

HANFORD ADVISORY BOARD

A Site Specific Advisory Board, Chartered under the Federal Advisory Committee Act

Advising:

June 5, 2009

US Dept of Energy
US Environmental
Protection Agency
Washington State
Dept of Ecology

Dave Brockman, Manager
U.S. Department of Energy, Richland Operations
P.O. Box 550 (A7-50)
Richland, WA 99352

CHAIR:

Susan Leckband

VICE CHAIR:

Rick Jansons

BOARD MEMBERS:

Re: Systems Engineering Criteria for Remediation of Hanford Waste

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Department of Health

Dear Mr. Brockman,

At the December 2008 and February 2009 meetings of the Hanford Advisory Board (Board), the Board offered advice to the Tri-Party Agreement (TPA) Agencies on the use of a systems engineering approach for managing Hanford wastes (Advice #209), and suggested specific systems criteria for the Department of Energy - Office of River Protection (DOE-ORP) to guide them with defining the proper path to deal with secondary wastes (Advice #214).

During the discussion of Advice #214, the Board recognized that the top level, stakeholder and legal criteria were appropriate to systems engineering and other technical work performed by both the DOE-ORP and the DOE-Richland Operations Office (DOE-RL). The Board feels that, in past Board advice, it has provided consistent criteria that can be of value in assisting both Hanford field offices in:

- Examining each of the site's waste streams
- Developing integrated, common cleanup actions, and
- Ensuring that all risks are mitigated simultaneously.

In the appendix attached to this letter, the Board discusses selected past Board advice that may be of value to DOE-RL in developing the top level criteria to initiate the systems engineering process in their area of responsibility. The Board recommends that DOE evaluates all applicable past Board advice, together with their own perspectives, to develop final criteria to be used as important tools for systematically selecting the best technical path forward.

The Board reminds DOE that in 1997 DOE adopted a systems engineering approach as a result of the Columbia River Comprehensive Impact Assessment (DOE/RL-96-16).

The Board reaffirms the recommendation put forth in our Advice #214, that DOE-ORP and DOE-RL collectively sponsor a joint strategic systems engineering task force to meet and brainstorm possible integration opportunities, strategies and alternatives for cleanup actions that span the responsibilities of both field offices.

Envirolssues

Hanford Project Office

713 Jadwin, Suite 3
Richland, WA 99352
Phone: (509) 942-1906
Fax: (509) 942-1926

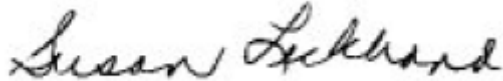
Hanford Advisory Board

Subject: System Engineering Criteria for Remediation of Hanford Waste

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Sincerely,



Susan Leckband, Chair
Hanford Advisory Board

This letter represents Board consensus for this specific topic. It should not be taken out of context to extrapolate Board agreement on other subject matters.

cc: Shirley Olinger, Manager, U.S. Department of Energy Office of River Protection
Michelle Pirzadeh, U.S. Environmental Protection Agency, Region 10
Jay Manning, Washington State Department of Ecology
Doug Shoop, Co-Deputy Designated Federal Official, U.S. Department of Energy, Richland Operations Office
Steve Pfaff, Co-Deputy Designated Federal Official, U.S. Department of Energy, Office of River Protection
Richard Campbell, Environmental Protection Agency
Jane Hedges, Washington State Department of Ecology
Catherine Brennan, U.S. Department of Energy Headquarters
The Oregon and Washington Congressional Delegations

Appendix to Systems Engineering Criteria for Remediation of Hanford Wastes

Below is a discussion of selected past Board advice that may be of value to DOE-RL in developing the top level systems engineering criteria. The overarching top level criteria control or constrain the potential range of solutions and their associated attributes (e.g. cost, schedule, priority and critical path). The guiding criteria imply a degree of flexibility and an expectation that the criteria will be expanded and refined.

Past Board Advice Associated with Top Level Criteria

- Remediate and protect the groundwater, vadose zone, soil, environment and Columbia River for maximum long-term beneficial use.

The DOE-RL 2015 Vision is to: Complete cleanup along the Columbia River by 2015; shrink the active area of cleanup to 75 square miles; and focus freed-up resources on full-scale cleanup of the Central Plateau. This criterion is the essence of the Board's values as expressed in Advice #132, #173 and #197.

- Determine viable disposal paths for all waste streams so they meet environmental and human health risk requirements.

This criterion ensures that DOE-RL addresses the waste issue in the near term. A systems engineering approach requires that solutions for wastes/processes are available, integrated and likely to succeed before committing to process the waste. This criterion is discussed in Advice #61 and #214.

- Mitigate multiple risks for preferred paths (e.g. simultaneously consider the final end state of the waste sites, surrounding and underlying soil, and the effects on groundwater).

This criterion focuses on one of the fundamental advantages of using a systems engineering approach. Examining the starting points, end states, TPA milestones, permits and selecting options that achieve all end states simultaneously could accelerate schedules and lower costs. This criterion is discussed in Advice #61 and #214.

- Identify and select options that provide contingency paths where feasible. Clearly identify paths that lack contingencies as vulnerabilities.

This criterion is intended to institutionalize the systems engineering and project management practices of looking at possible credible future risks and analyzing alternative paths. This approach is a requirement in DOE project management and is a part of systems engineering best practices. An example is addressed in other Board advice on the implications of not having a repository to receive Hanford waste. This criterion is also intended to eliminate "stove piping" of implementing actions without determining their effect on any inter-related areas or actions. This criterion is discussed in Advice #214.

- Establish funding priorities that increase the probability of meeting or accelerating the end state. If feasible, mitigate the highest risks in the shortest time, provided that does not conflict with other criteria.

This criterion recognizes the importance of setting a path focused on accelerating achievement of the ultimate end state. If possible, select near term steps that place priority on eliminating the highest risk as quickly as possible (e.g. focus on zone closure rather than individual higher risk sites). To the degree possible, closures must include any inter-related areas or actions (e.g. other tanks, adjacent cribs or sites, pipelines, vadose zone and groundwater). This criterion is discussed in Advice #214.

- Evaluate and select proven technologies over unproven technologies while accelerating pilot scale demonstrations to determine credibility of promising options.

This criterion recognizes there may be technologies available in the commercial/industrial world that could be applied to DOE work. For example, excavation technologies used in the mining industry may be used for waste retrieval. This criterion is discussed in Advice #214.

Past Board Advice Associated with Stakeholder and Legal Criteria

- Reduce risk to the public, workers and environment by the thorough application of the Integrated Safety Management System.

This criterion is to ensure that alternatives to reduce the ultimate end-state risk do not create near-term risks to the public, workers or the environment. Application of the ISMS is discussed in Advice #134.

- Comply with all applicable laws, regulations and DOE Directives. Conduct early evaluation of Natural Resources Injury and Damage Assessment impacts and costs to allow full comparison and analysis of potential alternatives and actions.

This criterion restates the obvious legal directives that are considered “constraints” or “requirements” in the systems engineering terminology. Included are the National Environmental Policy Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation, and Liability Act, Atomic Energy Act, Clean Air Act, and Occupational Safety and Health Administration requirements. This criterion is discussed in Advice #63 and #141.

- Honor Tribal Treaty rights and comply with federal treaty commitments and obligations.

This criterion recognizes that tribes are sovereign nations and the United States has made legal treaty commitments to them that must be honored. This criterion is discussed in Advice #141 and #214.

- Satisfy the current Hanford Federal Facilities and Agreement Consent Order (HFFACO, also known as the Tri-Party Agreement) or propose improved paths for risk mitigation with regulator approval.

This criterion recognizes the legal status of HFFACO. This criterion presumes that the regulators will be receptive to options that accelerate site closure and is discussed in Advice #214.

Past Board Advice Associated with Guiding Criteria

- Cleanup emphasis should be placed on permanent remedies; such as, Retrieval, Treatment and Disposal (RTD).

This criterion recognizes that the Board has consistently placed a high priority on and bias toward RTD for all waste site cleanup decisions. The Board does recognize that in some cases, complete RTD may be technically impractical, and that options that employ institutional controls (ICs) may be required. This criterion is discussed in Advice #63, #173, #180 and #197.

- Physical and administrative Institutional Controls should not be substituted for cleanup activities or become end states.

This criterion recognizes that cleanup emphasis should be placed on permanent remedies, to avoid reliance on ICs. ICs are not a substitute for meeting the applicable cleanup standard or practical available treatment requirements under applicable regulations. This criterion is discussed in Advice #63, #173 and #197.

- Favor concentration and isolation/destruction options over dilution and on-site storage.

This criterion reflects the forgotten wisdom that “dilution is not the solution.” At one time, this practice was legally discouraged. New technologies should be considered; recent data demonstrates that it is possible to transmute radioactive technetium into non-radioactive ruthenium. This criterion suggests that these and other alternatives should be considered and is discussed in Advice #214.

- Dispose of the highest and longest lived radioactive hazards in deep geological disposal, not in near surface disposal at Hanford.

This criterion emphasizes caution not to select options that leave long-term risks at Hanford. This particularly relates to leaving transuranic elements disposed in near surface locations prior to 1970. The general guidance from various laws is to place the highest and longest lived radioactive hazards in deep geologic disposal, not in near-surface disposal. This criterion is discussed in Advice #214 and #215.

- Ensure that the highest risk contaminants (e.g. technetium, uranium, iodine, neptunium, plutonium, cesium, strontium, carbon tetrachloride, and hexavalent chromium) have solid and realistic risk mitigation options. Place a priority on dealing with mobile contaminants that drive long-term risks (e.g. uranium and technetium).

Technetium is a long-lived isotope that is highly mobile through the soil and in groundwater. The resin column extraction pretreatment option for tank wastes was eliminated by a prior decision.

Current planning will result in a large amount of technetium being sent to land disposal in undefined waste forms and ultimately affecting the groundwater. This criterion also applies to the records of decisions for PW-1, 3, and 6 and waste sites surrounding U Canyon. This criterion is discussed in Advice #207 and #214.

- Give priority to removing the highest risk and longest lived contaminants from the vadose zone and groundwater with emphasis on the highest risk mobile contaminants. To the extent practical, consider simultaneous treatment options for different contaminants within a designated groundwater or vadose zone area. Ensure releases to the Columbia River meet drinking water and aquatic standards.

This criterion augments the top level criterion by emphasizing those resources necessary to eliminate certain risks increase with time if the risks are not eliminated. Vadose zone contaminants that move downward into groundwater and/or toward the Columbia River with time is an example. This criterion is discussed in Advice #132 and # 197.

- Give priority to closing sections of the site to reduce the overall cost of operations. Minimize the size of the Central Plateau Core Zone dedicated to long-term waste operations and management.

This criterion restates the objective of reducing entire sections of the site to eliminate the “hotel operation costs” that can be redirected to other cleanup activities. This criterion is discussed in Advice #132 and #214.

- Economic consideration in remedy selection should include analysis of the residual contamination that may remain after completion of remediation to determine appropriate Long Term Stewardship costs. The analysis should include a comparison of cost versus actual risk reduction over time.

- Expand the review of protectiveness of current remedial actions beyond reliance on current or near-term ICs that limit exposure. This extended analysis would help assess and determine whether or not the current cleanup remediation strategy will meet long-term cleanup goals. Risk analyses must include a model that recognizes that all ICs are expected to fail and the accompanying consequences. This criterion is discussed in Advice #141.