

**A. What are people hearing and/or doing that is causing concerns and what are those concerns?**

- a) Too numerous to detail (DNFSB, worker complaints, ...)
- b) A senior WTP engineer has proclaimed major design flaws for system performance and success. Lawsuit withstanding.
- c) Multiple workers proclaim discrimination for their 'whistle-blowing'.
- d) US Secretary of Energy expresses concern for project.
- e) DNFSB conducts investigation and halts work on pre-treatment facility.
- f) US DOE surveys workforce, presents solutions for generic 'safety culture' issues
- g) HAB members voice a range of concerns, and dissatisfaction for current approach
- h) Public lacks involvement, often misunderstands by way of media's portrayal
- i) Contractors seem minimally present in discussion and accountability
- j) CONCERNS: WTP functionality, waste-flow bottlenecks, potential criticality. Worker safety, and voice legitimacy. Persistent confusion of fundamental issues (no clear problem hierarchy). Contractor incentives driven by deadlines rather than factory performance. Lack of oversight for details and outcomes.
- k) It is what we are not hearing as much as what we are hearing. We need people to feel safe coming forward with unreported issues and not be worried that they'll get sacked for doing so.
- l) People are afraid. Willing to say that one on one or small groups but afraid to be public.

## B. What are the root causes and drivers that led to the problems?

- a) Unlearned lessons from Chernobyl
- b) Inadequate and unspecific definition of "Safety Culture"
- c) Failures in the conceptual design phases
  - Focus on "cost" led to bad concepts that INCREASED costs and led to current problems
- d) Bad priorities in the conceptual and later design phases
  - PJM's absent data and experience
  - Black Cells despite failure at THORP
  - Burying black cells deep inside the buildings
  - Minimal footprint leading to tight bends and increased wear; and to severe limitations on future design revision when problems are discovered
  - Bad and inadequate seismic basis
- e) Failure to REQUIRE validation of design
- f) Failure to challenge the design at all stages
- g) Bad focus on priorities
- h) Lack of understanding of critical path methodology
- i) The vit plant did not perform an adequate risk identification and mitigation analysis as part of the functional requirements.
- j) DOE did not have the technical expertise to realize the importance of defining and mitigating risks as part of the contract.
- k) In recent history the vit plant leadership did not adequately list and prioritize all known technical issues.
- l) The vit plant was overrunning costs and slipping schedule which delayed resolution of issues and discouraged anyone from raising new issues.
- m) Inadequate planning and preparation by the contractors removed thoroughly evaluating the safety concerns from the schedule--not enough time to do it. Building before the design and safety basis is established. Emphasizing cost and schedule over safety and operability. We only hear accolades for a project that is under budget and ahead of schedule - not for a project that has 100% safety and all safety concerns resolved.
- n) Time/complexity. Incentivized contracts. Hasty orders to meet Tri-Party Milestones. Agency reps move positions too quickly. Lack of an agency-public appointed team for overseeing the 'list of fundamental construction concerns'. Extreme and unusual circumstances.
- o) Cost and schedule considerations, sacrificing safety issues.
- p) Inability of the Department to effectively oversee contractors –
  - Not enough competent personnel on DOE staff, i.e., no chemical engineers assigned to WTP.
  - DOE too close to contractor, not an enforcement mentality.
  - Contractor (Bechtel) is the design agent and design authority. The functions need to be separated so that the design authority role is held by an independent entity.

**C. What current and future consequences are we dealing with as a result of these root causes?**

- a) Potential failure of the entire WTP to be able to function
- b) Severe cost overruns
- c) Severe schedule delays
- d) Loss of Congressional and public support
- e) Severe jeopardy to the environment and public health
- f) Bad products that result in ongoing safety and environmental problems and which may necessitate sending all of the glassified waste to a deep repository.
- g) Delaying technical issues will cost more to resolve and could lead to significant design changes and tearing out previous construction. Unknown technical issues may have been suppressed leading to future surprises.
- h) We will continue to have safety problems and contractors focusing on PROFIT and cost and schedule until DOE gets its act together and forces the contractors to measure up in the safety arena.
- i) Current – Minimally: A wide-ranging increase of intra-agency efforts and costs. Future – Extremely: A catastrophic event due to any one of the many construction and technology issues.
- j) Increased cost
- k) Delays
- l) A waste treatment plant that might not work, with indeterminate quality

#### D. Why didn't ISM catch the problems in the design phase?

- a) In one view it wasn't applied to the design phase.
- b) In another view, ISMS doesn't apply/isn't applied to the design phase
- c) ISMS fails to provide adequate direction on design philosophy development and conceptual design development to assure safety
- d) ISMS fails to direct a what-if analysis of things breaking, going wrong, intentional malevolent events, poor technical understanding, or of modes of failure – common, serial, parallel, cascade, etc...
- e) ISMS allows the staff to select what aspects of design and what issues need to form a part of the "safety basis".
- f) ISMS focuses on mitigation
- g) ISM made two fundamental errors: The process was not applied to the facility design and the expected principles of behavior were not defined or practiced.
- h) I do not believe that ISM was properly implemented from the most senior management down with an honest and real commitment. I do not believe that senior DOE management has its heart in ISMS, either, no matter what they say in public.
- i) Because, as stated on Hanford.gov, "...the Integrated Safety Management System (ISMS) and the As Low As is Reasonably Achievable (ALARA) program **go hand-in-hand**." The two functions are not treated as specializations of their own, complementary, areas of focus. Integrated Safety Management should focus on the ideal states of performance, first in isolation, and only then after with consideration to ALARA's efficiency options. Perhaps ISMS outweighed industrialization over the value for risk aversion. [Alarming little information on ISMS online.]
- j) Failure to follow ISM.

- E. What needs to be changed in the ISMS process in order to identify all of the critical design issues to ensure resolution before design is completed?**
- a) Change the ISMS procedure to explicitly cover the design phase from philosophy development, through conceptual design, design iteration, design challenge to detailed design ensuring safety and environmental protection are placed at the highest priority
  - b) Change ISMS to avoid mitigation unless design changes cannot be made to eliminate the need for mitigation
  - c) Change ISMS to direct a comprehensive and on-going what-if analysis of:
    - o Potential failures (things breaking, going wrong, intentional malevolent events)
    - o Poor or missing technical understanding
    - o Modes of failure – common, serial, parallel, cascade, etc...
  - d) Change ISMS to force a critical analysis of what aspects of design and what issues form the “safety basis”. These are not things to be selected. They exist and must be found. The procedure needs to be explicit and exhaustive in doing that.
  - e) Maintain a true lessons process. The current lessons learned process is unfocused and does not encourage learning.
  - f) Each new project should examine the risks and define the mitigation actions as part of the Project Management Plan. Ongoing projects should complete the same actions. Proactive harvesting of any concerns from all employees should be part of this effort.
  - g) Following the guiding principles and the Core Functions. It will get you there. AND, it begins with management.
  - h) **\*\*Not enough knowledge to answer confidently.** Best guess: Expand territory and personnel; improve transparency of and participation with ISMS procedures.

**F. What needs to change at a policy level so these problems don't happen again?**

- a) At the highest level, safety and environmental protection must be the core of the design work. They must never be thought of as add-ons.
- b) Cost though important must be made a low consideration on priorities and must only be considered in weighing alternative successful designs for safety and environmental protection, not for substituting mitigation for inherent inbuilt designs that assure these.
- c) DOE culture needs to be changed to incorporate safety and environmental protection as core philosophies, not as attributes. Safety and environmental protection first, foremost and always.
- d) DOE culture needs to demand open, honest, transparent processes that invite critical analysis from anyone who cares to participate. DOE culture needs to embrace and encourage this.
- e) DOE needs a highly trained staff who understand these principles and who embrace them.
- f) The projects must initiate with a thorough ISM risk identification. Contractor selection should include an oral examination of the leadership to determine their principles of behavior with respect to listening to the employees. ISM must be applied to all facility designs.
- g) DOE must take firm control of its contractors and enforce adherence to the ISMS precepts.
- h) Attached diagram of ISM Guiding Principles and Core Functions (Basic Overview of ISM, HSS and DOE, April 2011)
- i) More contractor accountability and stakeholder/agency oversight. Formal analysis of contract incentives. Impose limitations for how often/quickly reps can change between the public (RL/ORP) offices and private (contractor) manager roles
- j) Clear direction and action from leadership that supports people raising issues that need to be resolved EVEN if the cost of the project increases and there are delays. I do not mean a memo saying "we don't tolerate reprisal..."
- k) Acknowledging whistleblowers concerns and inappropriate action taken to silence concerns.
- l) Efforts to reward truth-tellers.

**G. What are the technical issues that have not been identified are and how can DOE create safe mechanisms for finding out what they are?**

- a) The plant design is severely flawed based on very poor philosophical design choices (black cells, black cells buried deep in the buildings, pulse jet mixers for mixing, what constitutes high-level waste {high activity, short half-life - versus – long half-life, mobile constituents})
- b) The problem now is to first understand the problems, then to find solutions, then to fix them.
  - Highest priority is understanding the physical characteristics of the wastes and how those behave to be able to design pulse jet mixing systems, including particle movement, criticality control, gas evolution and other factors.
  - Next highest and dependant on the answers to that is to design and build the PJMs.
  - Next highest and dependant on that is the installation and testing.
- c) Essential is for DOE to understand, employ and train their staff in critical path methodology.
- d) Also essential is a highly trained federal staff with strong skills in chemical, nuclear, systems and control systems engineering; along with strong skills in complex project management and critical path management.
- e) Listing the unknown is an oxymoron. Special sessions should be conducted with the technical staff and the union personnel to proactively harvest any potential technical issues.
- f) Polling the design and safety analysis engineers and scientists should surface all concerns and open items--IF management does it in an honest and open way that is not career threatening. Bechtel and URS don't seem to be able to do that.
- g) Technical issues list is unsettled – HAB members should not provide this, but should expect this from DOE and contractors (individual submissions). DOE should implement a mechanism that concentrates solely and specifically on the broad topic of risk, so that risks to goals, workers, region/environment, are clearly defined and analyzed.
- h) DOE can hire an independent group that is skilled in recruiting and investigating these types of concerns in a safe and confidential setting, and have that group prepare a report with an investigation punch list. That list should then be followed up on by the same group to assure that each such issue is investigated, validated and resolved. Need loop back system to the employee making allegation.

#### **H. What is the process to resolve the technical issues?**

- a) The current process appears to be ad hoc and lez a faire. Success is not assured. That has to change. DOE must take ownership of the design, process and solutions rather than leaving these to the contractors.
- b) Each issue should be prioritized by a special working group and put on a formal tracking system with regular reviews. These priorities should be confirmed via an independent review. The required mitigation actions should be funded activities as part of the revised baseline.
- c) Process? Work on them until everyone is satisfied that they are resolved. There is nothing unique in this approach. One cannot say that they are on schedule if there reopen items trailing in the dust. It becomes a shell game of chance.
- d) The current 'process' is unclear – a sign that a solid approach is lacking. The majority of resolution processes seemingly belong to very few, and to the incentivized contractors.
- e) See above. Should include employee who is reporting issue

#### **I. Does DOE have the technical skills and the staff to be able to identify and resolve the concerns?**

- a) No
- b) DOE's lack of technical understanding, project management, and contracting expertise is one of the root causes of this current situation. DOE, as the "integrator", should have expertise equivalent or superior to the contractors in order to adequately manage their performance.
- c) No! That is patently clear. And, DOE is understaffed in this area.
- d) It should, but it doesn't. Too many decisions have been allocated to private contractors.
- e) No. Need chemical engineers, welding inspectors, QA specialists, systems engineers.

**J. What implications do these WTP issues have regarding management for the entire site?**

- a) The issues are largely cultural in origin and apply to all of DOE.
- b) The cost and schedule overruns will result in decreased funding for the other Hanford priorities with consequent major impacts.
- c) The leadership issues observed at the vitrification plant could be generic to the site. The solutions should be applied site-wide.
- d) If DOE is inadequate to oversee the WTP contractors, they are inadequate to oversee the other contractors. It is the same DOE management.
- e) Gives a sense that this isn't the only 'decision culture' issue. The processes for how technology is chosen and implemented should be addressed site wide.
- f) It is not just the WTP that suffers from an obsession with cost and schedule at the expense of safety.
- g) Efforts to address safety culture at WTP need to create policy shifts site-wide to be truly meaningful

**K. What actions by DOE would indicate or demonstrate change in the right direction?**

- a) Implementing our recommendations.
- b) Issue a letter to the contractors and modify their contract defining expected principles of behavior. Use response to employee concerns as an example of the behavior that will be monitored.
- c) Provide semi-annual formal feedback to the senior corporate parents concerning the leadership style of their contractor team.
- d) Increase the use of the penalty clauses that are allowed in the contract to levy financial fines on unacceptable behaviors that impact safety.
- e) Bring additional ISMS expertise into the office and spend the time it takes to oversee the contractors and demand that they measure up.
- f) DOE and the contractors must provide a comprehensive list of technical issues, and worse-case scenarios (potential catastrophes and their probabilities).
- g) DOE, Ecology, EPA and HAB should appoint a special team of Hanford/WTP risk assessors who regularly present to the stakeholders, and who maintain their position for 7+ years (for continuity of knowledge/experience); specialists should be of international and academic caliber.
- h) An acknowledgement of the problem. Public announcement that safety culture issues are a problem and that cost and schedule considerations are taking priority and that this needs to change.
- i) Action to support workers who are raising concerns.

**L. How do we get the message to DOE that they need to take firm and decisive action to improve safety, safety culture and the contractors?**

- a) Advice is all we can have to offer
- b) With this advice
- c) Let's tell it like it is. DOE is inadequate to the task of overseeing and enforcing a proper ISMS and establishing a valid safety culture
- d) Formally remind agency reps of their accountability to us (their "employers")?
- e) Enact public/media to pressure private contractors?
- f) Provide concise and organized set of expectations according to 'technical issues list', with specifics for achieving these expectations
- g) More regular meetings with contractors, DOE, Ecology, EPA, HAB committees, and public (academics).
- h) Foster trusting and open communication/relationships between groups; invest in team-building psychology; act as the creative driver for reaching a shared goal.
- i) Offer more risk education to the HAB and agencies.
- j) Agree to a hierarchy of risks.
- k) Appeal to Congress and Administration for independent agency to oversee nuclear safety.

### **M. How should safety culture be defined and what are the issues related to safety culture?**

- Safety culture should be defined as practicing certain behaviors. These include active listening and providing feedback to the employees, respect and caring for the welfare of the employees.
- A satisfactory Safety Culture places safety, both personnel and process, equal to or above cost and schedule. It means that management energy and time are spent achieving the maximum safe environment for the workers and the maximum safety built into the plant and its operations--equally. Workers should feel free to bring safety issues to the table and to management's attention and management should energetically deal with these issues RIGHT NOW. Bring the workers into the action by listening to them and by making them part of the solution.
- 'Safety Culture' should have tiers of definition – First (most relevant here) are the goal-based performance standards, next are the basic industrial workspace standards, and further are left to be designated.
- 'Safety Culture' should be accompanied with attention to 'Decision Culture' The main issues related to 'safety culture' should be distinguished as 'project breakers': if factory details have significant potential for failure, then these details should be analyzed/resolved before implementation; are construction due dates a priority over design confidence and refinements? How do decisions flow through to action? Where/how/why are decisions in disconnection between the many participants?

### **N. How do we explain and resolve the language issue to ensure that we are all meaning the same things by the words we are using?**

- a) The phrase "Safety Culture" was created directly as a result of the Chernobyl disaster. It referred to the complex mix of design and operating instructions based on that design, and human factors that led to the destruction of the plant. The phrase was then defined by a panel of experts, though the definition is not explicit and has led to much confusion.
- b) Recommendation: 1) Replace 'Safety Culture' with "Safe Design, Construction, Management, Operations and Maintenance". 2) Note that Safe Design first designs safety in and adverse events out, and only when that is not possible uses mitigation, and then only with extreme caution.
- c) First, resolve the differences among the HAB members, then present a tutorial presentation at the full HAB.
- d) Write about ISMS and safety culture and write about technical issues separately.
- e) Concentrate on themes of hierarchy, value, risk, and decision. Propose innovative expansion of decision-maker involvement at the engineering level. Research and subsume more democratic roles for technology decision making.
- f) More conversations. Clarifying what we mean instead of assuming everyone is on the same page.

**O. What are the policy changes the HAB wants to see as a result of this advice related to WTP safety culture?**

- a) Redefine safety culture to learn the lessons from major past disasters (including Chernobyl)
  - Suggest: “Safety First, Last and Always” subtitled “Safe Design, Construction, Management, Operations and Maintenance”
- b) Redefine and rebuild the DOE culture
  - Focus on “Safety First, Last and Always” and NOT on short term cash flow
    - ✓ Make decisions based on quality and results NOT “cost”
  - Focus on Life Cycle (Planning, Process, Costs, ...)
  - Focus on Openness and Transparency throughout
  - Learn from failure NOT hide failure and pretend it never happened
- c) DOE create a value statement as guidance to the contractors that defines the expected principles of behavior expected from their leadership.
- d) Would like to see RL and ORP take a more active role in ensuring that their contractors understand and implement adequate and sufficient safety controls and postures, like ISMS or Safety Culture or whatever. DOE management seems unable to control its contractors, indicating poor management and oversight on its part.
- e) A new group of specialists who focus on performance risk, and who are protected from agency and contractor agendas, and who DO NOT MOVE POSITIONS EVERY FEW YEARS. Perhaps policy changes should include adjustments to Tri-Party Milestones and processes for dealing with deadline conflicts. Formal analysis of contract processes, return on investment, and incentive alternatives. (DOE should harness Game Theory to assess on-going ‘outcomes’, ‘deals’ and ‘winners’.)
- f) Establishment and maintenance of a culture that welcomes and takes seriously allegations from employees, in a manner that is protective of the employee, and in a manner that inspires trust in the employee that the allegation is being fairly and rigorously investigated and/or resolved.
- g) A house-cleaning exercise that invites all employees with unresolved or unreported concerns to come forward so that those concerns can be examined and resolved.
- h) A measurable system of accountability that demonstrates the DOE’s intolerance of reprisal from contractors or its own personnel, with meaningful consequences and incentives to deter such behaviors.

**P. What else might the committee consider? For example, does achievement of a safety culture require an enforcement component? Is there another way to think about the problem that may lead to other solutions (e.g., resilience engineering, behavioral approaches)?**

- What I meant by "enforcement" is that a procedure to protect employees who disagree with DOE or its contractors on a safety related issue is essential. The existing system fails to offer that protection. In order to achieve an appropriate safety culture a change in the process of investigating and resolving claims of retaliation is necessary. A program designed to deal expeditiously with assertions of retaliation should be built into DOE contracts to replace the current system (referral to the Department of Labor) that entails unacceptable delays in resolving "whistleblower" issues. Such delays, while the alleged retaliation continues, effectively silences legitimate disagreement with management on safety issues.
- All this other stuff confounds and confuses the issues and the concerns. The WTP contractors are not fully analyzing the safety basis and the design before committing \$\$ to build something and they are reluctant to back up to fix something or do additional analysis. The employees are threatened and won't speak up anymore. Call it what you may, it is lousy management, a poor safety culture, lack of a commitment to ISMS, and inadequate oversight and contract management by DOE.
- Yes. Because leaders change. We need enforcement that is not invested in a certain timeline or paycheck and has teeth to make sure actions are taken to ensure problems are dealt with now, not punted into the future.
- Need a system like Nuclear Regulatory Commission (NRC) – accountable, transparent, in regulations, with meaningful incentives.
- Check NRC record at commercial sites for other solutions

**Q. What are the shortfalls of the Employee Concerns Program (ECP)?**

- Backlog is too large, takes too long to resolve concerns, employees are not part of the resolution in all cases, management does not care (really care!) about the employees.
- They are broken. Therefore, there is no existing credible system for getting your issues resolved.
- Many, many examples of how system has failed – lack of employee trust, low validation rate, contractor conducts investigation against itself, no transparency in process, ECP managers threaten employees, etc.