

SYSTEMS ENG CONCERN

- 1 - MAR 01 1989

MEMORANDUM FOR: Robert E. Browning, Director  
Division of High-Level Waste Management

FROM: Joseph O. Bunting, Chief  
Engineering Branch  
Division of High-Level Waste Management

SUBJECT: APPLICATION OF SYSTEMS ENGINEERING AND INTEGRATION BY DOE  
TO ITS HLW PROGRAM

The Division of High-Level Waste Management (DHLWM) as well as a number of other Divisions within the Office of Nuclear Material Safety and Safeguards are currently engaged in the review of DOE documents describing DOE's plans and schedules for implementing the requirements and related activities of the Nuclear Waste Policy Act (NWPA) of 1982 and the Nuclear Waste Policy Amendments Act (NWPAA) of 1987. DHLWM, for example, is currently reviewing DOE's Site Characterization Plan for the geologic repository as required by NWPA (and in a related high-level waste (HLW) matter, the Waste Acceptance Process for planned HLW vitrification activities). In the area of transportation, the Division of Safeguards and Transportation (SGTR) has had a number of pre-application meetings with DOE and DOE contractors for design of spent fuel transportation casks. Six design contracts have been awarded by DOE and the final truck and rail/barge designs are scheduled to be submitted in the 1990-91 time frame for certification by NRC, as required by NWPAA. Should the need be demonstrated, possible design information with regard to the independent spent fuel storage facility and/or the monitored retrievable storage facility could be submitted to NRC for licensing, again as required by NWPAA.

In the management of complex engineering and technical programs, program managers have relied upon systems engineering and integration practices to help define and manage the program(s) being implemented. Within industry, such practices generally include but are not limited to the identification of system interface, subsystem, system qualification, production, and acceptance specifications and design control practices, including quality assurance. However, in reviewing certain DOE HLW documents, it is not clear how DOE has applied systems engineering practices to its HLW program. Absent this information (e.g. systems engineering, integration, and analysis), NRC therefore has no reference against which it can compare DOE's designs and evaluate their adequacy for compatibility among the various HLW programmatic systems consisting of not only the geologic repository facility but also the monitored retrievable storage and the independent fuel storage facilities (should the need be demonstrated), the Defense Waste Production Facility (DWPF), the West Valley Demonstration Project (WVDP), and transportation considerations.

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The problem of integrated systems engineering at DOE may be regarded as both "structural" and "organic" in nature. For example, DOE's Office of Civilian Radioactive Waste Management (OCRWM) is not responsible for the management of the DWPF and WVDP programs although all three are a part of the Nation's civilian HLW management system. The DWPF and WVDP people initially attempted to deal with us directly. However, we have attempted to maintain our licensing interface through OCRWM. It is uncertain just how much integration has taken place. Although NRC has no statutory authority for regulating DOE's glass-making program, NRC does have an interest in understanding how WAP product control will affect the waste package's ultimate performance in the repository; an area in which NRC does have regulatory authority. Even though NRC has indicated that the Waste Acceptance Process per se appears adequate, it is not clear how the WAP as presently defined will comply with some overall interface specification (performance, for example) for the OCRWM programs.

There are concerns of how effectively OCRWM is implementing systems engineering practices. DOE has in place a series of orders which require the use of systems engineering. However, in the matter of exploratory shaft facility (ESF) construction at Yucca Mountain, NRC has repeatedly raised specific objections, comments, and concerns regarding DOE's ESF designs which are indicative of a major problem regarding systems engineering management and integration. In the matter of quality assurance, again NRC has had concerns with respect to how the absence of an overall quality assurance (QA) plan affects site characterization activities that are ultimately intended to support a license application at Yucca Mountain.

In reviewing the NNWSI Project Systems Engineering Management Plan (SEMP), a document intended to implement DOE's orders, OCRWM states that it is a matter of "policy" that it use systems engineering practices to manage, integrate, interface, and document the technical activities of its geologic repository program (see attachment 1 -- page 1-1). However, given the ESF and QA issues at Yucca Mountain, we have questions about the effectiveness of OCRWM's systems engineering and integration program.

To DOE's credit, we believe OCRWM is aware of these problems as they have recently selected the Bechtel Group, Inc. (see attachment 2) to serve as the systems integrator for DOE's HLW program. (The statement of work from DOE's "Request for Proposals" is attachment 3.) However, as previously stated, NRC is now being asked to review and comment on DOE's HLW documentation before the benefits of integration of DOE's program can be realized. We are concerned about evaluating individual WAP and ESF documents in the absence of an integration specification.

In light of these concerns, we recommend the following:

1) That a letter be transmitted from NRC to OCRWM briefly outlining what NRC's interests and concerns are. This letter should indicate that it is our wish to understand more about how DOE has applied the "systems" approach to the management of its HLW programs, the necessity to have the appropriate integration specifications available to NRC in order to adequately review the individual plans, and a desire to understand how it integrates the technical exchange of information between OCRWM, DWPF, and WVDP;

2) That the Director of the Office (NMSS) establish a coordinating committee (with a charter) to meet (perhaps on a quarterly basis) to review and exchange pertinent information regarding scheduling, engineering, and design information on various aspects of the HLW program that are being reviewed by NRC. This would include but not be limited to information from the following areas: geologic repository, transportation, DWPF, WVDP, and independent spent fuel storage (including monitored retrievable storage); and involve the following organizations: the Director's Office, the Division of High-Level Waste Management, the Office of Nuclear Regulatory Research, the Division of Safeguards and Transportation (SGTR), the Division of Fuel Cycle, Medical, Academic and Commercial Use Safety (IMNS), the Office of the General Counsel, and the Center for Nuclear Waste Regulatory Analyses; and

(In order to provide for resources for this activity, we recommend that provision be made in the forthcoming iteration of the NMSS budget call.)

3) That DOE identify all "objectives," "activities," and "schedules" necessary to achieve not only the operation of the geologic repository but also the DWPF, WVDP, and any other NWA/NWPAA programs that are part of the integrated waste management system, and for which there are engineering or design interfaces. This recommendation could be achieved through the DOE Project Decision Schedule, which at present identifies those activities necessary to achieve the operation of only the repository. Furthermore, this recommendation is consistent with NRC's comments to DOE on the need to develop an integrated schedule for the WAP at DWPF and WVDP (memorandum dated October 14, 1989). (This recommendation may also be consistent with section 301(a)(1-2) of NWA which makes reference to certain systems engineering and integration requirements that DOE is to demonstrate when describing its repository program in the Mission Plan. We have been in contact with the Office of the General Counsel to clarify what this requirement means to DOE and to NRC's regulatory authority.)

Please feel free to contact me if I may be of further assistance to you in this matter.

**Original Signed By**

Joseph O. Bunting, Chief  
Engineering Branch  
Division of High-Level Waste Management

- Enclosures (3):
1. NNWSI Project Systems Engineering Management Plan
  2. Wall Street Journal Article on the Bechtel Group, Inc.  
(dated December 12, 1988)
  3. OCRWM Statement of Work for Systems Engineering

cc: Stuart A. Treby, OGC

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RECORD NOTE: This memo was discussed with CMacDonald (SGTR) and his comments were incorporated.

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