E's consideration going forward.

ESRB required PG&E to explain how it planned to address the corrective actions recommended by BV (which are attached hereto as Appendix A).[6] On April 25, 2013, PG&E emailed to ESRB that its newly-developed contractor safety program would address almost all of BV's recommendations, and outlined its response specific to each recommendation.

The program included a guidance document to help PG&E Lines of Business develop a comprehensive contractor safety management program. According to PG&E, the new program will better track contractor safety performance and improve overall contractor safety.

PG&E proposed to hire specialists to validate and track contractor safety data. In March 2013, PG&E hired Pacific Industrial Contractor Screening (PICS). PICS will verify contractors' safety program data before awarding contracts. PG&E indicated that it will begin a pilot program in 2013 with safety data from 25 suppliers that support the Energy Supply, Gas Operations, and Electric Operations Lines of Business, and will expand the program in 2014.

In response to additional information requests from ESRB, PG&E provided copies of:

- PG&E's new 2013 Contractor Safety Guidance Document (received by ESRB on May 6, 2013); Cleveland's new "PG&E Safe Work Plan, Tanks – Tank Farm Area," dated May 15, 2013 (received by ERSB on May 16, 2013), and subsequently certified by Cleveland's engineer, dated May 24, 2013 (received by ESRB on May 28, 2013). PG&E characterized the new work plan as a significant change to the August 2012 revised tank work plan. The plan enlisted greater use of mechanical demolition in place of the former manual approach.
- Cleveland's Task Hazard Analyses, dated May 20, 2013, (received by ESRB on May 21, 2013), and referenced in the updated May 15, 2013, tank farm work plan.
- Photographs of the terrain around the tanks, received on June 4, 2013.

On June 7, 2013, ESRB removed its stop work order. Cleveland dismantled the fuel oil tanks during the week of June 17, 2013, without further incident.

[6] Bureau Veritas, "Root Cause Analysis of Fatal Injury at Kern Power Plant," February 6, 2013, page 29, Section 7.0, "Recommendations for Possible PGE Program and/or Management Systems Improvements."

7. ESRB Conclusions

7.1 PG&E failed to actively manage and oversee work performed by contractors, accept responsibility for work conducted on PG&E facilities, review contractor work plans, and ensure the safety of workers at the jobsite.

PG&E sought to transfer its oversight role and responsibilities to Cleveland through broad contract indemnification. Although a contract may specify safety expectations and requirements, the Commission and California courts have found that a regulated utility or power plant may not delegate safety responsibilities to a contractor.[7]

According to the BV report, the role and responsibilities of PG&E's onsite representative were not clearly defined, and Cleveland's site safety officer lacked formal training in safety management and risk assessment. BV recommended that PG&E evaluate such training. ESRB found no evidence that the contractor's onsite safety officer was involved with direct oversight of the tank demolition.

ESRB compared PG&E's demolitions at the Kern and Humboldt Bay power plants.[8] A work plan for the Humboldt Bay fuel oil tank demolition specified:

> "NOTE: Tank demolition will be completed entirely by mechanical methods. No unprotected workers will be in or near the area of demolition activities. Additionally, spotters will be placed outside the area of demolition activities to control unauthorized entry. At ground level, cut and downsize plate."

BV found the torch cutting method employed by Cleveland to be outdated and no longer an accepted industry best practice. BV based the finding on consultations with three independent experienced tank demolition practitioners. URS/Cleveland disputes BV's finding. Independent of the specific torch cutting practice, Cal/OSHA cited Cleveland for five safety violations. Cleveland contested the citations .[9]

Post-incident, PG&E approved Cleveland's revised tank demolition work plans based upon an engineer's stamp certifying the plans. PG&E provided no evidence that it questioned the plans, even though the previous plans were provided by the same contractor and certified by the same engineer. PG&E provided no evidence of efforts to research best practices or industry standards or to seek demolition experts to critique the adequacy of the new work plans. BV subsequently consulted experienced third parties to comment on the tank demolition work methods.

BV also found that Cleveland did not use the mechanical method to cut the tank that was in the Demolition Work Plan, and that PG&E failed to assess the contractor's revised approach for hazards, risks and necessary mitigations. In their respective comments to the BV report, PG&E and

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[7] Decision (D.) 00-06-038; D.04-04-065; Snyder v. Southern California Edison Company, 44 Cal.2d 793, 799-801 (1955).

[8] Humboldt Bay continues operations as a group of gas-fueled generators and former nuclear power generation facility.

[9] https://www.osha.gov/pls/imis/establishment.inspection_detail?id=314829680.

URS/Cleveland disputed that the demolition was inconsistent with the work plan. Regardless, ESRB found no evidence that PG&E conducted its own risk assessment of work plan documents.

And finally, in incident investigations, PG&E's Safety and Health Program (Utility Standard Practice (USP) 22) appears to emphasize reduced legal liability over risk assessment, lessons learned and mitigation of hazards (bolding is from the original document):

> **"The General Counsel has exclusive jurisdiction over investigations into all third party incidents or serious employee injuries or fatalities. The information obtained in these investigations is collected with the dominant purpose of communicating to company counsel in anticipation of, or during, litigation. The investigations, and any reports generated as part of the investigations, are intended to be privileged and confidential."** [10]

ESRB was unable to locate a PG&E unit with the responsibility and autonomy to diligently investigate incidents and the authority to implement effective corrective actions across PG&E Lines of Business.

7.2. PG&E failed to adequately evaluate and rank contractor qualifications, including the contractors' own safety data and programs.

PG&E's "Demolition RFP Evaluation Scorecard" (Scorecard) process to evaluate the five bidders for the Kern demolition contains several flaws.

- Cal/OSHA records indicate that Cleveland, the selected contractor, incurred five Cal/OSHA recordable injuries in 2011, while PG&E's Scorecard indicates zero 2011 YTD (Year to Date)[11] recordable injuries for Cleveland. Of the five bidders, Cleveland incurred the highest number of recordable injuries in 2010 and 2011. PG&E's review of its own form "Data Sheets, Commercial Technical and Pricing Information Submitted by Bidders" failed to catch that the Cleveland bid proposal apparently omitted both the required 2011 total hours worked and total recordable injuries, as each entry was inaccurately recorded as zero in the report, leading to an inaccurate assessment and ranking of Cleveland.

- The Scorecard's "Workers Compensation Experience Modification Factor" safety data rate utilized by PG&E inaccurately represented Cleveland, as the rates were apparently derived from the overall parent company, URS, and thereby diluted by the parent company's employment of over 50,000 employees.

- PG&E qualified and disqualified the bidders, based upon PG&E criteria and bidder safety data, as "Go" or "No Go." Due to the inaccurate safety assessment described above, Cleveland passed this safety evaluation. Unless PG&E disqualified a contractor for safety or

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[10] PG&E USP 22, I. Safety and Health Program Overview, A. Identify Hazards, 3. Incident Investigation. USP 22 serves as PG&E's legally required Injury and Illness Prevention Program.

[11] PG&E Kern Demolition Request for Proposal 5298 was dated December 8, 2011, with bidder proposals due January 5, 2012.

other reasons, price was the majority rating factor for selection, as PG&E based [redacted] of the total contractor score upon price. PG&E disqualified one bidder based upon safety factors. PG&E's Scorecard indicates that Cleveland's bid was [redacted] lower in price than the next closest bidder. Two other bidders were apparently nearly three times the cost of Cleveland.[12] Such price disparity should trigger PG&E to examine possible reasons for the disparity and ramifications on safety.

7.3 PG&E failed to conduct and submit a timely and comprehensive root cause analysis to ESRB.

Beginning the day following the initial site visit, and over subsequent months, ESRB issued multiple requests for a root cause analysis.[13] PG&E did not submit a root cause analysis to ESRB until almost nine months after the incident, which runs counter to PG&E's own investigation procedures[14] and delayed ESRB's analysis and completion of the investigation report. Further, the BV root cause analysis report that PG&E ultimately provided to ESRB on March 17, 2013, has several important shortcomings, which PG&E failed to note in its comments on the report.

First, the scope of the root cause analysis prepared by BV was inappropriately limited, focusing heavily on contractor selection. Thus, opportunities were missed to identify and fully analyze a substantial set of potential causes including those described in Section 5 of this report, such as inadequate project safety review and oversight by PG&E, lack of support for the weakened tank walls, or inadequate controls on torch cuts that allowed one tank wall to pull on another. A statement from the report may explain the limited focus. Apparently not aware that a regulated utility may not transfer safety responsibilities or liability by contract, BV states:

> "The contract between CWC [Cleveland] and PGE clearly states that CWC has full responsibility for the safety and safety oversight of any and all activities that take place on the site. Under these circumstances, PGE's ability to prevent an accident would largely be limited to their choice of contractor to perform the demolition."

The restriction in scope of the BV report therefore prevented BV from providing a comprehensive root cause analysis for this incident, which PG&E would need to identify a complete set of root causes and appropriate corrective actions.

Second, BV did not interview Cleveland employees, a significant limitation which PG&E failed to identify or discuss in its response submitted with the root cause analysis. In its response to the BV report, URS/Cleveland stated:

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[12] The highest cost Kern bidder was the same contractor that performed the Humboldt Bay demolition.

[13] ESRB correspondence to PG&E included a June 29, 2012, request; a July 25, 2012, status request; an August 6, 2012, status request; an October 5, 2012, request; and an October 12, 2012, request for PG&E incident investigation procedures.

[14] PG&E USP 22, Safety and Health Program, and PG&E Safety, Health, & Claims Procedure 202, Incident Notification, Investigation and Analysis Procedure.

> "… no interviews of CWC [Cleveland] employees occurred by BV or its subcontracted 'experts.' Rather, BV simply incorporates portions of the RCA [root cause analysis] CWC prepared verbatim without any attribution to that document."

Third, PG&E failed to adequately critique technical aspects of the root cause analysis report. A critical review is important to ensure a complete and accurate set of root causes are identified so that effective corrective actions may be implemented to prevent accidents.

The BV report discussed the position of the man lift, the orientation of the man lift wheels, and the location of the torch cut above the tank access opening as contributing factors to the incident, but failed to provide technical evidence to support an apparent implied assumption that changes to the orientation of the man lift, wheels, or location of the torch-cut would have prevented the incident. At the same time, the perception that orientation of the man lift and wheels is important to safety indicates a hazard that was inadequately managed. BV described wheel orientation as important in that the man lift would roll back if struck, with no discussion of hazard assessment or mitigation strategies, such as ensuring that the weakened tank walls were adequately supported and workers were clear of the area during hazardous operations. If the man lift's position, wheel orientation and torch-cut locations are indeed critical to safety, the written work plans should describe such hazards and appropriate pre-emptive protections, and workers should be formally trained on those safety concerns and certified by a safety officer in advance of the tank demolition.

In its comments, URS/Cleveland disputed many of the concerns raised by BV, and concluded that, "It was [the fatally injured worker's] independent actions which ultimately led to his untimely death."[15] However, such a narrow view that attributes the cause to a particular employee action is unlikely to identify additional causal factors and spur change to protect other employees.[16]

ESRB is likewise concerned that PG&E project managers might not have received adequate training to conduct or critically analyze root cause analyses. When ESRB reviewed PG&E's root cause analysis training records, it found no records to indicate that the PG&E staff that managed the Cleveland project received such training. If PG&E lacks a central unit to conduct incident investigations (as discussed in Section 7.1 above) and fails to train project managers and key field staff to conduct root cause analyses, other incident investigations will likely fail to identify and assess potential problems or optimize targeted corrective actions.

8. Recommendations

The ESRB investigation found that PG&E lacks an effective safety culture. An effective safety culture is a prerequisite for adequate hazard assessment and risk management to mitigate hazards and reduce the likelihood of incidents. ESRB is aware that PG&E is undertaking significant efforts to improve its

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[15] URS/Cleveland comments on Bureau Veritas Root Cause Analysis, page 4.

[16] "Not stopping at 'Procedure not followed'": http://www.thinkreliability.com/video/Proced-Not-Followed/Proced-Not-Followed-Part1-Aug-09.html "Prevention vs. Blame": http://www.thinkreliability.com/pdf/prevention-vs-blame-jan-2011.pdf

safety culture. The above conclusions highlight how those efforts have yet to be incorporated across all PG&E Lines of Business.

ESRB found a focus on reduction of liability at the expense of diligent risk assessment and mitigation of hazards. While ESRB provides recommendations to address several specific findings, PG&E must proactively identify opportunities to improve safety rather than seek to assign its own responsibility for safety to third parties or wait for ESRB to intervene to compel utility action.

PG&E should accelerate efforts to effectively prioritize safety as part of PG&E's corporate mission. Three key safety components: safety culture, hazard assessment and risk management, have not yet permeated the programs, processes and procedures examined by ESRB and discussed herein. For safety culture in particular, PG&E should consider adoption of a safety culture metric similar to that adopted by other organizations. PG&E may then use this metric to assess and trend the effectiveness of PG&E safety culture initiatives across different PG&E Lines of Business.[17]

Recommendations:

1. PG&E should submit to ESRB, and implement, a corrective action plan to address not only the recommendations below, but also the deficiencies described in the Conclusions, Section 7 of this report.

2. PG&E should accept and acknowledge responsibility for work activities performed on PG&E-owned and/or operated facilities, whether PG&E employees or contractors perform the work.

3. PG&E should change its procedures to encourage and support thorough investigations, routinize root cause analysis and implement effective corrective actions before directed to do so by ESRB or the CPUC.

4. PG&E should shift its safety approach from one where litigation risks impede data collection and dissemination. Abundant and accessible data is critical to risk assessment and mitigation activities.

5. PG&E should develop mechanisms to share safety incident data and lessons learned from root cause analyses and incident investigations across PG&E's Lines of Business.

6. PG&E should conduct a risk assessment of all work plans, including revisions, for hazards, risks and necessary mitigations. The PG&E staff or team selected to do this must be qualified to perform such work and should make use of experts as appropriate.

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[17] Safety culture metric examples:

- Contra Costa County Industrial Safety Ordinance: Safety Culture "Employee Perception Index" example, and Safety Culture Survey example: http://cchealth.org/hazmat/pdf/iso/attachment_e.pdf
- U.S. Navy: https://www.safetyclimatesurveys.org/mainpage.aspx

7. PG&E should require contractors to provide an onsite safety officer for significant projects, one that is formally trained in safety management and risk assessment to provide adequate oversight. PG&E should evaluate the training qualifications of those officers.

8. PG&E should provide a trained PG&E onsite safety officer, formally trained in safety management and risk assessment, to provide oversight for all significant projects.

9. PG&E should revise its contractor program to require that in the event of an incident, bidders agree to fully engage contractor staff in PG&E's root cause analysis efforts to identify improvements to PG&E contractor management and other programs to reduce the likelihood of similar incidents in the future.

10. PG&E should ensure that its employees receive adequate root cause analysis training to ensure implementation of an effective and comprehensive root cause analysis program, one that seeks to identify procedural or other changes to reduce safety risks. At minimum, PG&E should expand its root cause analysis training program to include all project management and safety staff. PG&E should also consider some level of training for front line staff who, because of their involvement in or knowledge of an incident, may contribute to the identification of improvements to reduce the likelihood of future incidents.

11. PG&E should implement any other corrective actions needed to respond to the BV root cause analysis findings and recommendations.[18]

[18] See Section 6 and Appendix A of this report.

Appendix A

Bureau Veritas Root Cause Analysis
Excerpts from Section 7.0,
"Recommendations for Possible PGE Program And/Or Management Systems Improvements"

1. CONTRACTOR QUALIFICATION

PG&E's procurement process should examine disciplinary policies as part of contractors' safety qualification. In California a company's disciplinary policy should be found in the company's Injury – Illness Prevention Program.

2. CONTRACTOR QUALIFICATION

Procurement process should examine and put a high value on contractor's policies regarding prescription drugs and drug testing as part of contractors' safety qualification.

3. CONTRACTOR QUALIFICATION

The formal safety training and safety certifications of contractors' proposed site safety officers should be evaluated before they are accepted in that role during the bid process.

4. CHANGE MANAGEMENT

When significant changes in the work methods agreed upon during the bidding process are proposed, there should be a risk assessment conducted on the proposed new process including a discussion of additional hazards and risks, necessary mitigation, and potential costs.

5. CONTRACTOR QUALIFICATION

The role and responsibilities of any PG&E on-site representative should be clearly defined in writing and communicated to all on-site and project staff and contractors. In future similar projects, the qualifications of candidates performing that role should be carefully evaluated, especially as it pertains to any assigned safety responsibilities.

6. TRAINING and LEARNING FROM EVENTS

To maximize and capture learnings from events to foster continuous improvement in the training of future site representatives there should be a written record of the takeaway lessons learned during projects.

7. CONTRACTOR QUALIFICATION

Procurement should consider employing a 3rd party specializing in assessing contractors' safety programs and validating/tracking/ contractors' safety and insurance data.

8. LEARNING FROM EVENTS

Future tank demolition should follow the agreed upon contract language and use mechanical means avoiding the use of manual labor whenever possible.