BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Develop a Risk-Based Decision-Making Framework to Evaluate Safety and Reliability Improvements and Revise the General Rate Case Plan for Energy Utilities	R.13-11-006 (filed November 14, 2013)

JOHN LATHROP'S REPLY COMMENTS ON THE REFINED STRAW PROPOSAL

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John Lathrop (later first person, "I") provides these Reply Comments on the fifteen Opening Comments (dated May 12 and May 23, 2014) to the Refined Straw Proposal (RSP) included as Appendix A to the Administrative Law Judge's (ALJ's) April 17, 2014 Ruling in this docket to consider changes to the Rate Case Plan (RCP).

In brief, I have important reservations about the Straw Proposal for this OIR that I presented in the form of Redline insertions to that Straw Proposal, April 7, 2014. Many of those reservations were not addressed in the RSP. I had hoped they would be addressed by the set of fifteen Opening Comments. Some were addressed, but many were not. Consequently, I here present those unaddressed reservations, in the form of twelve challenges and corresponding recommendations. Every issue I raise here I previously raised in my presentation as a panelist at the March 19-21 Workshop concerning this OIR, and in my Redline to the Straw Proposal, though here I present them in more operational detail. Again, what I present here are only the reservations that have not been addressed in either the RSP or the fifteen Opening Comments, and recommendations corresponding to those unaddressed reservations.

I. Opening Orientation

To summarize a review of the Opening Comments: Many of them are quite astute, but all of them generally focus on details of process, timing, etc., rather than the substance of the analytic and communication/metric challenges we face in this OIR. While, yes, procedural details are necessary, I am afraid we are wandering in to an OIR process that will nudge us in an incremental direction where we focus on the trees without seeing the forest we are creating. A very real risk, then, is that we will realize fundamental weaknesses in the process too late in CY2014 for us to correct things and remain on the hoped-for timeline. It is for that reason that my Reply Comments, here, consist entirely of high-level reservations and issues, worded as challenges and recommendations. I could have bored us all with a detailed, paragraph-by-paragraph commentary on some of the Opening Comments, but that would not

serve us as well as the high-level comments I make in these Reply Comments. Frankly, we need to "get out ahead of the process" rather than let it unfold in a series of Comments. By "get out ahead" I mean we should address the challenges I list here, very soon.

While I mention details of process, the Opening Comments are typically lacking in the actual substance of what the analyses and analysis results will actually look like. That is understandable, since the analyses called for are frankly quite challenging, and it would be unreasonable to expect substantive progress on those analyses and analysis results by the Opening Comments deadline. But that is all the more reason for us to take this opportunity to discuss and settle on the requirements for those analyses and analysis results, as I have done in my comments here. Settling on those requirements will give the utilities targets to shoot for as they develop their analyses and analysis result formats. It will also make clear to all parties what issues are at stake, and what we want to require of the utilities. The words "require of the utilities" are ones I use as shorthand in my Challenge-Recommendation pairs below, but those words may be too strong. What should actually happen is a process of give and take, where the process specifies requirements, the utilities strive to meet those requirements, and find some of them unattainable, then adjustments are made. That is a natural pattern that has evolved in the field of systems engineering, the specification of requirements then compromises with reality. And that is the sort of thing we are about, here – a large systems engineering project.

An added complication in this project, and in fact what may turn out to be a driving issue, is the need for the utilities to mesh their analysis/reporting compliance with this OIR with their internal and existing external analysis/reporting practices. PG&E's Comments do a good job of describing those issues.

It is conceivable that there could be some push-back on some of the ideas I lay out here, arguing that my concepts of requirements are premature. I would argue that, quite the contrary, we need to get these requirements clarified now, rather than later. As one example, the various "Heat Maps" we see in some comments should be recognized as useful only for prioritizing risks, and not even for prioritizing risk mitigations, and certainly not for determining risk mitigation efficiency or the cost-benefit tradeoffs of alternative risk mitigation plans. The absence of clear and early requirements may allow any illusions of the usefulness of Heat Maps in this OIR to persist.

One more note: Many of the Opening Comments have many quite astute ideas and concepts. The fact that I do not mention them does not signal that I agree or disagree with them. Though I should say that the discussions of the Risk Lexicon are quite good, and I would look forward to participating in its refinement later.

So in sum, my Reply Comments here may come across to some as "out of step." I maintain that they are part of what is called for in this project at this stage -- certainly not a substitute for, but rather a complement to, the quite astute thinking to be found in the fifteen Opening Comments.

II. My Reply Comments, Worded as Twelve Challenge-Recommendation Pairs

We are setting up a quite challenging new procedure. The RSP leaves many issues, challenges and requirements unspecified that should be specified. While one could argue that it is better to leave those unspecified and let them be addressed in a sort of "rise out of the iterative process" manner as we proceed to develop this OIR, with all due respect I emphatically disagree. We all need to proceed with our eyes open to the challenges ahead, so each step in the process can be shaped to address those challenges. Though of course how we meet each of those challenges will be developed as we proceed, iteratively/incrementally, etc. I developed a long list of those challenges based on previous work, then screened out ones that were addressed in the RSP and the 15 Opening Comments.

So what remains, listed here, are challenges/issues that are unaddressed and should be explicitly addressed in future descriptions/specifications of the OIR process. The following discussion takes the form of Challenge-Recommendation pairs. The C-R pairs range over a wide range of scopes and scales. They are roughly ordered from strategic to tactical. Of necessity, there is some overlap and duplication among the pairs. In particular, some recommendations follow from more than one challenge. For clarity and focus, I have kept this discussion deliberately terse.

Challenges 1 - 3 cover overall challenges of the multi-party risk management system called for.
Challenges 4 - 6 cover challenges of communication of analysis results.
Challenges 7 - 12 cover challenges of analysis.

Challenge 1: Managing the complex, multi-party process of developing the risk management system sought by this OIR,

where:
1.) the utilities must develop new analyses and results reporting formats,
2.) the CPUC and all other stakeholders must be able to "process" those analysis results to achieve the risk management goals of this OIR,
3.) the analyses must be checked and vetted for methodological correctness and completeness.

Neither the utilities, the CPUC, nor all other stakeholders know what analyses etc. the utilities will be able to develop. The utilities do not have a clear idea of what is required of them to satisfy the CPUC and all other stakeholders.

Recommendation 1: Enforce a requirements-based approach, and a requirements-based checklist.

Appendix A presents a suggested requirements-based checklist. Many of those requirements are repeated or reflected in the following Challenge-Recommendation discussions.

Challenge 2: The need for assurance that the analyses meet standards of analysis quality.

The OIR calls for setting up a complex, multiparty risk management system. Even within each utility, the analysis needs for adequate and externally reviewable risk management are, frankly, daunting. The OIR effectively calls for all risks to be managed in a methodologically correct, transparent, third-party-reviewable way. That calls for standards of, and vetting for, analysis quality that is intrinsically fair and informed.

Recommendation 2: Enforce a Third Party Review of all analyses.

That Third Party must have the expertise called for. It must be external to the utilities. It will probably be best if it is not an organization within the CPUC, to maintain the necessary appearance and reality of impartiality, and to remove it from the normal quasi-adversarial relationship that may exist between the CPUC and the utilities. That third party review is vital to the process because risk management analyses involve wide ranges of assumptions, uncertainties, lack of data, and analytic complexity. Risk assessments (and risk management analyses) are not like voltmeters – their results are subject to those assumptions, uncertainties, etc. The net effect is that two risk management analyses, performed by two parties, may differ extremely in their results. Even if only one risk management analysis is performed, by an IOU, the CPUC cannot make the judgments required unless that one analysis has been vetted by a third party. In short, the CPUC cannot make the necessary judgments based on one or more risk management analyses unless all analyses are subject to third party review.

Part of that Third Party should take the form of an aggressive "Red Team," pro-actively probing the utilities with challenging questions about risk analysis completeness, data, assumptions, and calculations.

An additional benefit of that third party review is that it should include testing the models/analyses against broadly established (i.e., national, federal government, academic) standard analysis practices and rules. The Third Party should either perform, or insist that the utilities perform under its review, "VV&A," Verification, Validation and Accreditation. VV&A involves widely accepted standards at the national level. Standard citations include:

Department of Defense. Documentations of Verification, Validation, and Accreditation (VV&A) for Models and Simulations, MIL-STD-3022. 2008.

US Navy. Modeling and Simulation Verification, Validation, and Accreditation Implementation Handbook. Vol. 1, VV&A Framework.: Department of Defense; 2004.

US Navy. Modeling and Simulation Verification, Validation, and Accreditation Implementation Handbook, Vol. 2. VV&A: Adopt, Adapt & Improve. Department of Defense; 2006.

Department of Defense. The DOD Modeling and Simulation Master Plan as Authorized by DoD Directive 5000.59. 1994.

National Academy of Sciences. Assessing the reliability of complex models: Mathematical and statistical foundations of verification, validation, and uncertainty quantification. Washington DC: National Academy of Sciences, 2012.

Challenge 3. Fairness

The risk management system called for by the OIR must involve complex analyses. The utilities will have an extreme advantage in any analysis-based contention, since they have extreme advantages in terms of in-house analysis expertise, understanding of their (complex) risk-generating system, and native access to data. Some other stakeholders have admirable analytic expertise, but still cannot hope for a fair position in any contention with a utility regarding that utility's risk management analysis.

Recommendation 3. Enforce Third Party analytic support for non-utility stakeholders.

Operative words, here, are Third Party. The actual Third Party could be the same one called for in the Recommendation for Challenge 2. This Third Party also serves an important function in that it keeps the CPUC in its appropriate position to impartially balance competing contentions, rather than put the CPUC in the difficult position of balancing contentions where the different parties have quite different levels of supporting expertise.

Challenges 4 – 6: Challenges of Communication of Analysis Results

Challenge 4. To manage risk in a verifiably *efficient* way, specifically and transparently.

This challenge can only be met with an analysis and reporting structure that allows all stakeholders to question whether or not there are other risk mitigation sets that either offer the same risk reduction for lower cost or more risk reduction for the same costs.

Recommendation 4: Require that the utilities develop an analysis and reporting structure that:

- generates methodologically correct sums of risk reduction metrics summing across the different risk-reduction elements in its proposal, and does so in a way that:
- can be effectively reviewed by other stakeholders,
- allows for alternative suites of risk reduction elements to be proposed by other stakeholders and for those alternative suites to be assessed in a way consistent with the assessment of the utility's proposed suite or suites.

Yes, that is a daunting challenge. But it follows directly from the announced goals of the OIR. If in fact the utilities want to argue that that requirement cannot be met, then that is a discussion we should be having now, not several months later in CY2014.

Challenge 4 and other challenges below point out a key advantage of this Challenge-Recommendation structure and the Requirements spelled out in the Appendix: It forces a discussion early in the OIR process. I find, in fact, an air of unreality in current discussions, where there seems to be an expectation that the OIR will result in a process of meeting the risk management goals of efficiency (and more, as listed below), but without any appreciation for the corresponding analysis challenges.

Challenge 5. To support policy judgments *trading off risk vs. cost-burden*, specifically and transparently.

This challenge can only be met with an analysis and reporting structure that allows all stakeholders to pose and evaluate (or accept a utility's posed and evaluated) mitigation suites alternative to the proposed suite, all of them found to be efficient, such as one at higher risk-reduction and cost, and one at lower risk-reduction and cost, so that a CPUC-moderated all-stakeholder discussion can determine whether or not the proposed mitigation suite represents an appropriate risk – cost-burden pair.

Recommendation 5: (The same as Recommendation 4, "Require that the utilities develop an analysis and reporting structure that etc.")

If the requirement of Recommendation 4 is met, then the challenge of supporting policy judgments trading off risk vs. cost-burden can be met using the same analysis and reporting structure as called for to meet Challenge 4. There are some tactical matters that could be discussed here concerning the different procedures involved in meeting Challenge 4 vs. meeting Challenge 5, but as long as we get the tools in place specified by Recommendation 4, those procedures are straightforward and need not concern us at this point in the OIR.

Challenge 6. Account for uncertainty.

One of the Opening Comments highlighted the difficulties of evaluating observed risk reduction in the short term, given the uncertainties involved. More generally, essentially all of the analyses and reporting involved in meeting Challenges 5 and 7 through 12 must deal with the reality that all risk reductions will be quite quite uncertain. More completely, this challenge is to measure the uncertainties in risks, risk reductions, and costs, propagate those uncertainties through all the necessary calculations, then communicate them with error bars or particular statements, then manage taking those uncertainties into account. A full treatment of all that is beyond the scope of these Reply Comments. Suffice it to say that

there is an ample literature and expertise established to accomplish all of that. So the Recommendation is:

Recommendation 6. Require that the utilities employ all accepted methodologies to measure, propogate, and communicate uncertainty.

Note that this recommendation can be enforced using Recommendation 2. As with Recommendation 5, there are some tactical matters that could be discussed here concerning exactly how uncertainties are presented in CPUC proceedings, but as long as we get the tools in place specified by Recommendation 6, those procedures are straightforward and need not concern us at this point in the OIR.

Challenges 7 – 12: Challenges of Analysis

Challenge 7. Completeness.

A classic and fundamental problem in risk analysis and management is completeness: What about unanticipated risks? If a risk, accident scenario, failure mode, etc., is not "on the list" in the analysis, it is simply missed – until it happens. Shorthand is "Unanticipated Scenarios." In this context the challenge is to anticipate all possible ways losses could occur, and all possible ways to reduce the risks of those losses, then build those into the risk analyses. But it is widely recognized that humility is called for – it is simply impossible to account for all possible scenarios. The clearest way to approach this challenge is to present two separate recommendations:

Recommendation 7.1 Require that the utilities employ the three widely recognized strategies for addressing the risks of unanticipated scenarios:

- Inherently robust systems, such that failure of any one element has a natural "backup" to minimize consequences.
- Fail-Safe systems, such that if a system does fail, it fails into a damage-limiting state.
- Systems specifically for incident management and recovery, even from incidents "not on the list."

Full discussion of these strategies would take a book. Suffice it to say the utilities should be required to build all three strategies into their system design, and to systematically scan all of their systems for opportunities to better manage the risks of unanticipated scenarios using one or more of those three strategies.

Recommendation 7.2. Require that the utilities install and sustain systems to manage and learn from unanticipated risks and near misses.

Again, those systems are commonly known, and involve such mechanisms as After Action Reports, Lessons Learned, Corrective Actions, and Corrective Action Tracking, all four of those applied to both

unanticipated incidents and near misses. In most cases a special system needs to set up to detect, log and react to near misses.

Challenge 8. Conduct a balanced risk management of five different risk types: Routine Operational, Special Operational, Legacy Infrastructure, Emerging, Unanticipated.

Emerging-novel risks include cyber risks, climate change, renewables, etc. While current discussions focus on asset risks (i.e. legacy infrastructure), in fact the other risks are considerable and shouldnot be left out of the OIR. The other four risk types call for importantly different aspects of risk management and risk management analysis. While some could argue that the other risks could be deferred to future phases, we need to consider how those four other risk types should be addressed during this phase of the OIR.

Recommendation 8. Require that the utilities develop risk management systems that account for a balanced risk management approach to all five different risk types.

While it would be reasonable for the utilities to suggest a phased approach, phasing in the different risk types over a matter of years, that phased approach should be planned out and presented during the current OIR process.

Challenge 9. Account for Uncertainty. And Recommendation 9 (repeating Challenge 6 and Recommendation 6)

I repeat Challenge and Recommendation 6 here because the challenge manifests itself in both analysis and communication of analysis results.

Challenge 10. Pacing of surveys of legacy infrastructure.

This challenge is singled out, here, to make sure it is well addressed. The pacing needs to be explicitly considered, as it is represents a crucial tradeoff between cost per year and speed of risk reduction. A special analysis challenge is involved in that pacing analysis has to address the special problems of missing data and the general lack of data.

Recommendation 10. Require that the utilities systematically analyze alternative pacing strategies, and clearly present the considerations of choices among alternative pacing strategies.

That analysis includes prioritizing different parts of the legacy infrastructure, and challenging analysis to assess the speed of risk reduction resulting from different survey strategies and speeds.

Challenge 11. Specifically counter the distorting effect on utility incentives favoring capital-based risk reduction measures.

The intent of the OIR is to best manage societal risk. Utility incentives favoring capital-based risk reduction measures over operations/labor-based measures distort societal risk management off of optimum, and need to be specifically countered.

Recommendation 11. Require that the utilities explicitly demonstrate that their proposed risk mitigation sets in fact optimize societal risk reduction, in spite of their incentives.

Other stakeholders are more than welcome to challenge utility proposed risk mitigation sets on this issue. What is called for here is to for the utility to spell out explicitly how it addressed the distorting effect of its incentives, to provide informed grounds for that discussion.

Challenge 12. The difficulty of obtaining complete and unbiased data from Subject Matter Experts (SMEs).

Many of the analysis needs in this context will require judgments from Subject Matter Experts (SMEs). Yet there is a well establish literature (e.g. Tetlock's Expert Political Judgment, 2005) that SME assessments are rife with distortions, most prominently overconfidence in their estimates and failures to consider all eventualities.

Recommendation 12. Require the utilities to employ all of the current Best Practices in SME elicitation.

Those Best Practices include documentation such that other parties can meaningfully review the SME elicitations.

III. CONCLUSION

I am quite impressed the RSP and the fifteen Opening Comments. That said, I respectfully ask that the Commission address the twelve challenges and recommendations I have listed here.

Respectfully Submitted,

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Appendix A: A Requirements Based Checklist

The overall system we are dealing with, here, is the system of utilities, the CPUC, and all parties, as a system that generates risks, manages those risks, incurs those risks and pays for that risk management. That is a complex system. So in this section, we adopt the classic systems engineering perspective. As applied in this context, that perspective is: The CPUC sets requirements for what the utilities must do, then lets the utilities figure out the best ways to meet those requirements, subject to CPUC and all-party review. Here we spell out those requirements.

We start with an "Uber Requirement," from which all more detailed, operational requirements follow:

UR. The risk management system set up by this process shall:

- make the best use of available data, defining "best use" to include the best use of all efficient feasible means to collect, organize and analyze that data
- to calculate risk metrics and formats for presenting those metrics
- such that the GRC process can make the most fair and informed risk management decisions possible
- supported by processes that allow effective participation by all parties
- and supported by means to verify all results and verify methodological correctness.

Based on that Uber Requirement, we can state the Key Action Requirement, Metrics Requirements and Organizational/Procedural Requirements:

Key Action Requirement

R1. The utilities shall survey all possible risk sources, collect data and build methodologically correct risk management models, then use that data and those models to make the best use of available data to support the GRC process as specified in the Uber Requirement and all following Requirements.

Metrics Requirements

R2. The metrics shall be verifiable by a third party, and include full pedigrees.

R3. The metrics shall be understandable to all GRC parties.

The metrics shall provide the most efficient feasible basis for judgments in the GRC process, such that the process:

R4. … manages risk in a verifiably efficient way;

R5. … supports policy judgments trading off risk vs. cost-burden;

R6. … clearly separates the above two issues;

R7. … supports effective, informed participation by all parties;

R8. … is compatible with the legal regime of the GRC;

R9. … does not require any CPUC decision maker to exercise expertise he or she does not now possess.

Organizational/Procedural Requirements

R10. The system shall include an explicit process for managing and learning from unanticipated risks.

R11. The system shall include all technical/analytic support called for by Requirements R7, R8 and R9.

R12. That support shall be inherently and verifiably unbiased over all parties.

Advantage of a Requirements Based Approach

This approach addresses the key problem of what this OIR is seeking to accomplish: The complexity discussed earlier. With this Requirements Based Approach, the CPUC simply demands a ten-requirement check-off action with each utility (Requirements R1 through R10). The utility must demonstrate, to the CPUC's satisfaction, that it has met all ten requirements. Then the process must also be checked against Requirements R11 and R12.