

REMARKS TO THE
NUCLEAR WASTE TECHNICAL REVIEW BOARD
STATUS OF THE CIVILIAN RADIOACTIVE WASTE
MANAGEMENT PROGRAM

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Chairman Cohon and Members of the Board:

Thank you for this opportunity to update the Board on the status and near-term plans for the Civilian Radioactive Waste Management Program. This meeting is certainly timely as we are now approaching key decision points in the repository development process prescribed by the Nuclear Waste Policy Act. Over the last decade, we have met many times and discussed many issues. During those meetings, we pointed towards an objective: supporting a national decision on geologic disposal at Yucca Mountain this year. We believe we are nearing that objective.

After we complete our present task of developing and strengthening the sound scientific basis for the next decision, the Secretary of Energy, the President, and the Congress must decide whether to make a decision to move to the next stage. Their choices will be to permit proceeding with further development and submission of a license application to the Nuclear Regulatory Commission for a potential repository at Yucca Mountain, or to adopt another, unknown approach for meeting our national and international nuclear waste management obligations.

Inspector General Report

At your meeting last January, I informed you of former Secretary Richardson's decision not to issue the Site Recommendation Consideration Report until the Department's Inspector General investigated whether bias may have compromised the integrity of our evaluation of the Yucca Mountain site. I reported at that time that the Inspector General was performing a comprehensive and thorough

inquiry into this issue. That investigation is complete. On April 23, 2001, the Inspector General released his report that concluded that there was no evidence to “substantiate the concern that bias compromised the integrity of the site evaluation process.” Their conclusion was based on a review of documents associated with the evaluation, including the draft Site Recommendation Consideration Report. The Inspector General report noted, however, four statements in a note to reviewers and in the text of an early, never used, working draft Overview that “...could be viewed as suggesting a premature conclusion regarding the suitability of Yucca Mountain.”

It is my firm belief, Secretary Abraham’s belief, and Departmental policy that all Federal, laboratory, and contractor employees must perform their work in a manner that reflects the integrity and objective approach necessary to conduct world-class science. I have demanded that all program participants remain vigilant in ensuring that we perform our work without any preconceived opinions or bias. In addition, we must ensure that our work does not raise the perception of possible bias. Public trust in the fundamental processes of government is crucial to the fulfillment of the Department’s mission. I have asked that all of us who work on the Program reaffirm our commitment to a site suitability evaluation process that is objective, unbiased, and based on sound science.

It is also important that our suitability evaluation process and the supporting science program not be inappropriately influenced by schedule considerations. The Program has made tremendous progress over the last several years despite funding shortfalls. The progress we have made has contributed to a substantial momentum to discharge our generation’s responsibility for achieving key milestones this year. I recognize that constrained funding can create pressure to avoid any possible loss of momentum; however, achieving milestones must be predicated on appropriate, transparent, and defensible technical work. Therefore, I have also directed our Federal and Contractor management to ensure that our planning decisions do not adversely impact the credibility of our scientific and technical conclusions.

Release of the Yucca Mountain Science & Engineering Report and Supplement to the Draft Environmental Impact Statement

Now, after almost twenty years of intensive investigative science to prepare the technical basis for making a decision, we are implementing the next step in the process. Last Friday, May 4, we initiated the formal site consideration process with the release of the Yucca Mountain Science and Engineering Report. The Science and Engineering Report summarizes information and data collected to date in our multi-year study and characterization of the Yucca Mountain site. This report describes the results of site characterization studies completed to date, the waste forms to be disposed, a repository and waste package design, and updated assessments of the long term performance of the potential repository. The Department intends for the report, and its supporting documents, to be part of the technical basis for site recommendation consideration and to be used by the public as an aid in providing comments on the technical information and data.

As the Board is well aware, the technical and scientific analyses are continuing. It is our intent to make the extensive information developed by the Department on the Yucca Mountain site available in stages, so that the public and interested parties have ample time to review all the available materials and formulate their comments regarding a possible site recommendation by the Secretary. Late this spring, we will strengthen the technical basis with the supplemental science reports that should provide a sufficient bases for the next incremental step. That step would be to issue a Preliminary Site Suitability Evaluation in the summer and at that time schedule the statutorily required hearings to inform and receive comments from the residents living in the vicinity of the site.

In addition to the release of the Science and Engineering Report last Friday, we released the Supplement to the Draft Environmental Impact Statement (EIS) to update information presented in the Draft EIS, which was released in August 1999. The Supplement evaluates potential environmental impacts that could occur, based on the design options and range of possible operating modes presented in the Science and Engineering Report. The Supplement compares the impacts associated with the flexible design described in the Science and Engineering Report to the impacts presented in the Draft EIS.

Additional program documents to update the Total System Life Cycle Cost and the Nuclear Waste Fund fee adequacy were also released on Friday. These important documents provide the public and all interested parties with important information as we initiate the formal site consideration process.

We will consider the comments we receive during this process before making any decision whether to recommend the site. The Department is committed to making progress, but we will ensure that sound science governs each decision. For us to proceed further, the underlying scientific basis must demonstrate that a repository can operate safely, with adequate protection for human health, safety, and the environment. The public's views on the validity of this work will weigh heavily in any decision by the Secretary on whether to forward a recommendation to the President.

Board's March 2001 Letter

While we are proud of our recent achievements, we recognize we have additional work to do to strengthen the technical bases to support the next steps toward a possible site recommendation. Your recent communication, both letters and discussions during meetings, has been helpful in identifying and prioritizing this work. In particular, we appreciate the Board's feedback during and following the January meeting in Amargosa Valley. I am encouraged by the progress we have made this year in improving our communication with you and am pleased with positive reaction we received with respect to our efforts to address and resolve specific questions you have posed. We intend to continue to strengthen this communication process and address those areas where the Board has requested further information. Consistent with your observations, we recognize that we need to continue to provide information on investigations as they advance to strengthen the technical basis for the Secretary's decision on a possible site recommendation.

Your recent letter reiterates the Board's priorities for improvements in our technical program that Chairman Cohon noted in Amargosa Valley. In response to the concerns of the Board, we continue to implement and refine our plans for additional technical work. Our work remains focused on the four areas that the Board recommended: (1) meaningful quantification of conservatisms and uncertainties in the performance assessments, (2) progress in understanding the underlying fundamental processes involved in predicting the rate of waste package corrosion, (3) an evaluation

and comparison of the base-case repository design with a lower-temperature design, and (4) further development of multiple lines of evidence to support the safety case, the lines of evidence being derived independently of performance assessment and thus not subject to the limitations of performance assessment.

Our recent response to your communications describes our approach to addressing these priority concerns. We paid particular attention to providing details regarding our plans for evaluating and comparing designs in recognition of the importance of that issue. Much of this information will be presented and discussed over the next day and a half in the context of the specific questions you asked. I look forward to further feedback from the Board regarding our approach.

Meaningful Quantification of Uncertainties and Conservatism

Treatment, quantification, and communication of uncertainties are important to the analysis of long-term repository performance. To enhance our work in these areas, the Department is quantifying key unquantified uncertainties and assessing their significance. In our initial evaluation of unquantified uncertainties, we have performed a preliminary qualitative assessment of the conservatism introduced into model results by not quantifying uncertainties and are using it as the basis for the implementation of a more in-depth review of model predictions. This information will be useful to policy-makers for evaluating the potential trade-offs between the projected performance of the potential repository and the uncertainty in its projected performance in order to reach informed decisions. The results of the current analysis of unquantified uncertainties will be included in Supplemental Science and Engineering Report that will be available in the early summer. Prior to a site recommendation, this information will be supplemented and additional documentation will be made available.

Improved Understanding of the Fundamental Processes Involved in Waste Package Corrosion

Central to our safety strategy is the performance of a waste package and engineered barrier system specifically tailored to the characteristics of the Yucca Mountain site. Current extrapolation of relatively short-term corrosion data for Alloy 22 to longer periods (thousands of years) is based on existing data. Other lines of evidence, such as the behavior of commercial analog materials and

natural analogs tend to support the basis of these extrapolations. Furthermore, the Department is planning a detailed experimental program and development of a more advanced theoretical corrosion model to reduce uncertainties in the long-term performance of waste package and drip shield materials. Specific areas of study include general corrosion, localized corrosion, waste package environmental conditions, and stability of passive films. The scope of this experimental program was presented to the Board at the Amargosa Valley Meeting in January.

This experimental program, along with work that is already underway, should provide a better understanding of the fundamental corrosion processes in passive materials such as Alloy 22 and improved confidence in our ability to extrapolate short-term data to predict long-term material behavior. Improved estimates of corrosion rates with reduced variability are possible by taking advantage of longer-term test results currently available. Data from this long term testing activity will be made publicly available as the testing progresses.

The Department has also initiated a peer review of the technical basis for waste package performance. The Panel will review the current technical basis for predictions of waste package and drip shield performance, and the long-term testing and modeling program. The Panel will evaluate the current model and provide recommendations for augmenting planned tasks that would significantly reduce the uncertainties in predicting material performance. In the September 2001 timeframe, the Panel will document its comments, conclusions, and recommendations in an interim report to support a possible Site Recommendation.

Evaluation and Comparison of Repository Designs

The Department is evaluating the repository design over a range of thermal operating modes including both the higher temperature and lower temperature regimes. This evaluation features the following key considerations:

- Repository design parameters and thermal operating concepts;
- Confidence that the process models are representative of processes and conditions over the range of thermal operating modes;

- Improved understanding of the effects of uncertainties over the range of operating modes;
- A documented total system approach to evaluating the range of operating modes;

The design and operational parameters for a high temperature thermal mode (base case) and low temperature thermal mode have been identified and presented in the Science and Engineering Report. These parameters produce a repository design that is capable of being operated over a range of thermal modes (waste package surface temperatures as low as 85°C up to the high temperature mode with 50 percent of the pillar below boiling.) The repository design documentation will be revised to accommodate operations over a range of thermal modes. The evaluations that will be represented in the Supplemental Science and Performance Analyses (SSPA), for the high and low temperature thermal modes will use the same repository design parameters, with different operational parameters. For example, the thermal modes use identical design parameters, including waste streams, waste packages, drift diameters, and drift spacing. The lower thermal mode is achieved by varying operational parameters such as the size of the emplacement area, the waste package spacing, and the duration of forced ventilation.

The process models were developed to represent processes and conditions over the temperature range from ambient (25°C) to over 200°C at the drift wall, and back to ambient. The abstractions of these models were initially focused on a higher-temperature operating mode. Consequently, some thermally driven processes were not explicitly incorporated or were represented by a bounding approach. The Department is revising, as necessary, these process models to more completely propagate the process level understanding of thermally driven processes into the total system performance assessments. This work will be summarized in the SSPA.

The repository design concept provides flexibility to operate over a range of thermal regimes as described in the Yucca Mountain Science and Engineering Report. This range is being examined to enhance the understanding of potential performance benefits and uncertainty reductions that could be realized by using various operating modes and to understand the impact that design features have on the performance of the site across a range of conditions. To address the impact of uncertainties over the range of operating modes, the Department is evaluating the impact of lower temperatures on the near-field environment. The goal is to see if the complexity of the processes that operate in the near-

field environment could be reduced and the models used to assess performance simplified by lowering the maximum temperatures of the waste package surface or by controlling other environmental parameters, such as humidity and chemistry.

To evaluate the full thermal range being considered, the Department is conducting supplemental total system performance assessment analyses for the cooler end of the thermal range using the same design configuration while varying operational parameters. DOE has also revised its Total System Performance Assessment to incorporate new information from climate studies, preliminary results of the unquantified uncertainties effort, and other recently available information. The system performance will be calculated using the same thermal goals as the previous efforts, and the results compared. The system performance will also be calculated for a lower temperature thermal goal. Sensitivity studies will be used to examine the range of operating modes between these two end members. This work will be included in the SSPA.

Our approach to selection of an operating mode is to analyze the various parameters related to thermal performance, including spacing and heat output of waste packages, different ventilating modes, and fuel aging before emplacement to determine if alternative configurations could improve repository performance or reduce uncertainties in long-term performance assessments. The objective is to maintain a flexible approach now that will keep future options open to benefit from new information from ongoing and planned tests and analyses.

The Department's overarching goal is to eventually select an operating mode that achieves enhanced performance of the potential repository system, reduced uncertainty, and design optimization. A general framework for structured design decision making within the program is in place and will be adapted for the next phase of design evolution. The final selection of the repository operations mode, which may not be made until well into the operations phase of the repository, will consider available information regarding performance assessment, uncertainty, cost, licensing issues, and other relevant criteria at the time of the decision.

Multiple Lines of Evidence to Support the Safety Case

As discussed at the Board's April 13, 2001 Panel Meeting, the Department agrees that multiple lines of evidence are required by the proposed regulations in addition to the numerical output from a performance assessment to demonstrate repository safety. Our current approach attempts to supplement the numerical system performance calculations and enhance confidence in public safety by demonstrating the adequacy of our testing, experimentation, and modeling, as well as through the evaluation of defense-in-depth and safety margin, and the consideration of natural and anthropogenic analog information. The Department will more explicitly document the theoretical support for key models, based on fundamental physics of the processes in our models, simple models and calculations of key processes, analogs, and other lines of evidence. The goal is to present a safety case as robust as possible, and minimize its dependence on any single fact, theory, process, or line of evidence. The Department recognizes that both qualitative and quantitative information will be employed in making the safety case to support various decision points in the repository program. This summer, we will summarize our current evaluation of multiple lines of evidence, which provide additional confidence in the models and parameters in the Department's performance assessment.

Conclusion

The Department has made considerable progress to strengthen our technical bases and, despite enormous challenges, maintained the essential momentum to implement our Nation's policy for the management of spent nuclear fuel and high-level radioactive waste. We believe we have conducted a world-class investigative science program to determine whether the Yucca Mountain site is suitable for further development. We have now reached the next step in the process, and the Department has initiated the formal site consideration process.

The Board's constructive feedback on our activities is important to us to assure that we provide decision-makers with a sufficient technical basis to support the next decisions on geologic disposal. I believe the Board's recommendations have led to further strengthening of our technical program, especially toward influencing the evolutionary, stepwise design process and the analysis of uncertainty for each step. The stepwise development of a geologic repository, with design and

operational flexibility and reversibility, coupled with continuous learning feedback loops, is extremely important for a program like this. We have begun the science-based site consideration process, as a part of the steps required under law to develop a geologic repository and to hopefully fulfill our generations' responsibilities and begin waste acceptance in 2010.

We will continue to operate this program in an open and transparent manner, worthy of public confidence and trust. I believe that after 20 plus years we are in a position to achieve important national and global decisions later this year. Thank you and I would be pleased to answer any questions you may have.