

Appendix G

Nuclear Waste Technical Review Board Strategic Plan for FY 2001-2006 (Revised March 2001)

Statement of the Chairman

The U.S. Nuclear Waste Technical Review Board was established as an independent agency of the United States Government on December 22, 1987, in the Nuclear Waste Policy Amendments Act. Congress charged the Board with evaluating the technical and scientific validity of activities undertaken by the Secretary of Energy, including characterizing a site at Yucca Mountain, Nevada, for its suitability as the location of a permanent repository for civilian spent nuclear fuel and high-level radioactive waste. The Board also reviews activities related to packaging and transporting such waste. In creating the Board, Congress realized that an unbiased technical and scientific evaluation of the credibility of site evaluation and other high-level radioactive waste management activities would be crucial to public acceptance of any approach for disposing of the waste.

The Board takes its peer review role very seriously. The Board strives to provide Congress and the Sec-

retary of Energy with completely independent, credible, and timely technical and scientific program evaluations and recommendations achieved through peer review of the highest quality. The Board's technical and scientific findings and recommendations are included in reports that are submitted at least twice each year to the Secretary of Energy and the Congress. The Board can make recommendations but cannot compel the Department of Energy to comply.

The attached strategic plan includes the Board's goals and objectives for 2001 through 2006. *If* the site is recommended for repository development, much important technical and scientific work will continue on repository design, and transportation and packaging of the waste will gain in prominence. Because many critical decisions will be made throughout this period, we believe that the Board's ongoing review of these efforts will continue to be critically important.

On behalf of the Board,
Jared L. Cohon, Chairman

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 [high-level radioactive waste management] activities undertaken by the Secretary of Energy, including site-characterization activities; and activities related to the packaging or transportation of high-level radioactive waste and spent nuclear fuel." By law, the Board shall 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 technical and scientific review and evaluation of the highest quality, the Board makes a unique and essential contribution to enhancing the technical and scientific credibility of the Secretary of Energy's efforts to characterize the Yucca Mountain site for its suitability as the location of a permanent repository for the safe disposal of spent nuclear fuel and high-level radioactive waste. If the Secretary and the President recommend the site and if the site is accepted, the Board will continue to perform critical technical and scientific peer review of performance-confirmation work. If construction of a repository proceeds at the site, the Board also will provide technical and scientific oversight of activities related to packaging and transporting the waste to the repository.

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 conflicts of interest—real or perceived—related to the Secretary's efforts to characterize the Yucca Mountain site or to package and transport spent nuclear fuel and high-level radioactive waste.

The 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 and recommendations are technically and scientifically sound and are based on the best available technical analysis and information.

The Board's findings 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 discussion of its findings and recommendations at its meetings.

NWTRB General Goals and Objectives

The national goal for radioactive waste management established by Congress in the Nuclear Waste Policy Act of 1982 and the Nuclear Waste Policy Amendments Act of 1987 is safe disposal of civilian spent nuclear fuel and high-level radioactive waste in a permanent geologic repository at a suitable site or sites. In the acts, Congress directed the U.S. Department of Energy (DOE) to characterize a site at Yucca Mountain, Nevada, to determine its suitability as the potential location of a permanent repository for high-level radioactive waste. Congress charged the Nuclear Waste Technical Review Board with reviewing the technical and scientific validity of the Secretary of Energy's activities associated with achieving this goal, including characterizing the site and packaging and transporting the waste. The Board's general goals have been established in accordance with its congressional mandate.

General Goals

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

1. Ensure that technical and scientific activities undertaken by the DOE related to determining the suitability of the Yucca Mountain site as the possible

location of a permanent repository and predicting the performance of a potential repository establish a sound technical basis for a decision on whether to recommend the site for repository development.

2. Ensure that technical and scientific activities undertaken by the DOE related to designing a repository and waste packages are well integrated and establish a sound technical basis for designing the repository system, including the engineered barrier system (EBS).
3. Ensure that technical and scientific activities undertaken by the DOE related to packaging, handling, and transporting spent nuclear fuel and high-level radioactive waste to a permanent repository are well integrated and establish a sound technical basis for designing and operating a waste management system.
4. Ensure that long-term technical and scientific activities undertaken by the DOE, including performance confirmation and design modifications, establish a sound technical basis for reducing uncertainties related to repository performance, operating a repository, and revising repository and waste package designs. (Will apply only if the site is found suitable and a site recommendation is approved.)

Strategic Objectives

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

1. Objectives Related to Site Suitability and Predicting Repository Performance

- 1.1 Evaluate the technical and scientific validity of DOE studies, testing, and analyses supporting a decision on whether to recommend the Yucca Mountain site.
- 1.2 Evaluate the hydrologic, geologic, chemical, and other natural processes at the Yucca Mountain site that establish the foundation for predicting repository performance.
- 1.3 Review the technical and scientific validity of models used to predict repository performance.

- 1.4 Evaluate the DOE's progress in developing a safety strategy for the Yucca Mountain site.
- 1.5 Review the *Record of Decision* for the final environmental impact statement (EIS) for a potential Yucca Mountain site.

2. Objectives Related to the Engineered Repository System

- 2.1 Evaluate repository and waste package designs, including the technical bases for the designs.
- 2.2 Review the progress and results of materials testing being conducted to address uncertainties about waste package performance.
- 2.3 Assess the integration of science and engineering in the DOE program, paying particular attention to the effects of site-characterization studies (e.g., modeling, testing, and analyses of thermal, mechanical, and chemical effects) on repository and waste package designs.

3. Objectives Related to the Waste Management System

- 3.1. Evaluate the accuracy and reasonableness of analyses, methods, and major assumptions used by the DOE in estimating health and safety risks associated with transporting spent nuclear fuel and high-level radioactive waste.
- 3.2. Review the adequacy of requirements for developing the transportation infrastructure necessary to move significant amounts of spent nuclear fuel from individual reactor sites to a DOE storage or disposal site. Compare these requirements with current transportation capabilities, and determine the effort needed to develop a large-scale transportation capability.
- 3.3 Review the adequacy of the DOE's plans for safely handling and packaging spent nuclear fuel and high-level radioactive waste for transport to a permanent repository.
- 3.3. Evaluate the effectiveness of the DOE's efforts to integrate the various components of the waste management system (packaging, handling, transport, storage, and disposal of the waste).

3.4. Review the DOE's plans for addressing public safety concerns and for enhancing safety capabilities along transportation corridors. This includes activities related to development of plans (e.g., route selection), coordination, accident prevention (e.g., improved inspections and enforcement), and emergency response.

4. Objectives Related to Long-Term Activities

(Will apply only if the site is found suitable and a site recommendation is ratified)

4.1 Monitor performance-confirmation activities undertaken by the DOE that are designed to reduce uncertainties related to repository performance, including corrosion testing.

4.2 Monitor performance-confirmation activities undertaken by the DOE, and evaluate the need to revise repository or waste package designs on the basis of the results of such activities.

Achieving the Goals and Objectives

Congress granted significant investigatory powers to the Board in the NWPAA. In accordance with the NWPAA, 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. By law, no nominee to the Board is employed by the DOE or its contractors. The Board has adopted strong anti-conflict-of-interest procedures that go even further to ensure that the Board avoids even the appearance of a conflict.

Subject to existing law, the DOE is directed 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. The Board believes that it has adequate powers under current law to achieve its goals and objectives.

Much of the Board's information gathering is done at open public meetings where the DOE, its contractors, and other program participants present technical information. The Board's five panels meet as needed and are organized around specific issue areas. The full Board meets three or four times each year. The Board also gathers information through field trips to the Yucca Mountain site, visits to contractor laboratories and facilities, and informal meetings with individuals working on the project. Although the Board's information-gathering activities are carried out primarily to further the Board's review, they 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 of the information gathered by the Board are performed by its members, the Board's professional staff, and consultants hired to supplement the expertise of the Board and the staff.

The DOE is scheduled to decide in 2001 whether to recommend the Yucca Mountain site for repository development. If the decision is positive and the President and Congress approve the recommendation, the DOE will apply to the Nuclear Regulatory Commission (NRC) for a license to construct and operate a repository at the site. If the license is approved, the expectation is that testing will continue at the site to increase confidence in predictions of repository performance. The Board expects to review the analytical processes as well as the base of technical information used by the DOE in making decisions about site recommendation. The Board also will review the technical and scientific validity of activities related to confirmatory testing and to transportation and packaging of spent nuclear fuel and high-level radioactive waste. The Board reports the results of its reviews at least twice each year to Congress and the Secretary of Energy. Additional communication occurs as needed. Such communications are available to the public either by request or on the Board's Web site at www.nwtrb.gov.

Crosscutting Functions

Several entities and agencies share responsibility for the ultimate national goal established by Congress of packaging, transporting, and disposing of spent nuclear fuel and high-level radioactive waste in a geologic repository at a suitable site. Although there may be crosscutting areas of interest, the Board's role is unique among those involved in managing high-level radioactive waste. For example:

Congress and the Administration, including the Secretary of Energy, make policy decisions on what the national goals will be and how they will be implemented. The Board's role in this process is to help ensure that policy-makers are given unbiased and credible technical and scientific analyses and information.

State and local governments comment on and oversee 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.

Federal agencies that have roles in achieving a safe 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 the waste management system and for planning and conducting research activities related to disposal, packaging, and transportation of spent nuclear fuel and high-level radioactive waste. The NRC is the regulatory body authorized to license the construction and operation of the repository to ensure protection of public health and safety and the environment. The EPA is the agency given the responsibility to issue health-based safety standards. The DOT is responsible for regulating the transportation of the waste. The USGS partici-

pates in site-characterization activities at the Yucca Mountain site. The Board's role is unique among these federal agencies: perform ongoing, independent review and oversight of the technical and scientific validity of the Secretary of Energy's activities relating to civilian radioactive waste management, including site characterization and packaging and transportation of spent nuclear fuel and high-level radioactive waste, and communicate its findings and recommendations to Congress, the Secretary of Energy, and the public. The Board's evaluation of the technical and scientific validity of the Secretary's activities related to civilian radioactive waste management complements and enhances 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 definition and mandate a review body that can only make recommendations to the DOE. Congress expected that the DOE would accept the Board's recommendations or indicate why the recommendations should not be followed. However, the DOE is not legally obligated to accept any of the Board's recommendations.

To increase its effectiveness, the Board has developed procedures for increasing the relevance of its findings and recommendations for Congress, the Secretary, DOE program managers, and the public. The Board's recommendations and the DOE's responses are included in Board reports to Congress and the Secretary. 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.

Legislation could affect nuclear waste policy. Congress has considered nuclear waste legislation several times in the last few years, and the current Congress may vote on legislation in the next two years. The effects of such legislation, if enacted, on

the program or the Board's activities are not currently known.

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 will conduct an annual review of its actions in achieving its performance goals from the previous year. The Board believes that measuring its effectiveness by directly correlating improvements in the DOE program with Board actions and recommendations would be ideal. However, the Board has no implementing authority, so it cannot compel the DOE to comply with its recommendations. Consequently, a judgment about whether a specific recommendation had a positive outcome for the DOE program is, in most cases, (1) subjective and (2) an imprecise indicator of Board performance because implementation of Board recommendations by the DOE is outside the Board's direct control. Therefore, to measure its performance in a given year, the Board has developed the following performance measures.

In evaluating its performance, the Board will consider (1) whether the reviews, evaluations, and other activities included in its performance goals have been completed; and (2) whether the results of reviews, evaluations, and other activities undertaken under the auspices of program goals have been communicated in a timely, understandable, and appro-

priate way to the Secretary of Energy and Congress. The results of this evaluation will constitute the Board's assessment of its performance for the year. The Board will regard its performance as minimally effective if the activities, reviews, evaluations, and other activities included in its annual performance goals were completed. The Board will regard its performance as effective if those activities were completed and the results were communicated in a timely way to the Secretary of Energy and Congress.

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 civilian radioactive waste program, to establish its annual performance goals and to develop its budget request for subsequent years. The results of the Board's performance evaluation are included in the Board's annual summary report to Congress and the Secretary.

Congressional and Stakeholder 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 this purpose during a meeting in Amargosa Valley, Nevada, on January 20, 1998. A copy of the plan is available on the Board's Web site: www.nwtrb.gov.

Appendix H

Nuclear Waste Technical Review Board FY 2000 Performance Plan and Evaluation (Revised March 2001)

NWTRB General Goals and Objectives

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

1. Objectives Related to Site Suitability and Predicting Repository Performance

- 1.1 Evaluate the technical and scientific validity of DOE studies, testing, and analyses supporting a decision on whether to recommend the Yucca Mountain site.
- 1.2 Evaluate the hydrologic, geologic, chemical, and other natural processes at the Yucca Mountain site that establish the foundation for predicting repository performance.
- 1.3 Review the technical and scientific validity of models used to predict repository performance.
- 1.4 Evaluate the DOE's progress in developing a safety strategy for the Yucca Mountain site.
- 1.5 Review the *Record of Decision* for the final environmental impact statement (EIS) for a potential Yucca Mountain site.

2. Objectives Related to the Engineered Repository System

- 2.1 Evaluate repository and waste package designs, including the technical bases for the designs.
- 2.2 Review the progress and results of materials testing being conducted to address uncertainties about waste package performance.
- 2.3 Assess the integration of science and engineering in the DOE program, paying particular attention to the effects of site-characterization studies (e.g., modeling, testing, and analyses of thermal, mechanical, and chemical effects) on repository and waste package designs.

3. Objectives Related to the Waste Management System

- 3.1 Evaluate the accuracy and reasonableness of analyses, methods, and major assumptions used by the DOE in estimating health and safety risks associated with transporting spent nuclear fuel and high-level radioactive waste.
- 3.2 Review the adequacy of requirements for developing the transportation infrastructure necessary to move significant amounts of spent nuclear fuel from individual reactor sites to a DOE storage or disposal site. Compare these requirements with current transportation capabilities, and determine the effort needed to develop a large-scale transportation capability.
- 3.3 Review the adequacy of the DOE's plans for safely handling and packaging spent nuclear fuel and high-level radioactive waste for transport to a permanent repository.
- 3.4 Evaluate the effectiveness of the DOE's efforts to integrate the various components of the waste management system (packaging, handling, transport, storage, and disposal of the waste).
- 3.5 Review the DOE's plans for addressing public safety concerns and for enhancing safety capabilities along transportation corridors. This includes activities related to development of plans (e.g., route selection), coordination, accident prevention (e.g., improved inspections and enforcement), and emergency response.

4. Objectives Related to Long-Term Activities

(Will apply only if the site is found suitable and a site recommendation is ratified)

- 4.1 Monitor performance-confirmation activities undertaken by the DOE that are designed to reduce uncertainties related to repository performance, including corrosion testing.
- 4.2 Monitor performance-confirmation activities undertaken by the DOE, and evaluate the need to revise repository or waste package designs on the basis of the results of such activities.

Performance Goals for FY 2000

The Board's performance goals for FY 2000 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. For example, the following performance goals for FY 2000 relate primarily to DOE activities supporting a DOE decision on whether to recommend the Yucca Mountain site to the President, the design of a potential repository and waste package, and transportation planning.

1. Performance Goals Related to Site Suitability and Predicting Repository Performance and Strategy for Achieving Performance Goals

Performance Goals

- 1.1.1 Identify and evaluate uncertainties that need to be addressed for making a technically supportable site-suitability decision in preparation for a possible site recommendation.
- 1.1.2 On the basis of an evaluation of the natural processes at work at the Yucca Mountain site, recommend additional needed information, paying particular attention to estimates of the rate and distribution of water seepage into the proposed repository.
 - 1.2.1 Evaluate geologic, hydrologic, and geochemical information obtained from the enhanced characterization of the repository block (ECRB) at Yucca Mountain.
 - 1.2.2 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.
 - 1.3.1 Monitor the results of flow-and-transport studies being conducted to obtain information on the potential performance of the saturated zone as a natural barrier in the repository system.
 - 1.3.2 Determine the strengths and weaknesses of the total system performance assessment (TSPA).
 - 1.3.3 Evaluate the DOE's use of risk assessment and quantification of uncertainty, and determine whether they are being used appropriately.

Strategy for Achieving Goals

The strategy for achieving performance goals for fiscal year 2000 is similar to that used and proven successful in previous years. The Board will accomplish its goals by doing the following.

Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, the TSPA for site recommendation, and the site recommendation.

Meeting with contractor principal investigators on technical issues, including those related to climate change, unsaturated and saturated zone flow and transport, seepage, and the biosphere.

Holding public meetings with the DOE and contractor personnel at least three times a year with the full Board and several meetings with individual Board panels.

Visiting and observing ongoing laboratory investigations, including the facilities at Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, Sandia National Laboratory, and the engineered barrier test facility.

Observing field investigations, including the niche, alcove, and sealed cross drift (ECRB) studies and Busted Butte.

Meeting with other entities carrying out research on, or providing input to, scientific and technical issues related to waste disposal, including the NRC and its contractors the Southwest Research Institute, the Nye County Early Warning Drilling Program, the University of Nevada at Las Vegas project on fluid inclusions, the Environmental Protection Agency, and the State of Nevada Nuclear Waste Projects Office.

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

Performance Goals

- 2.1.1 Monitor and evaluate the DOE's progress in analyzing alternatives to the reference design for the waste package and the repository.
- 2.2.1 Evaluate the results of corrosion studies on materials being proposed for the EBS.
- 2.3.1 Assess the effects of site-characterization studies on the EBS design.

Strategy for Achieving Goals

The Board will accomplish its goals by doing the following.

Evaluating the technical bases for EBS design by reviewing technical documents and databases, particularly the technical bases for making and inspecting final closure welds of the waste package and the methods for making drip shield sections. Meetings will be held as necessary with project personnel to obtain clarification and confirmation.

Evaluating the technical bases for repository design by reviewing 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.

Evaluating repository and waste package designs to identify which parts (if any) of the designs do not have a satisfactory technical basis.

Evaluating the DOE's technical bases for alternative design features.

After identifying the corrosion mechanisms most important to performance of the overall repository system, reviewing the common database (literature, laboratory, and field data) and judging the adequacy of the database for a site recommendation decision.

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

Performance Goals

- 3.1.1 Determine the adequacy of the DOE's treatment of transportation in the draft environmental impact statement (DEIS).
- 3.5.1 Monitor progress by the railroad industry in implementing new technologies (e.g., electronic braking, wheel-bearing monitoring).

Strategy for Achieving Goals.

The Board will accomplish its goals by doing the following.

Attending DOE-sponsored public hearings to determine what, in the public's view, are the critical issues not currently addressed or adequately addressed in the DEIS. The Board also will contract with an independent contractor to conduct an analysis of the treatment of transportation in the DEIS. If the Board determines that there are weaknesses in the DEIS, it will provide feedback to the DOE.

Meeting with the American Association of Railroads (AAR) to review draft performance specification and evaluating the potential effect of the performance specification on the safety of the DOE's proposed shipping campaign. The Board will conduct a panel meeting with the AAR, the DOE, the DOT, and others to further evaluate the benefits of the ARR's performance specification. The Board will travel to the ARR's Technology Center in Pueblo, Colorado, to see demonstrations of the latest technologies related to train safety.

Measuring Board Performance

The Board will conduct an annual review of its actions in achieving its performance goals from the previous year. The Board believes that measuring its effectiveness by directly correlating improvements in the DOE program with Board actions and recommendations would be ideal. However, the Board has no implementing authority, so it cannot compel the

DOE to comply with its recommendations. Consequently, a judgment about whether a specific recommendation had a positive outcome for the DOE program is, in most cases, (1) subjective and (2) an imprecise indicator of Board performance because implementation of Board recommendations by the DOE is outside the Board's direct control. Therefore, to measure its performance in a given year, the Board has developed the following performance measures.

In evaluating its performance, the Board will consider (1) whether the reviews, evaluations, and other activities included in its performance goals have been completed; and (2) whether the results of reviews, evaluations, and other activities undertaken under the auspices of program goals have been communicated in a timely, understandable, and appropriate way to the Secretary of Energy and Congress. The results of this evaluation will constitute the Board's assessment of its performance for the year. The Board will regard its performance as minimally effective if the activities, reviews, evaluations, and other activities included in its annual performance goals were completed. The Board will regard its performance as effective if those activities were completed and the results were communicated in a timely way to the Secretary of Energy and Congress.

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 civilian radioactive waste program, to establish its annual performance goals and to develop its budget request for subsequent years. The results of the Board's performance evaluation are included in the Board's annual summary report to Congress and the Secretary.

Performance Evaluation for Fiscal Year 2000

On the basis of the following evaluation and in accordance with the performance measures described above, the Board's overall performance in fiscal year 2000 was effective. However, primarily because DOE engaged in very little transportation-related activity in 2000, the Board's performance in meeting

its two goals related to transportation of spent fuel and high-level radioactive waste was judged minimally effective.

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

- 1.1.1 Identify and evaluate uncertainties that need to be addressed for making a technically supportable site-suitability decision in preparation for a possible site recommendation.

Evaluation of 1.1.1: The Board reviewed DOE efforts to identify uncertainties and recommended that the DOE quantify any remaining uncertainties to increase the transparency of technical evaluations supporting a decision on site suitability. The Board commented on the importance of this issue in testimony before the House Subcommittee on Energy and Power, Committee on Commerce, on June 23, 2000. A comprehensive discussion of program uncertainties was included in Board answers to questions posed by Representative Joe Barton, Chair of the House Subcommittee on Energy and Power, following the congressional hearing. The Board's answers were submitted to Congressman Barton on August 31, 2000. The Board also commented on this issue in letters to Office of Civilian Radioactive Waste Management (OCRWM) director Ivan Itkin on March 20, 2000, on June 16, 2000, and on September 20, 2000, and in its year-end letter report to the U.S. Congress and the Secretary of Energy (December 2000).

- 1.1.2 On the basis of an evaluation of the natural processes at work at the Yucca Mountain site, recommend additional needed information, paying particular attention to estimates of the rate and distribution of water seepage into the proposed repository.

Evaluation of 1.1.2: The Board commented on this issue in letters to OCRWM director, Ivan Itkin on March 20, 2000, and September 20, 2000. This subject was discussed at several Board meetings and was touched on in the answers to questions from Representative Joe Barton (August 31, 2000).

1.2.1 Evaluate geologic, hydrologic, and geochemical information obtained from the enhanced characterization of the repository block (ECRB) at Yucca Mountain.

Evaluation of 1.2.1: Members of the Board toured the ECRB in 2000. Studies in the ECRB were the subject of discussion during several Board meetings in 2000. The Board commented on studies in the ECRB in letters to OCRWM director Ivan Itkin on March 20, 2000, and September 20, 2000, and in congressional testimony in June 2000.

1.2.2 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.

Evaluation of 1.2.2: Results from thermal tests were not available in 2000. The Board will continue to monitor these tests and will evaluate the results when they become available.

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

Evaluation of 1.3.1: The Board monitored the progress of flow-and-transport studies conducted by the Nye County Early Warning Drilling program and commented on findings from the studies and on coordination with the DOE in letters to OCRWM director Ivan Itkin on March 20, 2000, and September 20, 2000.

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

Evaluation of 1.3.2: The Board commented extensively on the TSPA during meetings with the DOE, in letters to OCRWM director Ivan Itkin on March 20, 2000, and September 20, 2000, in congressional testimony on June 23, 2000, in answers to questions from Representative Joe

Barton (August 31, 2000), and in its year-end letter report to the U.S. Congress and the Secretary of Energy.

1.3.3 Evaluate the DOE's use of risk assessment and quantification of uncertainty, and determine whether they are being used appropriately.

Evaluation of 1.3.3: The Board commented extensively on the need for the DOE to quantify uncertainty in meetings with the DOE, in letters to OCRWM director Ivan Itkin on March 20, 2000, and September 20, 2000, in congressional testimony (June 23, 2000), in answers to questions from Representative Barton, and in its year-end report to the U.S. Congress and the Secretary of Energy (December 2000).

2. Performance Goals Related to the Engineered Barrier System

2.1.1 Monitor and evaluate the DOE's progress in analyzing alternatives to the reference design for the waste package and the repository.

Evaluation of 2.1.1: The Board monitored the DOE's efforts in this area and commented extensively on the importance of this issue in letters to Ivan Itkin on March 20, 2000, on June 16, 2000, and on September 20, 2000; in testimony before the House Energy and Power Subcommittee (June 23, 2000); in answers to questions from Representative Barton; and in its year-end report to Congress and the Secretary of Energy (December 2000).

2.2.1 Evaluate the results of corrosion studies on materials being proposed for the EBS.

Evaluation of 2.2.1: The Board monitored the progress of corrosion testing conducted by the DOE and its contractors in 2000 and commented on the importance of this issue in its letter to Ivan Itkin on September 20, 2000, and in congressional testimony (June 2000).

2.3.1 Assess the effects of site-characterization studies on the EBS design.

Evaluation of 2.3.1: The Board commented on the importance of the waste package environment in a letter to Ivan Itkin on September 20, 2000.

3. Performance Goals Related to the Waste Management System

3.1.1 Determine the adequacy of the DOE's treatment of transportation in the draft environmental impact statement (DEIS).

Evaluation of 3.1.1: DOE activities related to transportation of spent nuclear fuel and high-level radioactive waste were very limited. The Board's Panel on the Waste Management System held a meeting in July 2000 during which this topic was discussed.

3.1.2. Monitor progress by the railroad industry in implementing new technologies (e.g., electronic braking, wheel-bearing monitoring).

Evaluation of 3.1.2: There was very little activity in 2000 related to transportation of spent nuclear fuel and high-level radioactive waste. The Board's Panel on the Waste Management System held a meeting in July 2000 during which this topic was discussed briefly.

Board Operations

The Board is composed of 11 members appointed by the President who serve on a part-time basis; are eminent in a relevant field of science or engineering, including environmental sciences; and are appointed solely on the basis of distinguished service. Because of the comprehensive nature of the program and the part-time availability of the members, Congress authorized the Board to maintain a small professional staff of 10 full-time employees to support the Board's comprehensive review of the DOE program. In addition to the members and profes-

sional staff, the Board maintains a small administrative staff that supports its activities.

The full Board meets three or four times each year. The Board has organized itself into panels that meet as needed. The Board also gathers information from field trips to the Yucca Mountain site, visits to contractor laboratories and facilities, and informal meetings with individuals working on the project. On the basis of the information gathered throughout the year, the Board issues its findings in letters and reports.

Resource Allocation for Fiscal Year 2000

The Board's budget request for fiscal year 2000 was \$3,150,000. Of that total, \$2,150,000 was allocated to activities related to site characterization. The allocation included the salaries and benefits of the Board's members and professional staff. It also included the cost of conducting meetings, field trips, and other fact-finding activities and the production of reports related to the activities. Transportation and packaging activities, which include activities similar to those used to evaluate site-characterization efforts, was allocated \$550,000. The balance of \$450,000 was allocated to the management and administrative support of the Board's activities in fiscal year 2000.

The Board's appropriation for fiscal year 2000 was \$2,600,000. As a result of reduction from the Board's budget request, the Board has had to adapt the performance plan to the reduced appropriation level. The revised allocations are as follows: \$1,350,000 for activities related to site characterization; \$500,000 for transportation and packaging activities,* which include activities similar to those used to evaluate site-characterization efforts; \$200,000 for communications (Congress, public, etc.); and \$550,000 for management support and for administrative and information technology support of the Board's activities in fiscal year 2000.

* Because of DOE inactivity in the area of packaging and transportation in fiscal year 2000, almost \$400,000 of this amount was reallocated to activities related to site characterization. The remainder was spent on a meeting of the Board's panel on transportation and the waste management system and on reviewing work supporting the Board's FY 2001 transportation goals.

Appendix I

Nuclear Waste Technical Review Board

Fiscal Year 2001 Performance Plan

(Revised March 2001)

NWTRB General Goals And Strategic Objectives

The national goal for radioactive waste management established by Congress in the Nuclear Waste Policy Act of 1982 and the Nuclear Waste Policy Amendments Act of 1987 is safe disposal of civilian spent nuclear fuel and high-level radioactive waste in a permanent geologic repository at a suitable site or sites. In the acts, Congress directed the Department of Energy (DOE) to characterize a site at Yucca Mountain, Nevada, to determine its suitability as the potential location of a permanent repository for high-level radioactive waste. Congress charged the Nuclear Waste Technical Review board with reviewing the technical and scientific validity of the Secretary of Energy's activities associated with achieving this goal, including characterizing the site and packaging and transporting the waste. The Board's general goals have been established in accordance with its congressional mandate.

General Goals

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

1. Ensure that technical and scientific activities undertaken by the DOE related to determining the suitability of the Yucca Mountain site as the possible location of a permanent repository and predicting the performance of a potential repository establish a sound technical basis for a decision on

whether to recommend the site for repository development.

2. Ensure that technical and scientific activities undertaken by the DOE related to designing the repository and waste packages are well integrated and establish a sound technical basis for designing the repository system, including the engineered barrier system (EBS).
3. Ensure that technical and scientific activities undertaken by the DOE related to packaging, handling, and transporting spent nuclear fuel and high-level waste to a permanent repository are well integrated and establish a sound technical basis for designing and operating a waste management system.
4. Ensure that long-term technical and scientific activities undertaken by the DOE, including performance confirmation and design modifications, establish a sound technical basis for reducing uncertainties related to repository performance, operating a repository, and revising repository and waste package designs. (Will apply only if the site is found suitable and a site recommendation is approved.)

Strategic Objectives

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

1. Objectives Related to Site Suitability and Predicting Repository Performance

- 1.1 Evaluate the technical and scientific validity of DOE studies, testing, and analyses supporting a decision on whether to recommend the Yucca Mountain site.
- 1.2 Evaluate the hydrologic, geologic, chemical, and other natural processes at the Yucca Mountain site that establish the foundation for predicting repository performance.
- 1.3 Review the technical and scientific validity of models used to predict repository performance.
- 1.4 Evaluate the DOE's progress in developing a safety strategy for the Yucca Mountain site.
- 1.5 Review the *Record of Decision* and maintain awareness of legal challenges to the final environmental impact statement (EIS) for a potential Yucca Mountain site.

2. Objectives Related to the Engineered Repository System

- 2.1 Evaluate repository and waste package designs, including the technical bases for the designs.
- 2.2 Review the progress or results of materials testing being conducted to address uncertainties about waste package performance.
- 2.3 Assess the integration of science and engineering in the DOE program, paying particular attention to the effects of site-characterization studies (e.g. modeling, testing, and analyses of thermal and mechanical effects) on repository and waste package designs.

3. Objectives Related to the Waste Management System

- 3.1 Evaluate the accuracy and reasonableness of analyses, methods, and major assumptions used by the DOE in estimating health and safety risks associated with transporting spent nuclear fuel and high-level radioactive waste.

- 3.2 Review the adequacy of plans and requirements for developing the transportation infrastructure necessary to move significant amounts of spent fuel from individual reactor sites to a DOE storage or disposal site. Compare these requirements with current transportation capabilities, and determine the effort needed to develop a large-scale transportation capability.
- 3.3 Review the adequacy of the DOE's plans for safely handling and packaging spent nuclear fuel and high-level radioactive waste for transport to a permanent repository.
- 3.4 Evaluate the effectiveness of the DOE's efforts to integrate the various components of the waste management system (packaging, handling, transport, storage, and disposal of the waste).
- 3.5 Review the DOE's plans for addressing public safety concerns and for enhancing safety capabilities along transportation corridors. This includes activities related to development of plans (e.g., route selection), coordination, accident prevention (e.g., improved inspections and enforcement), and emergency response.

4. Objectives Related to Long-Term Activities (Will apply only if the site is found suitable and a site recommendation is ratified)

- 4.1 Monitor performance-confirmation activities undertaken by the DOE that are designed to reduce uncertainties related to repository performance.
- 4.2 Monitor performance-confirmation activities undertaken by the DOE, and evaluate the need to revise repository or waste package designs on the basis of the results of such activities.

Performance Goals for FY 2001

The Board's performance goals for FY 2001 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. For example, the following performance goals for FY 2001 relate primarily to DOE activities supporting a DOE decision on whether to recommend the Yucca Mountain site to the President, the design of a potential repository and waste package, and transportation planning.

1. Performance Goals Related to Site Suitability and Predicting Repository Performance and Strategy for Achieving Performance Goals

Performance Goals

- 1.1.1 Review for technical validity the technical and scientific components of the DOE site recommendation report.
- 1.1.2 Review for technical validity the technical and scientific components of the DOE site recommendation "notification document."
- 1.1.3 Review for technical validity the technical components of the DOE site recommendation "consideration document."
- 1.1.4 Evaluate the DOE's use of risk assessment and quantification of uncertainty, and determine whether they are being used appropriately.
- 1.2.1 Monitor the results of flow-and-transport studies being conducted to obtain information on the potential performance of the saturated zone as a natural barrier in the repository system.
- 1.2.2 Evaluate geologic, hydrologic, and geochemical information obtained from the enhanced characterization of the repository block at Yucca Mountain.
- 1.2.3 Evaluate results of the fluid inclusion study.
- 1.3.1 Set priorities among and evaluate for technical validity the DOE process model reports that will be used to support a decision on site recommendation.

1.3.2 Determine the strengths and weaknesses of the total system performance assessment (TSPA) and recommend additional measures to strengthen DOE's repository safety case.

1.4.1 Determine the appropriateness of the "principal factors" identified by the DOE in its safety strategy.

1.4.2 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.

Strategy for Achieving Goals

The strategy for achieving performance goals for fiscal year 2001 is similar to that used and proven successful in previous years. The Board will accomplish its goals by doing the following.

Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, the TSPA, and the site recommendation.

Meeting with contractor's principal investigators on technical issues, including those related to climate change, unsaturated and saturated zone flow and transport, seepage, and the biosphere.

Holding public meetings with the DOE and contractor personnel at least three times a year involving the full Board and several meetings with individual Board panels.

Visiting and observing ongoing laboratory investigations, including the facilities at Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, Sandia National Laboratory, and the engineered barrier test facility.

Observing field investigations, including the niche, alcove, and sealed cross drift (ECRB) studies and Busted Butte.

Meeting with other entities carrying out research on, or providing input to, scientific and technical issues related to waste disposal, including the NRC and its contractors, the Southwest Research Institute, The Nye County Early Warning Drilling Program, the University of Nevada at Las Vegas project on fluid inclusions, the Environmental Protection Agency, and the State of Nevada Nuclear Waste Projects Office.

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

Performance Goals

- 2.1.1 Evaluate the accuracy and completeness of the technical bases for repository and waste package designs.
- 2.1.2 Evaluate the extent to which the DOE is using the technical bases for developing repository and waste package designs.
- 2.1.3 Monitor and evaluate the DOE's progress in developing a technical basis for modified or novel design features.
- 2.1.4 Evaluate the adequacy for a site recommendation decision of corrosion studies on materials being proposed for the EBS.
- 2.1.5 Assess the integration of scientific studies with engineering designs for the repository and 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 to decide on spacing between emplacement drifts, degree of preclosure ventilation, and closure date.

Strategy for Achieving Goals

The Board will accomplish its goals by doing the following.

Evaluating the technical bases for the EBS design by reviewing technical documents and databases (e.g., the controlled design assumption document

and the technical database), paying particular attention to the technical bases for making and inspecting final closure welds of the waste package and methods for making drip shield sections. Meetings will be held as necessary with project personnel to obtain clarification and confirmation.

Evaluating the technical bases for repository design by reviewing federal documents and databases, paying particular attention to design features designed to promote drainage, control ventilation, and protect workers in the exhaust end of the ventilation system.

Evaluating repository and waste package designs to identify which parts (if any) of the designs do not have a technical basis.

Evaluating the DOE's technical program to fill in the gaps. In addition, where the DOE is working on alternative design features, the Board will evaluate the technical basis for these features.

After identifying the corrosion mechanisms most important to performance of the overall repository system, reviewing the common database (literature, laboratory, and field data) and judging the adequacy of the database for a site recommendation decision.

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

Performance Goals

- 3.1.1 Evaluate storage cask and container designs to ascertain whether there is a sufficient technical basis for predicting potential problems that could develop during storage and that could affect the performance of the spent nuclear fuel during subsequent repository disposal.
- 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.

- 3.2.2 Evaluate the effects of reduced receiving capacity at the repository surface facility on the nationwide transportation system.
- 3.3.1 Examine the ability of storage casks and containers, including multipurpose canisters, to serve as disposal casks and containers in a repository.
- 3.4.1 Monitor progress by the railroad industry in implementing new technologies that would enhance the safety of spent-fuel transportation (e.g., electronic braking, wheel-bearing monitoring). Evaluate how well the DOE works with the railroad industry to design an integrated transportation cask-rail and car-train system that would ensure maximum safety and efficiency.
- 3.4.2 Review criteria for waste acceptance for storage to ensure that accepted material has been suitably characterized for subsequent disposal.
- 3.4.3 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:

Meeting with the American Association of Railroads (AAR), individual railroad companies, and railroad infrastructure manufacturers to determine the current state of rail infrastructure and noting the effects of a sustained transportation campaign on the railroad industry. The Board will monitor the construction of a short-line rail line currently under construction in Minnesota as an analog to a possible rail line in Nevada from a main line to a repository at Yucca Mountain.

Continuing to meet with the AAR to keep up to date on the work they are doing related to their

performance specification for shipping radioactive waste. Meeting with AAR personnel at the AAR Technology Center in Pueblo, Colorado.

Attending the semiannual DOE-sponsored Transportation External Working Group meetings to meet with first responders along the proposed transportation corridors to determine how well the DOE is working to implement Section 180(c) of the Nuclear Waste Policy Act.

Holding a meeting of the Board's Panel on the Waste Management System.

3. Performance Goal Related to Licensing and Performance Confirmation and Strategy for Achieving the Goal

Performance Goal

- 4.1.1 Monitor the DOE's proposed performance confirmation plans to help ensure that uncertainties identified as part of the site recommendation process are addressed.

Strategy for Achieving Goal

The Board will accomplish its goal by doing the following:

Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, the TSPA, and the site recommendation.

Reviewing performance-confirmation plans and meeting with DOE personnel to discuss aspects of the plans.

Performance Measurement

The Board believes that measuring its effectiveness by directly correlating improvements in the DOE program with Board actions and recommendations would be ideal. However, the Board has no implementing authority, so it cannot compel the DOE to comply with its recommendations. Consequently, a judgment about whether a specific recommendation had a positive outcome for the DOE program is, in

most cases, (1) subjective and (2) an imprecise indicator of Board performance because implementation of Board recommendations by the DOE 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. Were the reviews, evaluations, and other activities undertaken under the auspices of the goal completed?
2. Were the results of the reviews, evaluations, and other activities communicated in a timely, understandable, and appropriate way to Congress and the Secretary of Energy?

If both measures are met, the Board's performance in meeting the annual goal will be judged effective. If only one measure is 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.

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 civilian radioactive program, to establish its annual performance objectives and develop its budget request for subsequent years. The results of the Board's performance evaluation are included in the Board's annual summary report to Congress and the Secretary.

Board Operations

The Board is composed of 11 members appointed by the President who serve on a part-time basis; are eminent in a relevant field of science or engineering, in-

cluding environmental sciences; and are appointed solely on the basis of distinguished service. Because of the comprehensive nature of the program and the part-time availability of the members, Congress authorized the Board to maintain a small professional staff of 10 full-time employees to support the Board's comprehensive review of the DOE program. In addition to the members and professional staff, the Board maintains a small administrative staff that supports its activities.

The full Board meets three or four times each year. The Board has organized itself into panels that meet as needed. The Board also gathers information from field trips to the Yucca Mountain site, visits to contractor laboratories and facilities, and informal meetings with individuals working on the project. On the basis of the information gathered throughout the year, the Board issues its findings in letters and reports.

FY 2001 Performance Plan Resource Allocation

The Board's budget request for fiscal year 2001 is \$3,200,000. Of that amount, \$1,583,285 will be allocated to activities related to site characterization and \$526,886 will be allocated to activities related to packaging and transportation. The activities are described in detail in the attached annual performance plan. That total represents 67 percent of the Board's total budget. The remaining 33 percent is allocated to administrative and information technology support, communication to Congress and the Secretary, and public outreach.

The budget allocations for site characterization and for transportation and packaging consist primarily of the salaries of Board members and technical staff. They also include travel to the project site at Yucca Mountain to meet with project staff and the expenses related to conducting meetings.

Appendix J

Nuclear Waste Technical Review Board Fiscal Year 2002 Performance Plan (March 2001)

NWTRB General Goals and Strategic Objectives

The national goal for radioactive waste management established by Congress in the Nuclear Waste Policy Act of 1982 and the Nuclear Waste Policy Amendments Act of 1987 is safe disposal of civilian spent nuclear fuel and high-level radioactive waste in a permanent geologic repository at a suitable site or sites. In the acts, Congress directed the Department of Energy (DOE) to characterize a site at Yucca Mountain, Nevada, to determine its suitability as the potential location of a permanent repository for high-level radioactive waste. Congress charged the Nuclear Waste Technical Review Board with reviewing the technical and scientific validity of the Secretary of Energy's activities associated with achieving this goal, including characterizing the site and packaging and transporting the waste. The Board's general goals have been established in accordance with its congressional mandate.

General Goals

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

1. Ensure that technical and scientific activities undertaken by the DOE related to determining the suitability of the Yucca Mountain site as the possible location of a permanent repository and predicting the performance of a potential repository establish a sound technical basis for a decision on

whether to recommend the site for repository development.

2. Ensure that technical and scientific activities undertaken by the DOE related to designing the repository and waste packages are well integrated and establish a sound technical basis for designing the repository system, including the engineered barrier system (EBS).
3. Ensure that technical and scientific activities undertaken by the DOE related to packaging, handling, and transporting spent nuclear fuel and high-level radioactive waste to a permanent repository are well integrated and establish a sound technical basis for designing and operating a waste management system.
4. Ensure that long-term technical and scientific activities undertaken by the DOE, including performance confirmation and design modifications, establish a sound technical basis for reducing uncertainties related to repository performance, operating a repository, and revising repository and waste package designs. (Will apply only if the site is found suitable and a site recommendation is approved.)

Strategic Objectives

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

1. Objectives Related to Site Suitability and Predicting Repository Performance

- 1.1 Evaluate the technical and scientific validity of DOE studies, testing, and analyses supporting a decision on whether to recommend the Yucca Mountain site.
- 1.2 Evaluate the hydrologic, geologic, chemical, and other natural processes at the Yucca Mountain site that establish the foundation for predicting repository performance.
- 1.3 Review the technical and scientific validity of models used to predict repository performance.
- 1.4 Evaluate the DOE's progress in developing a safety strategy for the Yucca Mountain site.
- 1.5 Review the *Record of Decision* for the final environmental impact statement (EIS) for a potential Yucca Mountain site.

2. Objectives Related to the Engineered Repository System

- 2.1 Evaluate repository and waste package designs, including the technical bases for the designs.
- 2.2 Review the progress and results of materials testing being conducted to address uncertainties about waste package performance.
- 2.3 Assess the integration of science and engineering in the DOE program, paying particular attention to the effects of site-characterization studies (e.g., modeling, testing, and analyses of thermal, mechanical, and chemical effects) on repository and waste package designs.

3. Objectives Related to the Waste Management System

- 3.1 Evaluate the accuracy and reasonableness of analyses, methods, and major assumptions used by DOE in estimating health and safety risks associated with transporting spent nuclear fuel and high-level radioactive waste.
- 3.2 Review the adequacy of requirements for developing the transportation infrastructure neces-

sary to move significant amounts of spent nuclear fuel from individual reactor sites to a DOE storage or disposal site. Compare these requirements with current transportation capabilities, and determine the effort needed to develop a large-scale transportation capability.

- 3.3 Review the adequacy of the DOE's plans for safely handling and packaging spent nuclear fuel and high-level radioactive waste for transport to a permanent repository.
- 3.4 Evaluate the effectiveness of the DOE's efforts to integrate the various components of the waste management system (packaging, handling, transport, storage, and disposal of the waste).
- 3.5 Review the DOE's plans for addressing public safety concerns and for enhancing safety capabilities along transportation corridors. This includes activities related to development of plans (e.g., route selection), coordination, accident prevention (e.g., improved inspections and enforcement), and emergency response.

4. Objectives Related to Long-Term Activities (Will apply only if the site is found suitable and a site recommendation is ratified)

- 4.1 Monitor performance-confirmation activities undertaken by the DOE that are designed to reduce uncertainties related to repository performance, including corrosion testing.
- 4.2 Monitor performance-confirmation activities undertaken by the DOE, and evaluate the need to revise repository or waste package designs on the basis of the results of such activities.

Performance Goals for FY 2002

The Board's performance goals for fiscal year (FY) 2002 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. For example, the following performance goals for FY 2002 relate primarily to DOE activities supporting a DOE decision on whether to recommend the Yucca Mountain site to the President, the design of a potential repository and waste package, and transportation planning.

1. Performance Goals Related to Site Suitability and Predicting Repository Performance and Strategy for Achieving Performance Goals

Performance Goals

- 1.1.1 Review for technical validity the technical and scientific components of a DOE site recommendation report (if applicable).
- 1.1.2 Monitor the DOE's efforts to quantify uncertainties related to estimates of repository performance.
 - 1.2.1 Monitor the results of flow-and-transport studies being conducted to obtain information on the potential performance of the saturated zone as a natural barrier in the repository system.
 - 1.2.2 Evaluate geologic, hydrologic, and geochemical information obtained from the enhanced characterization of the repository block at Yucca Mountain.
 - 1.3.1 Determine the strengths and weaknesses of the total system performance assessment (TSPA).
 - 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, including particular attention to estimates of the rate and distribution of water seepage into the proposed repository under proposed repository design conditions.
 - 1.3.3 Evaluate the DOE's quantification of uncertainties and conservatisms used in TSPA.

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

- 1.3.5 Evaluate data from drift-scale heater test.

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

Strategy for Achieving Goals

The strategy for achieving performance goals for fiscal year 2002 is similar to that used and proven successful in previous years. The Board will accomplish its goals by doing the following:

Reviewing critical documents provided by the DOE and its contractors, including contractor reports, process model reports, the TSPA for site recommendation, and the site recommendation.

Meeting with contractor's principal investigators on technical issues, including those related to climate change, unsaturated and saturated zone flow and transport, seepage, and the biosphere.

Holding public meetings with DOE and contractor personnel at least three times a year involving the full Board and holding several meetings with individual Board panels.

Visiting and observing ongoing laboratory investigations, including the facilities at Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, Sandia National Laboratory, and the engineered-barrier test facility. Observing field investigations.

Meeting with other entities carrying out research on, or providing input to, scientific and technical issues related to waste disposal, including the Nuclear Regulatory Commission (NRC) and its contractors, the Southwest Research Institute, The Nye County Early Warning Drilling Program, the Environmental Protection Agency, and the State of Nevada Nuclear Waste Projects Office.

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

Performance Goals

- 2.1.1 Monitor the DOE's development of analytical tools for assessing the differences between different repository designs.
- 2.1.2 Evaluate the accuracy and completeness of the technical bases for repository and waste package designs.
- 2.1.3 Evaluate the extent to which the DOE is using the technical bases for modifying repository and waste package designs.
- 2.1.4 Monitor and evaluate the DOE's progress in developing a technical basis for modified or novel design features.
- 2.1.5 Evaluate data from corrosion and waste package environment studies on the predicted performance of materials being proposed for the EBS.
- 2.1.6 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.
- 2.1.7 Evaluate the DOE's efforts in identifying natural and engineered analogs.

Strategy for Achieving Goals

The Board will accomplish its goals by doing the following:

Evaluating the technical bases for the EBS design by reviewing technical documents and databases (e.g., the controlled design assumption document and the technical database), paying particular at-

tention to the technical bases for making and inspecting final closure welds of the waste package and methods for making sections of the drip shields. Meetings will be held with project personnel as necessary to obtain clarification and confirmation.

Evaluating the technical bases for repository design by 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.

Evaluating repository and waste package designs to identify which parts (if any) of the designs do not have a technical basis.

Evaluating the technical basis for the DOE's work on alternative design features.

After identifying the corrosion mechanisms most important to performance of the overall repository system, reviewing the common database (literature, laboratory, and field data) and judging the adequacy of the database for a decision on site recommendation.

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

Performance Goals

- 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.
- 3.1.2 Evaluate the operation of the entire repository facility, including the surface and subsurface components.
- 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.
- 3.2.2 Evaluate the effects of reduced receiving capacity at the repository surface facility on the nationwide transportation system.

- 3.3.1 Examine the ability of storage casks and containers, including multipurpose canisters, to serve as disposal casks and containers in a repository.
- 3.3.2 Evaluate effects of human errors in risks associated with packaging and transporting spent nuclear fuel and high-level radioactive waste.
- 3.4.1 Evaluate logistics capabilities of the transportation system.
- 3.4.2 Monitor progress in implementing new technologies for improving transportation safety for spent nuclear fuel and high-level radioactive waste (e.g., electronic braking, wheel-bearing monitoring).
- 3.4.3 Review criteria for waste acceptance for storage to ensure that accepted material has been suitably characterized for subsequent disposal.
- 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.

Strategy for Achieving Goals

The Board will accomplish its goals by doing the following:

Meeting with the American Association of Railroads (AAR), individual railroad companies, and railroad infrastructure manufacturers to determine the current state of rail infrastructure, and noting the effects of a sustained transportation campaign on the railroad industry.

Attending meetings of the DOE-sponsored Transportation External Working Group to determine how well the DOE is working to implement Section 180(c) of the Nuclear Waste Policy Act.

Holding meetings of the Board's Panel on the Waste Management System, as appropriate.

4. Performance Goals Related to Long-Term Activities and Strategy for Achieving Performance Goals (Will apply only if the site is found suitable and a site recommendation is ratified.)

Performance Goals

- 4.1.1 Monitor DOE's proposed plans for performance confirmation to help ensure that uncertainties identified as part of the site recommendation process are addressed.
- 4.1.2 Monitor design modification activities undertaken by DOE.

Strategy for Achieving Goals

The Board will accomplish its goals by doing the following.

Reviewing critical documents provided by the DOE and its contractors including contractor reports, process model reports, the TSPA for site recommendation, and the site recommendation.

Reviewing performance-confirmation plans and meeting with DOE personnel to discuss aspects of the plans.

Performance Measurement

The Board believes that measuring its effectiveness by directly correlating improvements in the DOE program with Board actions and recommendations would be ideal. However, the Board has no implementing authority, so it cannot compel the DOE to comply with its recommendations. Consequently, a judgment about whether a specific recommendation had a positive outcome for the DOE program is, in most cases, (1) subjective and (2) an imprecise indicator of Board performance because implementation of Board recommendations by the DOE 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. Were the reviews, evaluations, and other activities undertaken under the auspices of the goal completed?
2. Were the results of the reviews, evaluations, and other activities communicated in a timely, understandable, and appropriate way to Congress and the Secretary of Energy?

If both measures are met, the Board's performance in meeting the annual goal will be judged effective. If only one measure is 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.

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 civilian radioactive program, to establish its annual performance objectives and develop its budget request for subsequent years. The results of the Board's performance evaluation are included in the Board's annual summary report to Congress and the Secretary.

Board Operations

The Board is composed of 11 members appointed by the President who serve on a part-time basis; are eminent in a relevant field of science or engineering, including environmental sciences; and are appointed solely on the basis of distinguished service. Because of the comprehensive nature of the program and the part-time availability of the members, Congress

authorized the Board to maintain a small professional staff of 10 full-time employees to support the Board's comprehensive review of the DOE program. In addition to the members and professional staff, the Board maintains a small administrative staff that supports its activities.

The full Board meets three or four times each year. The Board has organized itself into panels that meet as needed. The Board also gathers information from field trips to the Yucca Mountain site, visits to contractor laboratories and facilities, and informal meetings with individuals working on the project. On the basis of the information gathered throughout the year, the Board issues its findings in letters and reports.

FY 2002 Performance Plan Resource Allocation

The Board's budget request for fiscal year 2002 is \$3,100,000. Of that amount, \$1,490,556 will be allocated to activities related to site characterization and \$437,753 will be allocated to activities related to packaging and transportation. The allocation for these activities represents 62 percent of the Board's total budget. The remaining 38 percent is allocated to administrative and information technology support, communication to Congress and the Secretary of Energy, and public outreach.

The budget allocations for site characterization and for transportation and packaging consist primarily of the salaries of Board members and technical staff. They also include travel to the project site at Yucca Mountain to meet with project staff and the expenses related to conducting meetings.