

Appendix G

U.S. Nuclear Waste Technical Review Board

Strategic Plan: Fiscal Years 2004–2009

(Revised March 2004)

Statement of the Board

The Nuclear Waste Policy Amendments Act of 1987 directed the U.S. Department of Energy (DOE) to characterize one site, at Yucca Mountain in Nevada, to determine its suitability as the location of a permanent repository for disposing of spent nuclear fuel and high-level radioactive waste. The Act also established the U.S. Nuclear Waste Technical Review Board as an independent agency within the executive branch of the United States Government. The Act requires the Board to evaluate continually the technical and scientific validity of activities undertaken by the Secretary of Energy related to implementing the Act and to report its findings and recommendations to the Secretary and Congress at least twice yearly. The Board only can make recommendations; it cannot compel the DOE to comply.

Congress created the Board to perform ongoing independent and unbiased technical and scientific evaluation—crucial for public acceptance of decisions related to nuclear waste disposal. The Board strives to provide Congress and the Secretary of Energy with completely independent, credible, and timely technical and scientific program evaluations and recommendations achieved through peer review of the highest quality.

This strategic plan includes the Board's goals and objectives for fiscal years 2004 through 2009. During that period, the DOE plans to develop an application for authorization to construct a repository and to submit it to the U.S. Nuclear Regulatory Commission (NRC). During the next several years, important technical and scientific activities will be undertaken by the DOE aimed at (a) gaining a better understanding of the potential behavior of a Yucca Mountain repository, (b) developing a repository design, (c) reducing technical uncertainties, (d) confirming estimates of repository performance, and (e) developing and implementing plans for a waste management system that includes waste transportation, handling, and packaging and repository operations. In accordance with its statutory mandate, the Board will continue its evaluation of the technical and scientific validity of the DOE's work in these areas. In conducting its evaluation, the Board looks at how components of the repository and waste management systems interact with other elements of the systems. This "systems view" of repository and waste management activities will continue to be critically important because many crucial technical and scientific decisions will be made throughout this period.

Mission

The Board's mission, established in the Nuclear Waste Policy Amendments Act (NWPAA) of 1987 (Public Law 100-203), is to "...evaluate the technical and scientific validity of activities [for management of high-level radioactive waste] undertaken by the Secretary after the date of the enactment of the Nuclear Waste Policy Amendments Act of 1987..." By law, the Board will cease to exist not later than one year after the date on which the Secretary begins disposal of high-level radioactive waste or spent nuclear fuel in a repository.

Vision

By performing ongoing and independent technical and scientific peer review of the highest quality, the Board makes a unique and essential contribution to increasing the technical validity of DOE activities related to implementing the Nuclear Waste Policy Act (NWPA) of 1982. The Board also provides essential technical and scientific information to Congress and the public on issues related to the disposal, packaging, and transport of spent nuclear fuel and high-level radioactive waste. The Board performs technical and scientific evaluation of the DOE's work related to (a) gaining a better understanding of the potential behavior of a repository at Yucca Mountain, (b) developing a repository design for safe and efficient repository operations, (c) establishing a program for confirming estimates of repository performance, and (d) developing and implementing plans for a waste management system that includes waste transportation, handling, and packaging and repository operations.

Values

To achieve its goals, the Board conducts itself according to the following values.

- The Board strives to ensure that its members and staff have no real or perceived conflicts of

interest related to the outcome of the Secretary's efforts to implement the NWPA.

- Board members arrive at their conclusions on the basis of objective evaluations of the technical and scientific validity of the Secretary's activities.
- The Board's practices and procedures are open and conducted so that the Board's integrity and objectivity are above reproach.
- The Board's findings, conclusions, and recommendations are technically and scientifically sound and are based on the best available technical analysis and information.
- The Board's findings, conclusions, and recommendations are communicated clearly and in time for them to be most useful to Congress, the Secretary, and the public.
- The Board encourages public comment and discussion of DOE activities and Board findings, conclusions, and recommendations.

Goals and Strategic Objectives

The nation's goals related to disposing of spent nuclear fuel and high-level radioactive waste were set forth by Congress in 1982 in the NWPA. The goals are to develop a repository or repositories for disposing of high-level radioactive waste and spent nuclear fuel at a suitable site or sites and to establish a program of research, development, and demonstration for disposing of such waste.

In 1987, the NWPAA limited repository development activities to a single site at Yucca Mountain in Nevada. The NWPAA also established the Board and charged it with evaluating the technical and scientific validity of the Secretary of Energy's activities associated with implementing the NWPA. The activities include characterizing the Yucca Mountain site and packaging and transporting spent nuclear fuel and high-level radioactive waste.

The Board's general goals have been established in accordance with its statutory mandate and

with congressional action in 2002 authorizing the DOE to proceed with the submittal of an application to the NRC for authorization to construct a repository at Yucca Mountain. The goals reflect the continuity of the Board's technical and scientific evaluation and the Board's systems view of the repository and of waste management activities.

General Goals of the Board

To accomplish its congressional mandate, the Board has established four general goals.

1. Evaluate the technical and scientific validity of activities undertaken by the DOE related to understanding, testing, analyzing, and modeling geologic and other natural components of a proposed Yucca Mountain repository system. Review DOE activities related to estimating and confirming the performance of the natural components of the repository system.
2. Evaluate the technical and scientific validity of activities undertaken by the DOE related to understanding, testing, analyzing, and modeling the engineered components of a proposed Yucca Mountain repository system. Review DOE activities related to estimating and confirming the performance of the engineered components of the repository system.
3. Evaluate the technical and scientific validity of activities undertaken by the DOE related to understanding and modeling interactions among the components of the natural and engineered repository systems, estimating and confirming the performance of the proposed repository system, and integrating scientific and engineering activities.
4. Evaluate the technical and scientific validity of activities undertaken by the DOE related to planning, integrating, and implementing a waste management system, including the transportation, packaging, and handling of spent nuclear fuel and high-level radioactive waste and the operation of a repository.

Strategic Objectives of the Board

To achieve its general goals, the Board has established the following long-term objectives.

1. Objectives Related to the Natural System

- 1.1. Evaluate the technical and scientific validity of data and analyses related to the contributions of the natural barriers to waste isolation in a Yucca Mountain repository.
- 1.2. Evaluate DOE analyses and investigations related to hydrologic, geologic, geotechnical, seismic, volcanic, climatic, biological, and other natural features, events, and processes at the Yucca Mountain site and at related analogue sites.
- 1.3. Review DOE efforts to increase fundamental understanding of the potential behavior of the repository in a natural system.
- 1.4. Evaluate DOE and other studies and analyses related to repository tunnel environments.*
- 1.5. Review DOE integration of technical and scientific activities related to the natural system.
- 1.6. Review DOE efforts to confirm estimates of natural-system performance, including tests of models and assumptions and the pursuit of independent lines of evidence.

2. Objectives Related to the Engineered System

- 2.1. Evaluate the technical and scientific validity of DOE data and analyses related to the contribution of the engineered system to waste isolation in a Yucca Mountain repository.
- 2.2. Evaluate DOE studies and analyses related to the tunnel environments that will affect the performance of waste packages.*

*This is a shared objective under the natural system and engineered system.

2.3. Assess DOE efforts to increase understanding of fundamental corrosion processes in a proposed repository.

2.4. Review waste package designs, including the performance attributes and technical bases for such designs, and assess the need to revise waste package designs on the basis of the results of ongoing technical and scientific studies.

2.5. Evaluate the integration of science and engineering in the DOE program, especially the integration of new data into repository and waste package designs.

2.6. Review DOE activities related to confirming the predicted performance of the engineered system.

3. Objectives Related to Repository System Performance and Integration

3.1. Evaluate the technical and scientific validity of the DOE's technical basis for its estimates of repository system performance.

3.2. Review the technical and scientific validity of DOE models used to predict repository system performance.

3.3. Evaluate DOE efforts to increase confidence in its estimates of repository performance.

3.4. Evaluate the technical and scientific validity of DOE efforts to gain a more realistic understanding of the interaction of the natural and engineered components of a repository system.

3.5. Evaluate the integration of science and engineering with performance assessment.

3.6. Evaluate the technical bases for the DOE's repository safety case, including efforts to integrate the safety case with multiple lines of evidence and performance confirmation.

3.7. Review the development of DOE plans and activities for performance confirmation.

4. Objectives Related to the Waste Management System

4.1. Review DOE efforts related to the interaction of components of the waste management system from a life-cycle systems perspective, including at-reactor storage, waste acceptance, transportation, and repository design and operations.

4.2. Review the technical and scientific validity of the DOE's plans for safely handling and packaging spent nuclear fuel and high-level radioactive waste for transport to a permanent repository and for disposal in a permanent repository.

4.3. Review the technical and scientific aspects of the DOE's transportation plans.

4.4. Review the technical and scientific validity of the DOE's plans for developing a transportation infrastructure.

4.5. Evaluate design and engineering of the facility components or subsystems that involve innovative features, assumptions, and approaches.

4.6. Review the process through which the DOE provides technical and scientific information to interested parties and includes interested members of the public in the development of waste management plans.

Achieving the Goals and Objectives

The NWPA grants significant investigatory powers to the Board. In accordance with the NWPA, the Board may hold such hearings, sit and act at such times and places, take such testimony, and receive such evidence as it considers appropriate.

At the request of the Board and subject to existing law, the NWPAA directs the DOE to provide all records, files, papers, data, and information requested by the Board, including drafts of work products and documentation of work in progress. According to the legislative history, in providing this access, Congress expected that the Board would review and comment on DOE decisions, plans, and actions as they occurred, not after the fact.

By law, no nominee to the Board may be an employee of the DOE, a National Laboratory, or DOE contractors performing activities involving high-level radioactive waste or spent nuclear fuel. The Board has the power, under current law, to achieve its goals and objectives.

In conducting its ongoing technical and scientific review, the Board takes a “systems view” of the repository and of waste management activities. That view considers how one element of the repository system affects another. Consistent with this approach, the Board has established four panels composed of three or four Board members. As described in the following paragraphs, the purviews of the panels correspond to the Board’s general goals.

1. *Panel on the Natural System*

Panel Goal. Evaluate the technical and scientific validity of activities undertaken by the DOE related to understanding, testing, analyzing, and modeling geologic and other natural components of a proposed Yucca Mountain repository system. Review DOE activities related to estimating and confirming the performance of the natural components of the repository system.

2. *Panel on the Engineered System*

Panel Goal. Evaluate the technical and scientific validity of activities undertaken by the DOE related to modeling, understanding, testing, and analyzing the engineered components of a proposed Yucca Mountain repository system. Review DOE activities related to estimating

and confirming the performance of the engineered components of the repository system.

3. *Panel on Repository System Performance and Integration*

Panel Goal. Evaluate the technical and scientific validity of activities undertaken by the DOE related to understanding and modeling the interactions of natural and engineered repository system components, estimating the performance of the proposed repository system, confirming the performance of the proposed repository system, and integrating scientific and engineering activities.

4. *Panel on the Waste Management System*

Panel Goal. Evaluate activities undertaken by the DOE related to planning, integrating, and implementing a waste management system, including the transportation, packaging, and handling of spent nuclear fuel and high-level radioactive waste and the operation of a repository.

Much of the Board’s information-gathering occurs at open public meetings arranged by the Board. At each meeting, the DOE, its contractors, and other program participants present technical information according to an agenda prepared by the Board. Board members and staff question presenters during the meetings. Time is provided at the meeting for comments from members of the public and interested parties. The full Board holds three or four meetings each year. The Board’s panels meet as needed to investigate specific issue areas. The majority of Board meetings are held somewhere in Nevada.

The Board also gathers information from trips to the Yucca Mountain site, visits to contractor laboratories and facilities, and meetings with individuals working on the project. Board members and staff attend national and international symposia and conferences related to the science and technology of nuclear waste disposal. From time to time, Board members and staff also visit programs in other countries to review best

practices, perform benchmarking, and assess potential analogues.

Although the Board's information-gathering activities are carried out primarily to further the Board's review, they often have the collateral benefit of promoting communication and integration of technical information within the DOE program and facilitating the dissemination of information among interested parties outside the program. Analyses are performed primarily by Board members and the Board's staff. When necessary, the Board hires special expert consultants to perform in-depth reviews of specific technical and scientific topics.

Crosscutting Functions

Several entities and agencies are involved in developing a system for safely packaging, transporting, and disposing of spent nuclear fuel and high-level radioactive waste in a geologic repository at a suitable site. As discussed in the following paragraphs, the Board's ongoing peer review is unique among the organizations involved in managing spent nuclear fuel and high-level radioactive waste.

- *Congress and the Administration, including the Secretary of Energy*, make decisions on national policy and goals and how they will be implemented. The Board's role in this process is to help ensure that policy-makers receive unbiased and credible technical and scientific analyses and information.
- *State and local governments* comment on and perform local oversight of DOE activities. The Board's oversight activities are different in that they are (1) unconstrained by any stake in the outcome of the endeavor besides the credibility of the scientific and technical activities, (2) confined to scientific and technical evaluations, and (3) conducted by individuals nominated by the National Academy of Sciences and expressly chosen by the President for their expertise in the various disciplines represented in the DOE program.

- *Other federal agencies* (in addition to the Board) with roles in the waste management program include the DOE, the NRC, the Environmental Protection Agency (EPA), the Department of Transportation (DOT), and the United States Geological Survey (USGS). The DOE and its contractors are responsible for developing and implementing waste management plans and for conducting analytical and research activities related to licensing, constructing, and operating a repository. The NRC is the regulatory body having responsibility for licensing the construction and operation of a proposed repository and for certifying transportation casks. The EPA is responsible for issuing radiation safety standards that the NRC uses to formulate its repository regulations. The DOT is responsible for regulating the transporters of the waste. The USGS participates in site-characterization activities at the Yucca Mountain site.

The Board's role and its systems approach are unique among these organizations. The Board performs ongoing independent review and expert oversight of the technical and scientific validity of the Secretary of Energy's activities relating to civilian radioactive waste management and communicates its findings and recommendations to Congress, the Secretary, and the public. The Board's technical and scientific evaluations complement the work of other agencies involved in achieving the national goal.

Key External Factors

Some factors that are beyond the Board's control could affect its ability to achieve its goals and objectives. Among them are the following.

- *The Board has no implementing authority.* The Board is by statute a technical and scientific review body that only makes recommendations to the DOE. Congress expected that the DOE would accept the Board's recommendations or indicate why the recommendations could not or should not be implemented. However, the DOE is not legally obligated to

accept any of the Board's recommendations. If the DOE does not accept a Board recommendation, the Board's recourse is to advise Congress or reiterate its recommendation to the DOE, or both. The Board's recommendations and the DOE's responses are included in Board reports to Congress and the Secretary.

- *Legislation and budget considerations could affect nuclear waste policy.* The level of funding provided to the Board affects its ability to comprehensively review DOE activities. Funding levels for the program also may influence activities undertaken by the DOE in a given year or over time. In addition, it is not possible to predict if legislation related to nuclear waste disposal will be passed in the future or how the Board might be affected by such legislation, if enacted.

The Board will evaluate the status of these external factors, identify any new factors, and, if warranted, modify the "external factors" section of the strategic plan as part of the annual program evaluation described below.

Evaluating Board Performance

The Board believes that measuring its effectiveness by directly correlating Board recommendations with improvements in the technical and scientific validity of DOE activities would be ideal. However, the Board cannot compel the DOE to comply with its recommendations. Consequently, a judgment about whether a specific recommendation had a positive outcome as defined above may be (1) subjective or (2) an imprecise indicator of Board performance because implementation of Board recommendations is outside the Board's direct control. Therefore, to measure its performance in a given year, the Board has developed performance measures. For each annual performance goal, the Board considers the following.

1. Did the Board undertake the reviews, evaluations, and other activities needed to achieve the goal?

2. Were the results of the Board's reviews, evaluations, and other activities communicated in a timely, understandable, and appropriate way to Congress and the Secretary of Energy?

If both measures were met in relation to a specific goal, the Board's performance in meeting that goal will be judged effective. If only one measure was met, the performance of the Board in achieving that goal will be judged minimally effective. Failing to meet both performance measures without sufficient and compelling explanation will result in a judgment that the Board has been ineffective in achieving that performance goal. If the goals are deferred, that will be noted in the evaluation.

The Board will use its evaluation of its own performance from the current year, together with its assessment of current or potential key issues of concern related to the DOE program, to develop its annual performance objectives and performance-based budget request for subsequent years. The results of the Board's performance evaluation are included in its annual summary report.

Consultations

In developing its original strategic plan, the Board consulted with the Office of Management and Budget, the DOE, congressional staff, and members of the public and provided a copy of the plan to the NRC and to representatives of state and local governments. The Board solicited public comment and presented its strategic plan at a session held expressly for that purpose during a public Board meeting in Amargosa Valley, Nevada, on January 20, 1998. During 2003, the Board again solicited and received comment on its revised strategic plan and performance plan. Many of those comments are incorporated in this revision. Copies of the Board's strategic plan, annual performance plans, and performance-based budget for fiscal year 2005 are available in the Board's summary report for 2003 and on the Board's Web site: www.nwtrb.gov.

Appendix H

U.S. Nuclear Waste Technical Review Board

Performance Evaluation

Fiscal Year 2003

Evaluating the Board's Performance

The Board believes that measuring its effectiveness by directly correlating Board recommendations with improvements in the technical and scientific validity of Department of Energy (DOE) activities would be ideal. However, the Board cannot compel the DOE to comply with its recommendations. Consequently, a judgment about whether a specific recommendation had a positive outcome as defined above may be (1) subjective or (2) an imprecise indicator of Board performance because implementation of Board recommendations is outside the Board's direct control. Therefore, to measure its performance in a given year, the Board has developed performance measures. For each annual performance goal, the Board considers the following.

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performance goal. If the goals are deferred, that will be noted in the evaluation.

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Board's Performance Evaluation for 2003

On the basis of the following evaluation and consistent with the performance measures described in the previous section, the Board's performance for 2003 was found to be effective overall. However, the Secretary's activities related to the waste management program were again somewhat limited in 2003. In addition, some long-term design activities have not been undertaken by the DOE. Therefore, some of the Board's 2003 goals related to design have been deferred, pending DOE activities related to the goals. Goals not fully achieved are listed at the end of their respective sections.

The reliability and completeness of the performance data used to evaluate the Board's performance relative to its annual performance goals is high and can be verified by accessing the referenced documents on the Board's Web site: www.nwtrb.gov.

Performance Goals for FY 2003

The Board's performance goals for fiscal year (FY) 2003 were developed to further the achievement of the Board's general goals and strategic objectives. An evaluation of the Board's effectiveness in achieving each performance goal is provided in the bullet under the goal.

1. Performance Goals Related to Site Suitability and Predicting Repository Performance

PERFORMANCE GOALS AND EVALUATIONS

1.1.1. Review for technical validity the technical and scientific components of the DOE's on-going site investigations (if applicable).

- Evaluation of 1.1.1: The Board held a meeting on January 28, 2003, at which it received updates from the DOE on studies attempting to resolve differences in the existence of fast paths for water flow, on work related to low permeability areas that affect water flow and rates, and on scientific studies related to temperatures in repository tunnels and work in the cross drift. On March 5, 2003, the Board sent a letter to Dr. Margaret Chu stating that resolving differences in opinion on chlorine-36 studies is essential for understanding key processes at Yucca Mountain. The letter went on to state that paleosols merit investigation, noting that ongoing scientific studies will require adequate funding and the attention of program managers. At a February 24, 2003, joint meeting of the Board's Panel on the Natural System and Panel on the Engineered System, the Board discussed in detail the DOE's work related to estimating seismic hazard and in particular ground-motion estimates. In a follow-up letter to Dr. Chu, the panels pointed out problems associated with very conservative ground-motion estimates. After meeting in September 2003, the Board sent a letter on December 16, 2003, in which it encouraged the DOE to develop boreholes as monitoring wells

to obtain hydraulic head, water chemistry, and related hydrogeologic data at small cost. In the same letter, the Board suggested that the DOE undertake a "root cause" analysis to resolve discrepancies in chlorine-36 study results.

1.1.2. Monitor the DOE's efforts to quantify uncertainties related to estimates of repository performance.

- Evaluation of 1.1.2: Duplicate. (See evaluation of 1.3.3.)

1.2.1. Monitor the results of flow-and-transport studies being conducted to obtain information on the potential performance of the saturated zone (SZ) as a natural barrier in the repository system.

- Evaluation of 1.2.1: At a meeting held on January 28, 2003, the Board discussed the significance of alluvial sedimentary deposits (paleosols) in altering directions and rates of water flow and chemical transport in the SZ. The Board sent a letter to the DOE on March 5, 2003, in which it commented on this technical issue. The Board received several updates and a presentation on flow and transport in the SZ and the unsaturated zone at its September 2003 meeting. In a December 16, 2003, letter to Dr. Margaret Chu, the Board suggested that in conjunction with the DOE's planned drilling of aeromagnetic anomalies consideration be given for developing some of the boreholes as monitoring wells to conduct studies related to water flow in the SZ and to obtain information on the ability of the SZ to function as a barrier to migration of radioactive materials.

1.2.2. Evaluate geologic, hydrologic, and geochemical information obtained from the enhanced characterization of the repository block at Yucca Mountain.

- Evaluation of 1.2.2: After receiving an update on scientific activities at its January 2003 meeting, the Board sent a letter on March 5, 2003, to Dr. Margaret

Chu noting that these studies could be very valuable in increasing understanding of the potential behavior of Yucca Mountain but that adequate funding and attention from program managers would be needed to fully realize the potential of the studies.

1.3.1. Determine the strengths and weaknesses of the total system performance assessment (TSPA).

- Evaluation of 1.3.1: In a March 5, 2003, letter to Dr. Margaret Chu, the Board suggested that the DOE gain a better understanding of the potential behavior of the entire repository system through continued scientific studies and by exploring ways to determine and display the contributions of individual barriers to overall repository performance. As part of its comments to the DOE following a February 2003 joint panel meeting on seismic hazard, the Board stated that the lack of physical realism and unrealistic ground-motion estimates had implications for performance assessment, design, and scientific confidence. The Board reviewed and commented on the DOE's technical basis documents in a December 2003 letter to the DOE.

1.3.2. On the basis of an evaluation of the natural processes at work at the Yucca Mountain site, recommend additional work needed to address uncertainties, paying particular attention to estimates of the rate and distribution of water seepage into the proposed repository under proposed repository design conditions.

- Evaluation of 1.3.2: In letters to Dr. Margaret Chu sent by the Board in March and December 2004, the Board reiterated the need to resolve discrepancies between chlorine-36 studies related to the possible existence of fast water paths into exploratory tunnels. In its November 25, 2003, technical report on the potential for corrosion of waste packages during the thermal pulse, the Board commented extensively on the DOE's

active fracture model, which postulates that a vaporization barrier and the capillary properties of the repository tunnel walls will prevent water from seeping into the drifts and onto the waste packages for hundreds of years.

1.3.3. Evaluate the DOE's quantification of uncertainties and conservatisms used in TSPA.

- Evaluation of 1.3.3: In a letter dated June 27, 2003, the Board commented on the implications of using highly conservative assumptions to address seismic issues. The Board recommended that the DOE not take a physically unrealistic or highly conservative approach to addressing seismic issues for several reasons: Such an approach can skew understanding; compounding conservatisms does not always produce conservative results; unrealistic assumptions can lead to unreasonably high costs; using conservatisms in the place of understanding can undermine confidence in results; actions taken later in light of more-realistic assumptions could be harder to implement.

1.3.4. Recommend additional measures for strengthening the DOE's repository safety case.

- Evaluation of 1.3.4: At its January 2003 meeting, the Board received presentations on the contribution of individual barriers to the performance of the repository system. In a March 2003 letter to Dr. Margaret Chu following the meeting, the Board encouraged the DOE to continue its work to evaluate the contributions of the barriers and found that there appear to be opportunities for improving both the analytical approach and the clarity of the presentation of study results. In a December 2003 letter to Dr. Margaret Chu, the Board urged the DOE to integrate the conclusions from the DOE's technical basis documents into a concise description of the safety case for a Yucca Mountain repository. The Board also encouraged the DOE to include in its safety case a dis-

cussion of relevant analogs that can be used as lines of evidence.

1.3.5. Evaluate data from the drift-scale heater test.

- Evaluation of 1.3.5: The Board commented on the drift-scale heater test and other ongoing scientific studies in its letter to Dr. Margaret Chu dated March 5, 2003. The Board pointed out the value of these test in increasing understanding of the potential behavior of a repository system at Yucca Mountain. The Board noted that adequate funding and attention by managers would be necessary to realize the full potential of this scientific work.

1.4.1. Review plans and work carried out on natural and engineered analogs to the repository system.

- Evaluation of 1.4.1: The Board commented on the use of analogs in its June 2003 letter to the DOE on seismic hazard. The Board suggested that the DOE compare tunnel performance under extreme dynamic conditions in DOE models with nuclear test damage data and rockburst damage observed in mines with comparable rock-mass conditions. In its December 2003 letter, the Board suggested the use of analogs as lines of evidence in a repository safety case.

2. Performance Goals Related to the Engineered Repository System

PERFORMANCE GOALS AND EVALUATIONS

2.1.1. Monitor the DOE's development of analytical tools for assessing the differences between different repository designs.

- Evaluation of 2.1.1: On February 20, 2003, the Board transmitted to the DOE a compilation of its statements related to uncertainties related to high-temperature repository designs and thermal loads. The Board held a meeting in Washington, D.C., on May 13-14, that focused on the

DOE's repository design and operating mode for Yucca Mountain. At the meeting, the DOE made presentations related to thermal aspects of the repository design and operating mode, how the thermal aspects were analyzed for waste isolation, and the results of the analyses. The Board noted in its October 21, 2003, letter to the DOE that data currently available to the Board indicate that perforation of waste packages is unlikely if waste-package surface temperatures are kept below 95°C.

2.1.2. Evaluate the accuracy and completeness of the technical bases for repository and waste package designs.

- Evaluation of 2.1.2: The Board commented on the DOE's technical basis for dealing with the evolution of chemical environments on waste package surfaces in a letter to Dr. Margaret Chu dated March 5, 2003. In the same letter, the Board encouraged the DOE to document carefully and completely the technical basis for its answer to a question related to whether a repository with lower peak temperatures on waste package surfaces would reduce uncertainty and the likelihood or severity of corrosion problems. The Board also commented on the use of dual Alloy-22 lids, observing that they may not be justified. The Board devoted most of its May 2003 meeting to discussions about the technical basis for the DOE's proposed repository design and operating mode. Given the information presented at that meeting, the Board sent a letter to Dr. Margaret Chu on October 21, 2003, on the potential for corrosion of waste packages. On November 25, 2003, the Board issued a detailed technical report supporting its conclusions on the potential for deliquescence-based, localized corrosion during the thermal pulse. In December 2003, the Board combined its October letter and November technical report in a report submitted to Congress and the Secretary of Energy.

2.1.3. Evaluate the extent to which the DOE is using the technical bases for modifying repository and waste package designs.

- Evaluation of 2.1.3: The Board received updates at its meetings held in May and September 2003 on the DOE's plans to include a high-temperature repository design in a license application to the Nuclear Regulatory Commission. The Board commented in its letter of October 21, 2003, to Dr. Margaret Chu that most corrosion data are for temperatures below 95°C. Therefore the DOE's data may constitute an adequate technical basis for estimating generalized corrosion of waste packages if temperatures are kept below that level. The Board further comments that it believes that the high temperatures of the DOE's current repository design will result in perforation of the waste packages. The Board goes on to state that perforation is unlikely at temperatures below 95°C.

2.1.4. Monitor and evaluate the DOE's progress in developing a technical basis for modified or novel design features.

- Evaluation of 2.1.4: In a March 2003 letter to Dr. Margaret Chu, the Board commented on potential modifications of the waste package. The Board observed that the dual lid of the current waste package design may not be justified. In addition, the letter goes on to state that current plans not to mitigate tensile stresses of the inner Alloy-22 closure weld raises questions about the dual-lid concept. In addition, because the trunnion-collar sleeves appear complex and prone to crevice corrosion, it may be necessary to reconsider this part of the design.

2.2.1. Evaluate data from studies of corrosion and the waste package environment on the predicted performance of materials being proposed for the EBS.

- Evaluation of 2.2.1: At its January 2003 meeting, the Board heard a presentation

from contractors from the state of Nevada and from the DOE on potentially corrosive environments in repository tunnels and commented on those presentations in a March 2003 letter to Dr. Margaret Chu. In that letter, the Board noted that even though corrosive brines and condensates can be produced at laboratory scale the State presentations did not include estimates of the likelihood that such solutions would occur. The Board devoted most of its May 2003 meeting to discussions about the technical basis for the DOE's proposed repository design and operating mode. Given the information presented at that meeting, the Board sent a letter to Dr. Margaret Chu on October 21, 2003, on the potential for corrosion of waste packages. On November 25, 2003, the Board issued a detailed technical report supporting its conclusions on the potential for deliquescence-based, localized corrosion during the thermal pulse. In December 2003, the Board combined its October letter and November technical report in a report submitted to Congress and the Secretary of Energy. On the basis of data from the DOE, the Board concluded that there is a significant potential for localized corrosion of waste packages during the thermal pulse in the DOE's high-temperature repository design. The Board also found that there are questions about the repository environments predicted by the DOE.

2.3.1. Assess the integration of scientific studies with engineering designs for the repository and the waste package. In particular, monitor the results of ongoing thermal tests and evaluate DOE plans for using the test results to support models of the thermally disturbed region near the repository and for deciding on spacing between emplacement drifts, degree of preclosure ventilation, and closure date of the potential repository.

- Evaluation of 2.3.1: The Board commented in a December 2003 letter to Dr. Margaret Chu that the technical basis documents developed by the DOE have significant potential for improving program integration.

2.3.2. Evaluate the DOE's efforts in identifying natural and engineered analogs (see also 1.4.1).

- Evaluation of 2.3.2: The Board commented on the use of analogs in its June 2003 letter to the DOE on seismic hazard. The Board suggested that the DOE compare tunnel performance under extreme dynamic conditions in DOE models to nuclear test damage data and rockburst damage observed in mines with comparable rock-mass conditions. In its December 2003 letter, the Board suggested the use of analogs as lines of evidence in a repository safety case.

3. Performance Goals Related to the Waste Management System

PERFORMANCE GOALS AND EVALUATIONS

3.1.1. Monitor efforts by the NRC to update estimates of risk associated with transportation of spent nuclear fuel and high-level radioactive waste.

- Evaluation of 3.1.1: Board staff attended meetings of the NRC study committee and updated other staff and the Board members on the NRC committee deliberations.

3.1.2. Evaluate the operation of the entire repository facility, including the surface and subsurface components.

- Evaluation of 3.1.2: In a letter to Dr. Margaret Chu dated March 5, 2003, the Board urged the DOE to adopt a "systems" approach, addressing both strategic and operational considerations in its transportation planning. The Panel on

the Waste Management System held a meeting in February 2003 that tracked the theoretical movement of spent fuel from reactor sites to the repository surface facilities and began identifying issues of concern for future Board meetings. The Board reported its findings from the meeting in a letter to Dr. Margaret Chu dated April 30, 2003.

3.2.1. Evaluate the effects of "off-normal" events at the surface facility and how the events could affect the ability of the facility to receive waste shipments.

- Evaluation of 3.2.1: The Panel on the Waste Management System held a meeting in February 2003 that tracked the theoretical movement of spent fuel from reactor sites to the repository surface facilities and began identifying issues of concern for future Board meetings. In an April 2003 letter to Dr. Chu, the Board identified two issues of concern related to the surface and subsurface facilities at the repository and asked for additional information on both. First, the Board noted the possibility that a small amount of spent fuel could be damaged in transit, requiring mitigation before the remediation facilities are planned to be constructed. Second, the Board asked for information about new underground design changes, including the use of a wheeled waste transporter and the location of exhaust drifts and fans.

3.3.1. Examine the ability of storage casks and containers, including multipurpose canisters, to serve as disposal casks and containers in a repository.

- Evaluation of 3.3.1: Board staff attended meetings of a National Academy of Sciences committee involved in studying this issue and conveyed the discussions surrounding the issues to Board members and other Board staff.

3.4.1. Evaluate logistics capabilities of the transportation system.

- Evaluation of 3.4.1: In an April 2003 letter to Dr. Margaret Chu following its February panel meeting, the Board pointed out that no casks have been certified for transporting some of the higher-burnup spent fuel likely to be generated in the future. The Board went on to state that coordination of cask development with utility shipping needs and with repository and transportation system capabilities will be important.
- 3.4.3 Review criteria for waste acceptance for storage to ensure that accepted material has been suitably characterized for subsequent disposal.
- Evaluation of 3.4.3: In its letter to Dr. Chu of April 2003, the Board called attention to the need to coordinate with the nuclear utilities to ensure that the waste acceptance process proceeds smoothly.
- 3.4.4. Evaluate the DOE's plans for enhancing safety capabilities along transportation corridors, and review the DOE's planning and coordination activities (e.g., route selection), accident prevention activities (e.g., improved inspections and enforcement), and emergency response activities.
- Evaluation of 3.4.4: The Panel on the Waste Management System held a meeting in February 2003 that tracked the theoretical movement of spent fuel from reactor sites to the repository surface facilities and began identifying issues of concern for future Board meetings. In its April 2003 letter to Dr. Margaret Chu, the Board recommended that the DOE adopt safety as guiding principle in planning and developing a transportation system and should develop an integrated safety plan for guiding the development process.
- 3.2.2. Evaluate the effects of reduced receiving capacity at the repository surface facility on the nationwide transportation system.
- 3.2.3. Evaluate effects of human errors in risks associated with packaging and transporting spent nuclear fuel.
- 3.4.2. Monitor progress in implementing new technologies for improving transportation safety for spent fuel (e.g., electronic braking, wheel-bearing monitoring).
- 4. Performance Goals Related to Long-Term Activities**
(Will apply only if the site is found suitable and a site recommendation is ratified.)
- PERFORMANCE GOALS*
- 4.1.1. Monitor the DOE's proposed plans for performance confirmation to help ensure that uncertainties identified as part of the site recommendation process are addressed.
- Evaluation of 4.1.1: The Board received a presentation on the DOE's performance confirmation plans at its September 2003 meeting and commented on the plans in a December 2003 letter to Dr. Margaret Chu. The Board noted that the operational period for performance confirmation may extend beyond repository closure; therefore, it may serve to increase confidence in DOE models by confirming their predictions. The Board urged the DOE to clearly define what it means by performance confirmation.
- The following goal was deferred, pending DOE activities related to design modification.
- 4.1.2. Monitor design modification activities undertaken by the DOE.

The following goals were deferred to 2004, pending the commencement of activities in these areas by the DOE:

Appendix I

U.S. Nuclear Waste Technical Review Board Performance Plan

Fiscal Year 2004

The nation's goals related to disposing of spent nuclear fuel and high-level radioactive waste were set forth by Congress in the Nuclear Waste Policy Act of 1982. The goals are to develop a repository or repositories for disposing of high-level radioactive waste and spent nuclear fuel at a suitable site or sites and establishing a program of research, development, and demonstration for disposing of such waste.

The Nuclear Waste Policy Amendments Act of 1987 (NWPAA) limited repository development activities to a single site, Yucca Mountain in Nevada. The NWPAA also established the Board and charged it with evaluating the technical and scientific validity of the Secretary of Energy's activities associated with implementing the NWPAA. The activities include characterizing the Yucca Mountain site and packaging and transporting spent nuclear fuel and high-level radioactive waste.

The Board's performance goals for fiscal year (FY) 2004 have been developed to achieve the general goals and strategic objectives in its strategic plan. The goals also have been established in accordance with the Board's statutory mandate and reflect congressional action in 2002 authorizing the U.S. Department of Energy (DOE) to proceed with developing an application to be submitted to the Nuclear Regulatory Commission (NRC) for authorization to construct a repository at Yucca Mountain. The Board's performance goals reflect the continuity of the Board's ongoing technical and scientific evaluation and the Board's "systems view" of the repository and of waste management activities.

Performance Goals for FY 2004

The Board's performance goals for FY 2004 have been developed to further the achievement of the Board's general goals and strategic objectives. Because some of the general goals and strategic objectives relate to work and activities that will be undertaken in the future, they may not have corresponding annual performance goals in any given year. The performance goals have been numbered to correlate with appropriate strategic objectives in the Board's strategic plan for FY 2003–2008.

1. Performance Goals Related to the Natural System and Strategy for Achieving the Goals

PERFORMANCE GOALS

- 1.1.1. Review the technical activities and agenda of the DOE's science and technology program.
- 1.1.2. Monitor the results of flow-and-transport studies to obtain information on the potential performance of the saturated zone as a natural barrier in the repository system.
- 1.1.3. Review DOE efforts to confirm estimates of natural-system performance and pursue independent lines of evidence, including tests of models and assumptions.
 - 1.2.1. Review DOE efforts to resolve questions related to possible seismic events and igneous consequences.
 - 1.3.1. Evaluate geologic, hydrologic, and geochemical information obtained from the

enhanced characterization of the repository block (ECRB) at Yucca Mountain.

- 1.3.2. Evaluate data from the drift-scale heater test.
- 1.3.3. Review plans and work carried out on possible analogues for the natural components of the repository system.
- 1.3.4. Recommend additional work needed to address uncertainties, paying particular attention to estimates of the rate and distribution of water seepage into the repository under proposed repository design conditions.
- 1.4.1. Evaluate tunnel-stability studies undertaken by the DOE.
- 1.5.1. Review the DOE's efforts to integrate results of scientific studies on the behavior of the natural system into repository designs.

STRATEGY FOR ACHIEVING GOALS

The Board will accomplish its goals by doing the following.

- Holding three public meetings with the DOE and DOE contractor personnel involving the full Board, and holding meetings of the Panel on the Natural System as needed.
- Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, and total system performance assessment (TSPA).
- Meeting with contractor principal investigators on technical issues, including those related to climate change, seismic and volcanic events, flow and transport in the unsaturated and saturated zones, seepage, and the biosphere.
- Observing relevant laboratory and site investigations, including those conducted in the exploratory studies facility (ESF), the ECRB, and at Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, and Sandia National Laboratories. Observing other field investigations and visiting potential ana-

logue sites. Visiting countries with nuclear-waste disposal programs and attending national and international symposia and conferences.

2. Performance Goals Related to the Engineered System and Strategy for Achieving the Goals

PERFORMANCE GOALS

- 2.1.1. Monitor the DOE's studies related to the relative contribution of engineered barriers to repository performance.
- 2.2.1. Review thermal testing and rock stability testing related to potential conditions in repository tunnels.
- 2.2.2. Evaluate data from studies of the effects of corrosion and the waste package environment on the predicted performance of materials being proposed for engineered barriers.
- 2.3.1. Review the progress and results of materials testing being conducted to address uncertainties about waste package performance.
- 2.3.2. Evaluate the DOE's efforts in identifying natural and engineered analogues for corrosion processes.
- 2.4.1. Monitor the DOE's development of analytical tools for assessing the differences between repository designs.
- 2.4.2. Evaluate the accuracy and completeness of the technical bases for repository and waste package designs and the extent to which the DOE is using the technical bases for modifying repository and waste package designs.
- 2.4.4. Evaluate the integration of the subsurface design and layout with thermal management and preclosure facility operations.
- 2.5.1. Assess the integration of scientific studies with engineering designs for the repository and the waste package.

STRATEGY FOR ACHIEVING GOALS

The Board will accomplish its goals by doing the following.

- Holding three public meetings with DOE and contractor personnel involving the full Board, and holding meetings of the Panel on the Engineered System as needed.
- Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, and TSPA.
- Meeting with contractor principal investigators on technical issues.
- Reviewing DOE documents and databases, paying particular attention to design features developed to promote drainage, control ventilation, and protect workers in the exhaust end of the ventilation system.
- Reviewing the common database (literature, laboratory, and field data) and judging the adequacy of the database for a decision on repository development.
- Observing relevant laboratory investigations, including those conducted at Lawrence Livermore National Laboratory and Lawrence Berkeley National Laboratory. Visiting countries with nuclear-waste disposal programs and attending national and international symposia and conferences.

3. Performance Goals Related to Repository System Performance and Integration and Strategy for Achieving Performance Goals

PERFORMANCE GOALS

- 3.1.1. Identify which technical and scientific activities are on the critical path to reconciling uncertainties related to the DOE's performance estimates.
- 3.1.2. Determine the strengths and weaknesses of TSPA.
- 3.1.3. Evaluate the DOE's treatment of seismic and volcanism issues in TSPA.

- 3.2.1. Evaluate the DOE's quantification of uncertainties and conservatisms used in TSPA.
- 3.2.2. Review new data and updates of TSPA models, and identify models and data that should be updated.
- 3.3.1. Evaluate the DOE's efforts to create a transparent and traceable TSPA.
- 3.3.2. Evaluate the DOE's efforts to develop simplified models of repository performance.
- 3.3.3. Evaluate the DOE's efforts to identify analogues for performance estimates of the overall repository system.
- 3.4.1. Evaluate the DOE's efforts to analyze the contribution of the different engineered and natural barriers to waste isolation.
- 3.5.1. Evaluate technical aspects of value engineering (providing a needed function reliably and at the lowest cost) and performance-related trade-off studies, including criteria, weighting factors, and decision methodologies for such studies; how technical uncertainties are taken into account; and what factors are included or excluded from such studies and why.
- 3.6.1. Recommend additional measures for strengthening the DOE's repository safety case.
- 3.7.1. Evaluate the DOE's efforts to develop a feedback loop among performance-confirmation activities and TSPA models and data.
- 3.7.2. Monitor the DOE's proposed plans for performance confirmation to help ensure that uncertainties identified as part of the site recommendation process are addressed.

STRATEGY FOR ACHIEVING GOALS

The Board will accomplish its goals by doing the following.

- Holding three public meetings with DOE and contractor personnel involving the full Board, and holding meetings of the Panel on the

Repository System Performance and Integration as needed.

- Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, and the DOE's TSPA.
- Meeting with contractors' principal investigators on technical issues.
- Observing relevant laboratory investigations, including those conducted at Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, Sandia National Laboratories, and the engineered-barrier test facility. Observing field investigations. Visiting countries with nuclear-waste disposal programs and attending national and international symposia and conferences.

4. Performance Goals Related to the Waste Management System and Strategy for Achieving the Goals

PERFORMANCE GOALS

- 4.1.1. Evaluate the operation of the entire repository facility, including the surface and sub-surface components.
- 4.1.2. Monitor the identification of research needs to support improved understanding of the interaction of components of the waste management system.
- 4.1.3. Review the technical and scientific basis of the DOE's analyses of component interactions in various scenarios, including the degree of integration and redundancy across functional components over time.
- 4.1.4. Evaluate the effects of reduced receiving capacity at the repository surface facility on the nationwide transportation system.
- 4.1.5. Review criteria for waste acceptance for storage to ensure that accepted material has been characterized suitably for subsequent disposal.

- 4.2.1. Monitor the DOE's efforts to implement Section 180 (c) of the NWPA.
- 4.3.1. Monitor the DOE's progress in developing and implementing a transportation plan for shipping spent nuclear fuel and high-level radioactive waste to a Yucca Mountain repository.
- 4.3.2. Review the DOE's efforts to develop criteria for decisions on transportation mode and routing.
- 4.3.3. Evaluate logistics capabilities of the transportation system.
- 4.3.4. Monitor progress in implementing new technologies for improving transportation safety for spent nuclear fuel.
- 4.3.5. Evaluate the DOE's plans for enhancing safety capabilities along transportation corridors, and review the DOE's planning and coordination activities (e.g., route selection), accident prevention activities (e.g., improved inspections and enforcement), and emergency response activities.

STRATEGY FOR ACHIEVING GOALS

The Board will accomplish its goals by doing the following.

- Holding three public meetings with DOE and contractor personnel involving the full Board, and holding meetings of the Board's Panel on the Waste Management System in appropriate areas of the country.
- Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, and TSPA.
- Meeting with groups involved in implementing transportation plans, including the NRC, the Department of Transportation, railroad and trucking companies, nonprofit groups, nuclear utilities, and other interested parties. Visiting countries with nuclear-waste disposal programs and attending national and international conferences and symposia.

Appendix J

U.S. Nuclear Waste Technical Review Board Performance Plan

Fiscal Year 2005

Goals and Strategic Objectives

The nation's goals related to disposing of spent nuclear fuel and high-level radioactive waste were set forth by Congress in the NWPA. The goals are to develop a repository or repositories for disposing of high-level radioactive waste and spent nuclear fuel at a suitable site or sites and to establish a program of research, development, and demonstration for disposing of such waste.

The NWPA limited repository development activities to a single site, Yucca Mountain in Nevada. The NWPA also established the Board and charged it with evaluating the technical and scientific validity of the Secretary of Energy's activities associated with implementing the NWPA. The activities include characterizing the Yucca Mountain site and packaging and transporting spent nuclear fuel and high-level radioactive waste.

The Board's general goals and strategic objectives, which are presented in the Board's strategic plan for fiscal years (FY) 2004–2009, have been established in accordance with its statutory mandate and with congressional action in 2002 authorizing the DOE to proceed with developing an application to be submitted to the NRC for authorization to construct a repository at Yucca Mountain. The Board's goals reflect the continuity of the Board's ongoing technical and scientific evaluation and the Board's "systems view" of the repository and of waste management activities.

The Board's performance goals for FY 2005, which are included in this document, have been developed to further the achievement of the Board's general goals and strategic objectives. The performance goals have been numbered to correlate with appropriate strategic objectives, and preliminary budget amounts have been allocated to each set of performance goals.

Board Performance Goals for FY 2005

1. Performance Goals Related to the Natural System and Strategy for Achieving the Goals

(Dollars in Thousands)

| FY 03 | FY 04 | FY 05 |
|-------|-------|-------|
| 795 | 794 | 800 |

PERFORMANCE GOALS

- 1.1.1. Review the technical activities and agenda of the DOE's science and technology effort.
- 1.1.2. Monitor the results of flow-and-transport studies to obtain information on the potential performance of the saturated zone as a natural barrier in the repository system.
- 1.1.3. Review DOE efforts to confirm estimates of natural-system performance and pursue independent lines of evidence, including tests of models and assumptions.
 - 1.2.1. Review DOE efforts to resolve questions related to possible seismic events and igneous consequences.
 - 1.3.1. Evaluate geologic, hydrologic, and geochemical information obtained from the enhanced characterization of the repository block (ECRB) at Yucca Mountain.
 - 1.3.2. Evaluate data from the drift-scale heater test.
 - 1.3.3. Review plans and work carried out on possible analogues for the natural components of the repository system.
 - 1.3.4. Recommend additional work needed to address uncertainties, paying particular attention to estimates of the rate and distri-

bution of water seepage into the repository under proposed repository design conditions.

- 1.4.1. Evaluate tunnel-stability studies undertaken by the DOE.
- 1.5.1. Review the DOE's efforts to integrate results of scientific studies on the behavior of the natural system into repository designs.

STRATEGY FOR ACHIEVING GOALS

The Board will accomplish its goals by doing the following.

- Holding three public meetings with the DOE and DOE contractor personnel involving the full Board, and holding meetings of the Panel on the Natural System as needed.
- Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, and total system performance assessment (TSPA).
- Meeting with contractor principal investigators on technical issues, including those related to climate change, seismic and volcanic events, flow and transport in the unsaturated and saturated zones, seepage, and the biosphere.
- Observing relevant laboratory and site investigations, including those conducted in the exploratory studies facility (ESF), the ECRB, and at Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, and Sandia National Laboratories. Observing other field investigations and visiting potential analogue sites. Visiting countries with nuclear-waste disposal programs and attending national and international symposia and conferences.

2. Performance Goals Related to the Engineered System and Strategy for Achieving the Goals

(Dollars in Thousands)

| FY 03 | FY 04 | FY 05 |
|-------|-------|-------|
| 954 | 953 | 960 |

PERFORMANCE GOALS

- 2.1.1. Monitor the DOE's performance allocation studies.
- 2.2.1. Review thermal testing and rock-stability testing related to potential conditions in repository tunnels.
- 2.2.2. Evaluate data from studies of the effects of corrosion and the waste package environment on the predicted performance of materials being proposed for engineered barriers.
- 2.3.1. Review the progress and results of materials testing being conducted to address uncertainties about waste package performance.
- 2.3.2. Evaluate the DOE's efforts in identifying natural and engineered analogues for corrosion processes.
- 2.4.1. Monitor the DOE's development of analytical tools for assessing the differences between repository designs.
- 2.4.2. Evaluate the accuracy and completeness of the technical bases for repository and waste package designs and the extent to which the DOE is using the technical bases for modifying repository and waste package designs.
- 2.4.3. Evaluate the integration of the subsurface design and layout with thermal management and preclosure facility operations.
- 2.5.1. Assess the integration of scientific studies with engineering designs for the repository and the waste package.

STRATEGY FOR ACHIEVING GOALS

The Board will accomplish its goals by doing the following.

- Holding three public meetings with DOE and contractor personnel involving the full Board, and holding meetings of the Panel on the Engineered System as needed.
- Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, and TSPA.

- Meeting with contractor principal investigators on technical issues.
- Reviewing DOE documents and databases, paying particular attention to design features developed to promote drainage, control ventilation, and protect workers in the exhaust end of the ventilation system.
- Reviewing the common database (literature, laboratory, and field data) and judging the adequacy of the database for a decision on repository development.
- Observing relevant laboratory investigations, including those conducted at Lawrence Livermore National Laboratory and Lawrence Berkeley National Laboratory. Visiting countries with nuclear-waste disposal programs and attending national and international symposia and conferences.

3. Performance Goals Related to Repository System Performance and Integration and Strategy for Achieving Performance Goals

(Dollars in Thousands)

| FY 03 | FY 04 | FY 05 |
|-------|-------|-------|
| 636 | 635 | 640 |

PERFORMANCE GOALS

- 3.1.1. Identify which technical and scientific activities are on the critical path to reconciling uncertainties related to the DOE's performance estimates.
- 3.1.2. Determine the strengths and weaknesses of TSPA.
- 3.1.3. Evaluate the DOE's treatment of seismic and volcanism issues in TSPA.
- 3.2.1. Evaluate the DOE's quantification of uncertainties and conservatisms used in TSPA.
- 3.2.2. Review new data and updates of TSPA models, and identify models and data that should be updated.

- 3.3.1. Evaluate the DOE's efforts to create a transparent and traceable TSPA.
- 3.3.2. Evaluate the DOE's efforts to develop simplified models of repository performance.
- 3.3.3. Evaluate the DOE's efforts to identify analogues for performance estimates of the overall repository system.
- 3.4.1. Evaluate the DOE's efforts to analyze the contribution of the different engineered and natural barriers to waste isolation.
- 3.5.1. Evaluate technical aspects of value engineering and performance-related trade-off studies, including criteria, weighting factors and decision methodologies for such studies and how technical uncertainties are taken into account.
- 3.6.1. Recommend additional measures for strengthening the DOE's repository safety case.
- 3.7.1. Evaluate the DOE's efforts to develop a feedback loop among performance-confirmation activities and TSPA models and data.
- 3.7.2. Monitor the DOE's proposed plans for performance confirmation to help ensure that uncertainties identified as part of the site recommendation process are addressed.

STRATEGY FOR ACHIEVING GOALS

The Board will accomplish its goals by doing the following.

- Holding three public meetings with DOE and contractor personnel involving the full Board and holding meetings of the Panel on the Repository System Performance and Integration, as needed.
- Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, and the DOE's TSPA.
- Meeting with contractor's principal investigators on technical issues.

- Observing ongoing laboratory investigations, including those conducted at Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, Sandia National Laboratories, and the engineered-barrier test facility. Observing field investigations. Visiting countries with nuclear-waste disposal programs and attending national and international symposia and conferences.

4. Performance Goals Related to the Waste Management System and Strategy for Achieving the Goals

(Dollars in Thousands)

| FY 03 | FY 04 | FY 05 |
|-------|-------|-------|
| 795 | 794 | 800 |

PERFORMANCE GOALS

- 4.1.1. Evaluate the operation of the entire repository facility, including the surface and sub-surface components.
- 4.1.2. Monitor the identification of research needs to support improved understanding of the interaction of components of the waste management system.
- 4.1.3. Review the technical and scientific basis of the DOE's analyses of component interactions under various scenarios, including the degree of integration and redundancy across functional components over time.
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- 4.2.1. Monitor the DOE's efforts to implement Section 180 (c) of the NWPA.

- 4.3.1. Monitor the DOE's progress in developing and implementing a transportation plan for shipping spent nuclear fuel and high-level radioactive waste to a Yucca Mountain repository.
- 4.3.2. Review the DOE's efforts to develop criteria for decisions on transportation mode and routing.
- 4.3.3. Evaluate logistics capabilities of the transportation system.
- 4.3.4. Monitor progress in implementing new technologies for improving transportation safety for spent nuclear fuel.
- 4.3.5. Evaluate the DOE's plans for enhancing safety capabilities along transportation corridors, and review the DOE's planning and coordination activities (e.g., route selection), accident prevention activities (e.g., improved inspections and enforcement), and emergency response activities.

STRATEGY FOR ACHIEVING GOALS

The Board will accomplish its goals by doing the following.

- Holding three public meetings with DOE and contractor personnel involving the full Board, and holding meetings of the Board's Panel on the Waste Management System in appropriate areas of the country.
- Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, and TSPA.
- Meeting with groups involved in implementing transportation plans, including the NRC, the Department of Transportation, railroad and trucking companies, nonprofit groups, the utilities, and other stakeholders. Visiting countries with nuclear-waste transportation and disposal programs and attending national and international conferences and symposia.

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