

DEVELOPING A DECISION LOGIC FOR THE YUCCA MOUNTAIN TRANSPORTATION PROGRAM

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ABSTRACT

One of the key strategic documents for the Waste Isolation Pilot Plant (WIPP) was the development of the WIPP Disposal Decision Plan. This document consisted of a high level summary of the key milestones and logic ties for the five major program elements: Regulatory/Technical Processes; Stakeholders/Oversight; Experimental Programs and Performance Assessment; Waste Characterization, Certification, and Inventory; and, Operations.

On July 23, 2002, the President signed a joint resolution clearing the way for the submission of a license application to the Nuclear Regulatory Commission to open and operate Yucca Mountain as a geologic repository for the disposal of high-level waste and spent nuclear fuel. To support the effort of licensing, building, and operating the repository, and developing the transportation system needed to accept, ship and dispose of these materials, the Office of Civilian Radioactive Waste Management began developing an integrated schedule along the lines of the WIPP Disposal Decision Plan. This Draft Decision Plan, currently being developed, identifies the major activities, milestones, and decisions necessary to initiate repository operations in 2010, and the transportation portion of this plan is a key element. The transportation portion forms the basis for the decision timeline and depicts the program's critical path, key milestones, inter-relationship with the repository, the utilities and other U.S. Department of Energy sites. It includes information on overall planning milestones, such as development of strategic plans, operational plans and campaign plans; cask acquisition; develop of transportation facilities, if needed; development of Nevada infrastructure, if needed. Key transportation assumptions have also been included in the Draft Decision Plan. A Draft Decision Plan Milestone Dictionary has been developed to supplement this integrated program schedule.

INTRODUCTION

Congress established the framework for the U. S. Department of Energy (DOE) to site, license, and operate geologic repositories for disposal of high-level radioactive waste (HLW) and spent nuclear fuel (SNF) in the Nuclear Waste Policy Act of 1982 [1]. Amendments to the act in 1987

[2] eliminated all sites other than Yucca Mountain for characterization as a potential repository. The act established the process for the evaluation, recommendation, and approval of the Yucca Mountain site, including the need for a Final Environmental Impact Statement (EIS) as part of the comprehensive basis for a site recommendation. It also established the framework for construction approval and licensing of a Yucca Mountain repository by the U.S. Nuclear Regulatory Commission (NRC).

Consistent with the process laid out in the Act, on January 10, 2002, the Secretary of Energy notified the Governor of Nevada of his intent to recommend the Yucca Mountain site to the President. On July 23, 2002, the President signed into law (Pub. L. 107– 200) a joint resolution of the U.S. House of Representatives and the U.S. Senate designating the Yucca Mountain site in Nye County, Nevada, for development as a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste. DOE is now responsible for planning and implementing a transportation program for the shipment of spent nuclear fuel and high-level radioactive waste, in the event the Nuclear Regulatory Commission authorizes receipt and possession of spent nuclear fuel and high-level radioactive waste at Yucca Mountain.

Less than seven years remain to address the scientific, regulatory, and legal issues associated with proposed Yucca Mountain repository, develop the associated site and transportation infrastructure, and initiate waste acceptance by the 2010 goal. To meet this goal, a variety of options, such as modular design and staged construction at the repository are being considered [3]. Accelerating the development of the transportation program and infrastructure remains a key issue. Building upon the experience and lessons learned during the successful development, certification, and initiation of operations at WIPP repository provides an opportunity to assist the Yucca Mountain repository in achieving its goals.

WIPP EXPERIENCE

In addition to DOE's responsibilities for HLW and SNF, the department is also responsible for the disposal of defense generated transuranic radioactive waste (TRUW) at the WIPP repository. The WIPP Land Withdrawal Act of 1992 [4], as amended in 1996 [5], provides the legal basis for the disposal of TRUW. In addition, much TRUW contains regulated hazardous constituents (mixed TRUW) and its disposal must comply with the Resource Conservation and Recovery Act of 1996 [6]. The WIPP site opened in March of 1999 for the receipt of TRUW after being certified by the Environmental Protection Agency (EPA) in May of 1998. WIPP was subsequently certified for mixed TRUW in October of 1999.

A key element of both the successful certification and subsequent of WIPP was the development, publication, and implementation of the WIPP Disposal Decision Plan (DDP), shown in Figure 1. The WIPP DDP integrated all aspects of the development, certification, and initial operations of the WIPP repository. It served as a catalyst for both internal and external communications within the program and is credited with an almost three year advancement in the certification of WIPP [7]. The WIPP DDP was unique in that it institutionalized public and oversight group interactions to be early, frequent, and iterative. These interactions are credited with increasing public acceptance of the WIPP disposal concept and its post closure safety.

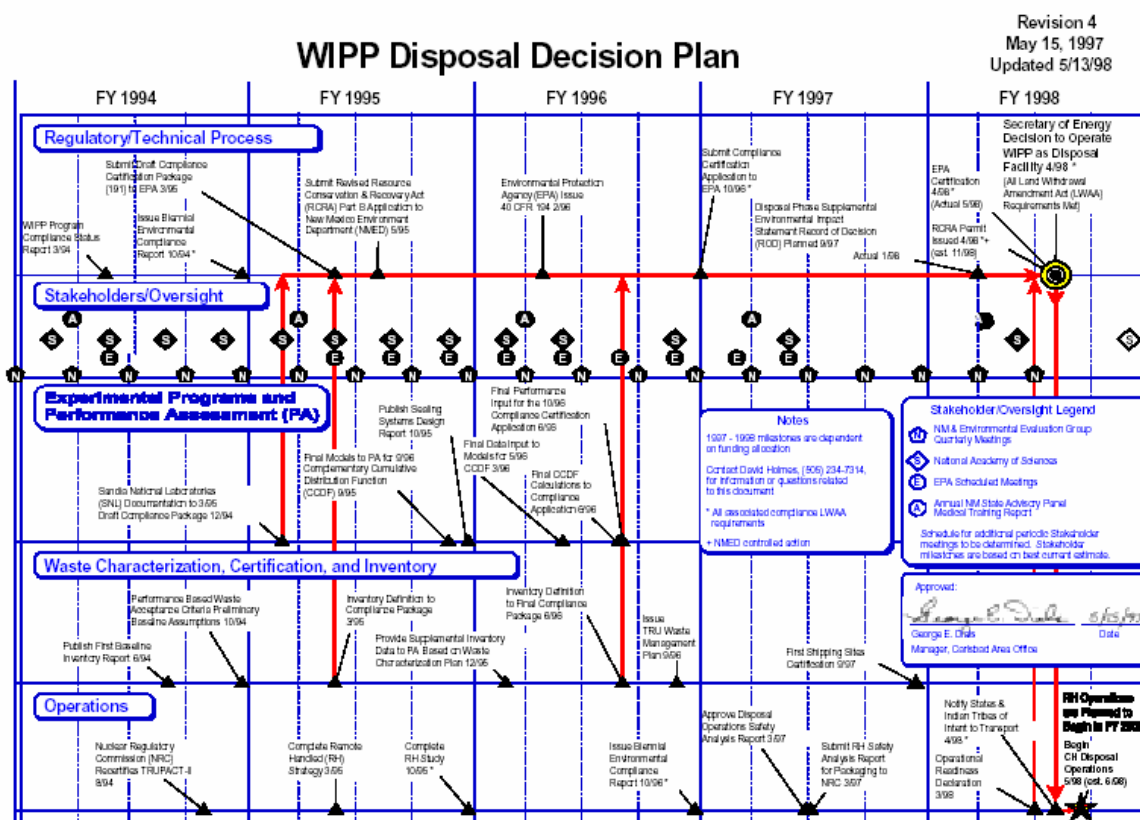


Fig. 1 The WIPP Disposal Decision Plan, Revision 4 [7]

DEVELOPMENT OF A YUCCA MOUNTAIN DISPOSAL DECISION PLAN

Building off of the experience with the WIPP DDP, the Office of Civilian Radioactive Waste Management (OCRWM) began to develop the key elements for a Yucca Mountain Disposal Decision Plan (YMDDP) for spent nuclear fuel and high-level radioactive waste. In March 2003, this effort was initiated and the basic structure of the YMDDP was developed in a facilitated large program meeting. These elements were then analyzed and successively improved through a series of smaller meetings with specialists in various areas of the program. The key aspects of YMDDP are that it incorporates all major program activities necessary to achieve the program goals and include the assumptions that were used in the development of the YMDDP. The YMDDP eventually would identify a critical path, key activities, and key feeds necessary to achieve program success. Eventually the plan would be statused monthly, for a three month rolling window that would include the previous month, the current month, and the next month. In addition, the plan would be resource-loaded. In this manner, management would be alerted to issues before they began to impact the program.

Critical to development of the YMDDP were the transportation aspects of the OCRWM program, as described in the next section.

YUCCA MOUNTAIN TRANSPORTATION PROGRAM DECISION LOGIC

In beginning to develop the transportation portions of the YMDDP, previous plans and reports were analyzed. Since the transportation program at OCRWM was not as well developed as the repository aspects of the program, much of the information needed did not exist and work began on deriving it.

Within the transportation program, three major elements were determined to be key to the success of the overall transportation mission: 1) National transportation/operations, 2) Nevada transportation, and 3) Institutional Interactions. National transportation included such activities such as acquisition of a transportation contractor, acquisition of casks and additional trailers or rolling stock, development of operations plans, and building a fleet management facility. Nevada transportation covered those aspects specific to the state of Nevada. Depending on what transportation mode decision was made, it could include building a railroad within the state of Nevada up to 323 miles long, or development of an intermodal transfer facility for moving a large rail cask from a rail car to a heavy-haul vehicle. If the mostly legal-weight truck alternative was eventually chosen, there would be no Nevada transportation-specific work required. Institutional interactions would be key to the success of National transportation and would include interactions with Tribal nations, as well as four state regional groups and other interested stakeholders.

The next section evaluates the kinds of issues and decisions necessary for each of the main transportation sections.

NATIONAL TRANSPORTATION

One of the main elements for the National Transportation development in the YMDDP was the issuance of the strategic plan for transportation [9] in November of 2003. The main elements cited in the plan included Interactions with States and Tribes, Interactions with Stakeholder Groups, Interactions with Transportation Industry and Cask Vendors, and Interactions with Nuclear Utilities. The plan laid out the approach OCRWM would use for interaction with four state regional groups – the Southern States Energy Board, the Western Interstate Energy Board, and the Midwestern Office and Eastern Regional Conference of the Council of State Governments. The Department already interacts frequently with these groups on other shipping programs and relies on them to provide consolidated state input on various topics and to assist with transportation plans. Demonstrating its continuing commitment to working with these groups, OCRWM in October 2003 reestablished its cooperative agreements with them. Where appropriate, OCRWM will interact with individual States, or its designated State agency, as specific issues of mutual concern arise.

Also important for the National Transportation activities include the acquisition of casks, rolling stock, and a transportation contractor to ship the spent nuclear fuel and high-level radioactive waste to Yucca Mountain, should the repository receive a license from the Nuclear Regulatory Commission. Depending on the transportation mode decision made, a suite of truck and possibly rail casks would need to be acquired, as well as rail cars or truck beds needed to ship it as well as the handling and grappling equipment necessary to maneuver the cask at the receiving end.

The fleet management facility consists of three main parts, which would not need to be co-located. The primary part would be a staging area where casks could be reconfigured for shipment to a new location. The second part consists of a maintenance facility where in-depth work such as replacing the seals on the casks could be performed. The third part would be the main operations center, which would consist of the operations hub where all the computer-based satellite tracking would occur. Determining locations of these pieces of the facilities as well as what kinds of equipment needed, staffing, etc. is still being developed.

NEVADA TRANSPORTATION

Depending on the transportation mode decision made by OCRWM, the Nevada transportation program could consist of building a rail line in Nevada and all associated activities. Since the Department's preference is for mostly rail, the types of activities that could need to occur include: an Environmental Impact Statement (EIS) to determine the alignment within one of the five proposed rail corridors where the rail line would actually be built, acquisition of the land for the possible rail road, and the design and the construction of the railroad itself.

In the Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada (DOE/ EIS-0250F) (Final EIS), [9] the Department evaluated various modes of transportation including mostly rail, mostly legal-weight truck and mostly heavy-haul truck. DOE identified the mostly rail alternative as its preferred mode of transportation in the Final EIS.

In the event that DOE selects the mostly rail alternative, a rail line would need to be constructed to connect the repository site at Yucca Mountain to an existing rail line in the State of Nevada. Accordingly, the Final EIS evaluated five rail corridors - Caliente, Carlin, Caliente-Chalk Mountain, Jean, and Valley Modified. After consideration of public comments, the analyses of the Final EIS and other information, the Department identified [10], on December 29, 2003, the Caliente corridor as its preferred rail corridor with the Carlin Corridor as the secondary preference. The Department's preference for Caliente takes into consideration many factors, including its more remote location, the diminished likelihood of land use conflicts, concerns raised by Nevadans, and national security issues raised by the U.S. Air Force on the Caliente-Chalk Mountain corridor. Approximately one-third of the Caliente and Carlin corridors overlaps. Since the Carlin corridor has similar attributes overall, DOE has identified the Carlin corridor as the secondary preference in the event the Caliente corridor is not selected.

Also on December 29, 2003, the Bureau of Land Management issued a Federal Register Notice [11] stating they had received a request from DOE to withdraw 308,600 acres of public land, approximating the Caliente corridor, to evaluate the land for the potential construction, operation, and maintenance of a branch rail line for the transportation of spent nuclear fuel and high-level radioactive waste in the event the NRC authorizes a geologic repository at Yucca Mountain. This notice segregates the land from surface entry and mining for up to 2 years while various studies and analyses are made to support a final decision on the withdrawal application.

Since the potential railroad would be one of the longest constructed in the United States for many decades, the design and construction will receive a lot of attention. Different construction

methods to ensure safety and efficiency, as well as endurance in a desert climate, would be evaluated.

Should the Department not choose the mostly rail alternative, two other sets of activities could occur in Nevada. One possibility would include the need to build an intermodal transfer facility at one of the three locations analyzed in the Final EIS. This type of facility could be used to transfer large rail casks from rail cars to a heavy-haul vehicle. If mostly legal-weight truck was chosen as the mode both nationally and in the State of Nevada, potentially no additional infrastructure work would need to occur in Nevada or it could consist of a small infrastructure work near an existing rail line to allow for truck casks being transported in a "piggyback" to be transferred to a legal weight truck and then transported to Yucca Mountain.

INSTITUTIONAL ACTIVITIES

State and tribal governments have primary responsibility for the health and welfare of their citizens and the environment. In that role, they are key to assisting OCRWM with determining how transportation operations will occur. Beginning in 2004, OCRWM will significantly increase interactions with states and tribes to update and prioritize the list of topics they wish to address.

1) DOE plans to interact with federally recognized tribes on a government-to-government basis. A range of methods may be used to work with tribes, based largely on the needs of the individual tribal governments. OCRWM will consider successful collaborative processes used by other federal agencies and will continue to work with its tribal partners throughout the planning, operational testing, and operations phases of the transportation program.

2) OCRWM will meet at least twice a year with each of the state regional groups and participate in conference calls or other meetings as needed. State regional groups, organizations representing local appointed and elected officials and tribal officials will also continue to participate in Transportation External Coordination Working Group (TEC) interactions. Beyond their participation in TEC, DOE envisions government-to-government consultation and other interactions with tribal governments. OCRWM will work with potentially impacted Federally recognized tribes to determine an efficient and effective consultation process with the tribal governments. OCRWM will work with states and tribes to develop schedules and approaches to address the topics identified through these discussions.

3) Discussions between OCRWM and states and tribes on topics of concern will be purposeful and outcome-oriented, leading to decisions necessary to implement an effective transportation system in accordance with all-applicable laws and regulations. As a starting point, OCRWM will raise the following topics for discussion; we expect that states and tribes will raise additional topics.

- **Selection of Transportation Routes.** OCRWM will work collaboratively with state regional groups and tribal governments to identify transportation routes. This will include providing assistance, as requested, to state and tribal governments in identifying routes, consistent with federal procedural and substantive requirements set forth in 49 CFR

397.103, including minimization of radiological risk. States and tribes also must consult with contiguous jurisdictions that may be affected to ensure consideration of all impacts and continuity of designated routes.

- **Emergency Response Planning and Training.** OCRWM will work with states and tribes to evaluate current preparedness for safe routine transportation as well as emergency response capabilities, and will provide funding, as appropriate, to ensure that state, tribal and local public safety officials are adequately trained. Additionally, OCRWM will work with states and tribes to refine the approach for implementing Section 180 (c) of the Nuclear Waste Policy Act and to coordinate and integrate Section 180 (c) activities with existing training programs designed for state, tribal and local emergency responders.
- **Shipment Security.** OCRWM will work with state regional groups and tribes in developing approaches to securing the shipments. This effort will address escort and inspection activities as well as new security requirements for shippers and carriers issued since September 2001. Our collaboration will include the Department of Homeland Security and other federal agencies with security requirements.
- **Operational Practices.** OCRWM will review operational practices as documented in the Radioactive Material Transportation Practices Manual 460.2-1 with state regional groups and tribes and update the Manual if needed. Additionally, OCRWM will work with States, tribes, other federal agencies, and industry to identify enhancements to its existing unclassified tracking satellite system called TRANSCOM, so that the most current generation of tracking systems appropriate to a particular mode is available for shipments to the repository.
- **Communications and Information Access.** OCRWM is committed to providing timely, accurate, and complete information about its transportation system and will do so by implementing a communications process with states, tribes, local governments, industry, and other parties participating in transportation planning. OCRWM will work with these parties to develop appropriate materials and to identify optimum distribution mechanisms.

Beginning in 2006, interactions with state regional groups and tribes will shift focus from topic identification and resolution to training and operational readiness. States and Tribes will be involved in reviewing transportation campaign plans, conducting emergency and communications exercises with local officials, reviewing associated public information programs along routes and participating in readiness reviews. These activities will require States and tribes to coordinate closely with local public safety officials.

TRANSPORTATION INTERACTIONS WITH OTHER PROGRAM ELEMENTS

In developing the transportation portions of the draft decision plan, the linkages with other elements of the repository are becoming evident. The types of linkages include things such as needing to acquire casks that can then be accommodated in the repository handling facilities.

Also, casks need to be acquired that can be used by the 72 commercial reactor facilities as well as the 5 DOE generator sites and be able to pick up all types of SNF and HLW canisters. Should DOE select the mostly rail alternative as the transportation mode, an Environmental Impact Statement would need to be written. Any work to support this EIS would need to be closely coordinated with the ongoing NEPA evaluations required as part of the repository operations as well as repository interactions with local stakeholders.

NEXT STEPS

In developing the transportation pieces of the YMDDP, it became evident that the transportation portion was a service organization to both Waste Acceptance as well as the Repository itself. It also became evident that a transportation system needed to be put in place that could adapt in a flexible manner to the changing needs of both groups. As the transportation portions of the YMDDP continue to be developed, it is with the assurance that the work being done is being closely coordinated with the rest of the program and that when the repository opens for business (assuming it receives a license from the Nuclear Regulatory Commission), it will be run in a safe and cost-effective manner.

REFERENCES

- 1 Public Law 97-425, *The Nuclear Waste Policy Act of 1982*.
- 2 Public Law 100-203, *The Nuclear Waste Policy Amendments Act of 1987*.
- 3 “The Decision to Recommend Yucca Mountain and the Next Steps Toward Licensed Repository Development,” L.H. Barrett, Waste Management 2002, Tucson, AZ, February 24 – 28, 2002.
- 4 Public Law 102-579, *The Waste Isolation Pilot Plant Land Withdrawal Act of 1992*.
- 5 Public Law 104-201, *The Waste Isolation Pilot Plant Land Withdrawal Amendments Act of 1996*.
- 6 Public Law 94-580, *The Resource Conservation and Recovery Act of 1976*.
- 7 “The WIPP Disposal Decision Plan: The Transparent Roadmap for Repository Certification,” G.E. Dials and L.G. Eriksson, IHLRWM 2003, Las Vegas, NV, March 30 – April 2, 2003.
- 8 “The Successful 1998 Certification of the Waste Isolation Pilot Plant Transuranic Waste Repository – Ten Important Lessons Learned,” M.H. McFadden and L.G. Eriksson, Waste Management 1999, Tucson, AZ, February 28 – March 4, 1999.
- 9 *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F), February, 2002.
- 10 *Strategic Plan for the Safe Transportation of Spent Nuclear Fuel and High-Level Radioactive Waste to Yucca Mountain: A Guide to Stakeholder Interactions*, Office of Civilian Radioactive Waste Management, November 18, 2003.

- 11 *Department of Energy - Notice of Preferred Nevada Rail Corridor*, Federal Register, Volume 68, Number 248, pp. 74951-74952, December 29, 3003.
- 12 *Department of the Interior – Bureau of Land Management - Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada*, Federal Register, Volume 68, Number 248, pp. 74965-74968, December 29, 3003.