

A Decade Since San Bruno: Major Problems in Managing and Regulating Infrastructure Safety

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GAS SAFETY RETROSPECTIVE: A DECADE SINCE SAN BRUNO

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Premise

For a number of years, and certainly since the San Bruno explosion, California has been conducting a natural experiment in critical infrastructure safety.

Our safety promotion and regulatory approach has in effect tested for the answer to a question: what level of infrastructure safety can be achieved by relying almost exclusively on retrospective fines and punishment for lapses in safety on the part of the utilities that own and manage the infrastructures.

I believe that by now we have abundant evidence of the answer: not a high enough level of safety to appropriately safeguard the citizens of the state.

The Current California Safety Regulatory System

Adversarial relationships predominate between the regulated utilities, the California Public Utilities Commission, the state legislature, the media and advocacy groups.

Retrospective after-accident blame-seeking and condemnation dominates the system as opposed to promotion of safety as a prospective, inter-organizational, research-based and potentially cooperative process

Careful forward-looking approaches to utility safety are overwhelmed by a search for fast resolutions and "solutions" to incidents and accidents -- in utility management, in law and in formal regulatory proceedings

In the search for these solutions blame and "corrections" are focused primarily on local and proximate causes of accidents and incidents, rather than on longer-term, systemic, or root causes.

The safety focus in management, regulation and law runs one accident or incident behind current conditions, challenges and operations in the infrastructures.

- The current California system is producing far less safety promotion and effective regulation than the level of dedication and commitment of its participants.
- Many of these participants -- in the utilities, the CPUC, and the legislature -- are deeply frustrated because they know they should be achieving better results.

Suggestions

- Consider the performance of the current California infrastructure safety system to be an important and urgent problem
- Worthy of a state-wide task force to more carefully understand safety deficiencies and their roots as well as a wider range of possible solutions?
 - Hear from people who have experienced the safety system from a variety of institutional perspectives
 - Their views of its strengths and weaknesses; their accomplishments and frustrations
 - Consider important safety functions and their potential placements
 - Asking important questions (What are we assuming? What are we not seeing?)
 - Safety research and analysis (A safety institute inside the CPUC?)
 - Regulation and rule-making (CPUC; Office of Energy Infrastructure Safety?)
 - Accident and incident investigation (CPUC; A Safety Board?; CCS&T?)
 - Inspections and enforcement of practices and compliance (CPUC; CEC)
 - Continuous safety improvement (Internal advocate?; Safety Board; CCS&T?)
- Find a home for research and regulation of inter-connected infrastructure risk

Critical Deficiencies Across Utilities and the CPUC Re: Safety Management

Elements in Safety Management Systems:

1. Safety Policy and Philosophy

- lack of clear and agreed-upon conceptions of “safety”
- "safety" is retrospectively defined and measured in intervals without accidents not prospectively understood through leading and not just lagging indicators
- lack of understanding of safety as “the continuous production of dynamic non-events” vs an interval of “failing to fail”
- currently the CPUC cannot distinguish between dynamic non-events and failing to fail among its regulated utilities
- safety is seen as following rules and procedures and regulatory compliance
 (“From my perspective if an organization is following the rules and in compliance that’s safety”)
- perceived conflicts between “reliability” and safety (“Reliability is about plant outputs, safety affects people.”)

SMS Deficiencies (2)

2. Risk Assessment and Risk Management

- safety is not simply the mitigation of risks – it also takes ongoing competence, attention and prevention apart from known risks
- risk assessments currently do not address organizational and management variables
- utilities and the CPUC do not have metrics for these variables
- risk assessments rarely assess interaction between specified risks nor interconnected risks across assets or infrastructures
- risk assessments do not adequately describe uncertainties in risk calculations (including the neglect of organizational and management conditions as risk precursors) and thus convey a false precision and possible errors in risk prioritization

SMS Deficiencies (3)

3. Safety Assurance

- Few safety management indicators exist in utilities to monitor effectiveness of current safety management systems or safety culture
- the CPUC does not require SMS indicators for utilities nor does it have any of its own metrics or indicators for assessing safety management or safety culture
- the CPUC workshops for safety metrics have focused narrowly on physical variables not organizational nor managerial variables
- the CPUC itself conducts no in-house research for regulatory metrics regarding safety management nor safety culture, nor does it conduct R&D workshops with its regulated utilities to encourage learning and improvement in SMS and safety culture in either the utilities or itself

SMS Deficiencies (4)

4. Safety Promotion

- Despite proclamations by utility officials, there significant evidence that safety management goals and practices do not penetrate down to all levels and across all units of the major utilities
- This is also true with respect to the CPUC's own efforts at developing its in-house SMS
- The CPUC has not been in a position to lead by example in the development of safety management systems, safety measures and leading indicators
- The CPUC is “awash in policies” that divert attention and resources from its regulation of safety in utility operations
- It has far too few inspectors, with far too little training, to appraise management weaknesses in the utilities nor assess the state of their safety culture.

Role of safety culture in safety and reliability outputs?

- a. Safety culture has only an indirect impact on outputs
- b. Safety culture is not a noun but an adverb: it refers to how things are done ("safely") in the process of producing outputs.
- c. Safety culture is a background condition that:
 - i. provides motivation for specific behaviors
 - ii. sets normative constraints on individual and collective decisions and actions
 - iii. stabilizes expectations about the behavior of others

Safety Culture Development as a Regulatory Dilemma

- We do not know systematically how to “grow” a safety culture within an organization.
- It takes time, persistent effort, adaptive behavior and continuous monitoring and correction to have an effective culture.
- A safety culture cannot be imposed by top-level executive orders in an organization. It must evolve and constantly adjust, correct and improve.
- A safety culture cannot be achieved on a pre-planned timetable. Acceptance, commitment and cultural development is not a fully predictable process.

Safety Culture (2)

- Both company executives and regulators should understand that they must commit to and be personally engaged “in a long and uncertain safety culture journey”. (National Academies of Sciences, Engineering, and Medicine 2016. *Strengthening the Safety Culture of the Offshore Oil and Gas Industry*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/23524>)
- Yet the CPUC has no way of following this process in its utilities on a continuing basis:
 - It has no metrics to monitor the process
 - It has no inspection force in size and training to continually follow this process
 - It must wait for lapses in safety connected to safety culture such as the Locate and Mark case to identify retrospectively the absence of progress in safety culture development or safety culture deterioration over time