APRIL 6, 2006

OVERSIGHT OF THE DEPARTMENT OF ENERGY'S WASTE TREATMENT PLANT AT HANFORD

U.S. HOUSE OF REPRESENTATIVES, COMMITTEE ON APPROPRIATIONS, SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT, AND RELATED AGENCIES

ONE HUNDRED NINTH CONGRESS, SECOND SESSION

HEARING CONTENTS:

Witnesses:

A.J. Eggenberger *[view PDF]*
Chairman, Defense Nuclear Safety Board

Kim Callan *[view PDF]*
P.E., C.C.E., U.S. Army Corp of Engineers

Tom Hash *[view PDF]*
Chairman, Bechtel National, Inc.

James A. Rispoli *[view PDF]*
Assistant Secretary for Environmental Management, Department of Energy

---

COMPILED FROM:

- *http://web.archive.org/web/20061227202253/http:/appropriations.house.gov/index.cfm?FuseAction=Hearings.Detail&HearingId=731&Month=4&Year=2006*

TESTIMONY OF

A.J. EGGENBERGER, CHAIRMAN

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

CONGRESSIONAL REVIEW

OF THE DEPARTMENT OF ENERGY'S HANFORD

WASTE TREATMENT AND

IMMOBILIZATION PLANT PROJECT (WTP)

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

COMMITTEE ON APPROPRIATIONS

UNITED STATES HOUSE OF REPRESENTATIVES

April 6, 2006

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

Thank you for the opportunity to present testimony on the Defense Nuclear Facilities Safety Board's review of the Department of Energy's Waste Treatment Plant (WTP) at Hanford, Washington. My testimony today will focus on the Board's efforts to

ensure that the nuclear safety aspects of the design of this important nuclear waste processing facility are adequate.

Legislative History and Statutory Mission of the Board

In the late 1980s, it became increasingly clear to Congress that conditions at sites used for production of nuclear materials and weapons were such that additional measures were needed to ensure adequate safety management by DOE. Residuals of production in formerly used facilities represented a potential threat to the safety of the public, workers, and the environment, and facilities required for the national security mission needed to be brought into operational modes consistent with current safety and environmental protection objectives. From 1987 to 1989, both houses of Congress examined a variety of legislative proposals intended to upgrade the safety management of DOE defense nuclear facilities. The Senate Committee on Governmental Affairs, under the chairmanship of Senator John Glenn, initially proposed to establish an independent nuclear safety board with recommendation powers (S.1085, *Nuclear Protections and Safety Act of 1987*). The Senate Committee on Armed Services, under the chairmanship of Senator Sam Nunn, proposed in the Nuclear Protections and Safety Act of 1987 an independent defense nuclear safety board with advisory powers, but reserving to the Secretary of Energy the ultimate responsibility to accept or decline advice.

During 1988, the House and Senate worked out a compromise solution resulting in formation of the Defense Nuclear Facilities Safety Board in 1989. The Board was granted extensive safety oversight over defense nuclear facilities under the control or jurisdiction of DOE. The Atomic Energy Act of 1954, as amended, currently establishes two categories of facilities subject to Board jurisdiction: (1) those facilities under Secretary of Energy control or jurisdiction, operated for national security purposes that produce or utilize special nuclear materials, and (2) nuclear waste storage facilities under the control or jurisdiction of the Secretary of Energy. The Board's jurisdiction does not extend to facilities or activities associated with the Naval Nuclear Propulsion Program, transportation of nuclear explosives or materials, the U.S. Enrichment Corporation, facilities developed pursuant to the Nuclear Waste Policy Act of 1982 and licensed by the Nuclear Regulatory Commission, or any facility not conducting atomic energy defense activities.

Under its enabling statute, 42 U.S.C. § 2286 *et seq.*, the Board is responsible for independent oversight of all programs and activities impacting public health and safety within DOE's defense nuclear facility (i.e., nuclear weapons) complex, which has served to design, manufacture, test, and maintain and decommission nuclear weapons. The Board is authorized to review and analyze facility and systems designs, operations, practices, and events, and make recommendations to the Secretary of Energy that the Board believes are necessary to ensure adequate protection of public health and safety, including worker safety. The Secretary may accept or reject the recommendations in whole or in part. The Board must consider the technical and economic feasibility of implementing the recommended measures, and the Secretary must report to the President and Congress if implementation of a recommendation is impracticable because of

budgetary considerations. If the Board determines that an imminent or severe threat to public health or safety exists, the Board is required to transmit its recommendations to the President, as well as to the Secretaries of Energy and Defense. After receipt by the President, the Board is required to make such recommendations public and transmit them to the Committees on Armed Services and Appropriations of the Senate and to the Speaker of the House.

The Board's enabling statute also requires the Board to review and evaluate the content and implementation of health and safety standards, including DOE's orders, rules, and other safety requirements, relating to the full life cycle of defense nuclear facilities, including design, construction, operation, and decommissioning. The Board must then recommend to the Secretary of Energy any specific measures, such as changes in the content and implementation of those standards, that the Board believes should be adopted to ensure that public health and safety are adequately protected. The Board is also required to review the design of new defense nuclear facilities before construction begins, as well as modifications to older facilities, and to recommend changes necessary to protect health and safety.

The Board may also conduct investigations, issue subpoenas, hold public hearings, gather information, conduct studies, establish reporting requirements for DOE, and take other actions in furtherance of its review of health and safety issues at defense nuclear facilities. These ancillary powers of the Board relate to the accomplishment of the Board's primary function, which is to assist DOE in identifying and correcting health and safety problems at defense nuclear facilities. DOE is required to cooperate fully with the Board in all of these matters.

Design Review of WTP

In 1995, DOE commenced a program to privatize the processing of high-level radioactive waste at Hanford**.** At its Richland Operations Office, DOE established a dedicated Regulatory Unit to establish design requirements for the plant (then referred to as the Tank Waste Remediation System, or TWRS) and to serve as a principal interface with the U.S. Nuclear Regulatory Commission (NRC), according to the terms of a Memorandum of Understanding signed in January 1997. This Memorandum of Understanding provided for the NRC to "assist DOE in performing reviews in a manner consistent with the NRC's regulatory approach and … to be prepared to develop an effective and efficient regulatory program for the licensing of DOE contractor-owned and contractor-operated facilities that will process waste at Hanford...." With the express statutory approval of Congress through specific appropriations, NRC provided assistance to DOE from January 1997 to May 2000, at which time DOE decided to abandon the privatization approach for TWRS in favor of a management and operating (M&O) style contract. This change ended NRC's involvement in the project. On December 11, 2000, DOE awarded the WTP construction contract to Bechtel National, Inc. (BNI). During the following year, BNI was heavily focused on completing the baseline validation, hiring and training, conducting a due diligence review of the previous design, and completing a safety basis certification required by the contract.

The Board began to devote substantial technical resources to the review of the plant's design near the end of 2001. In the early spring of 2002, the Board's technical staff commenced a detailed review of seismic design documentation. In a June 5, 2002, meeting between the Board's staff, DOE, and BNI, the issue of ground motion during an earthquake was discussed, with particular focus on the application of California attenuation relationships to the Hanford site. (These attenuation relationships establish how ground motion propagates through bedrock to the surface.) In a letter to DOE on July 30, 2002, the Board clearly stated that these unresolved seismic issues meant that the seismic loads used to design the WTP facility foundations may have been underestimated. In addition, the Board cautioned DOE that the aggressive schedule being pursued, which demanded that construction commence before the design was completed, posed a serious risk that design changes could result in expensive modifications. To avert this potentiality in regard to seismic design, the Board advised DOE to adopt conservative design margins.

Why are the seismic issues affecting the WTP design important to public and worker health and safety? Unmitigated radiological consequences to the general public, 6 miles away, from an earthquake induced event at the WTP could exceed 250 rem, an order of magnitude larger than the evaluation guideline. Also, should an earthquake of sufficient magnitude to threaten or possibly damage the high level waste storage tanks occur at the Hanford site, then the ability of the WTP to operate safely with manageable earthquake damage becomes even more important.

In its response to the Board on September 18, 2002, DOE took the position that the seismic loads used to design the WTP facility foundations were adequate. In two further letters to DOE dated December 16, 2002, and January 21, 2003, the Board continued to insist that the seismic loads being used in the design did not appear to be appropriately conservative.

The Board continued its efforts in 2003 and 2004 to ensure that the seismic design of WTP would be adequate. In November 2003, the Board's staff reviewed DOE's efforts to validate the attenuation model used by WTP; the problems this review uncovered were discussed with DOE in February 2004. On July 29, 2004, the Board wrote to DOE once again, challenging the conservatism of the ground motion criteria for Hanford. Three months later, the Board' s staff met with DOE to discuss progress in addressing ground motion concerns and demonstrated to DOE the problems with their attenuation model.

Because DOE originally believed the specified ground motion was adequate, work to resolve the seismic issues raised by the Board was not started immediately, and did not produce results until March 2005. On March 16, 2005, DOE forwarded to the Board a report entitled "Site-Specific Seismic Response Model for the Waste Treatment Plant (WTP) Hanford Washington." This report provided results from actions taken in response to the Board's July 29, 2004, letter. The most significant result was that DOE identified a significant increase in the ground motion applicable to WTP. This report was

followed by an April 1, 2005, letter from DOE that contained interim seismic criteria for WTP to allow design efforts to continue. Subsequently, DOE provided the revised ground motion criteria to accommodate the increased seismic loads now applicable to the project.

What is the current status of the seismic design in the Board's view? The Board finds that the most recent estimate of ground motion developed by DOE provides a reasonably conservative basis for validating the existing design and construction of the plant. But this finding is contingent on DOE using a conservative approach in the design of safety-related structures and equipment. Because conservative design margins in the structure were maintained, little or no change to the structure will be required as a result on the increased seismic loads. The Board has been informed that existing structures need not be torn down. However, the design margins for equipment were less conservative, and so some changes may be required to accommodate the increased seismic loads. There is, unfortunately, continued uncertainty caused by lack of site characterization data and final resolution of the site attenuation relationship. DOE has informed the Board that it plans to resolve this uncertainty.

Other Design Problems at WTP

The Board has reviewed other aspects of WTP's design and construction: structural engineering, electrical distribution, instrumentation and control, ventilation systems, process safety, fire protection, hydrogen control, pipe erosion, and concrete quality. In October 2005, the Board provided to the Secretary of Energy a summary of the primary remaining safety issues. These issues are summarized below.

- The Board identified structural engineering problems in the mesh density used in the structural models, application of thermal loads, and unique aspects of the High Level Waste building design. The Board also asked DOE to identify how loads are distributed throughout the structural members for each facility so the local and global behavior of the structural components could be understood. In response, BNI is revising the structural design bases, as well as the structural models, for the High Level Waste and Pretreatment facilities.

  Only a few issues remain unresolved in this area, and the Board expects that its future review of the design bases and model revisions should not result in the need to make any significant changes.

- The Board questioned the hydrogen generation rate estimates being used to design hydrogen mitigation systems. The Board suggested that the markedly different processing and accident conditions at WTP were not accurately reflected in that generation rate. After conducting studies, BNI revised its design basis generation rate equation to reflect the WTP process more accurately. BNI also revised the design basis for the waste feed to be consistent with an updated forecast of waste feed characteristics. BNI is in the process of revising its final estimate of the

quantity of hydrogen that will be generated during WTP operations and will incorporate this information into the design and safety bases.

- BNI has correctly identified hydrogen hazards associated with pipes and ancillary vessels and has developed some engineering solutions that will successfully prevent hydrogen-related accident scenarios. The exception appears to be BNI's desire to accept the risk associated with certain hydrogen deflagrations and detonations. If this is BNI's strategy, it must be demonstrated that the likelihood of these accidents is extremely remote and that the public and collocated and facility workers will be protected. DOE also needs to consider both the safety and mission risk of these types of accidents before approving a design with any inherent weaknesses. The Board believes this will be a difficult undertaking.

- The Board challenged the adequacy of test data being used to design the pulse jet mixing equipment for mixing non-Newtonian high-level waste. Although BNI has not completed the final mixing design, the research completed by BNI's research organization and Pacific Northwest National Laboratory indicates that BNI has developed a sufficient understanding of the requirements for mixing non-Newtonian fluids. The Board is aware of a number of design approaches, such as not requiring redundancy in certain cases, that will require careful DOE review before final designs can be approved. However, the Board believes BNI can develop a design that meets existing safety requirements upon completion of remaining research activities and ongoing engineering work.

- The Board objected to DOE's decision not to apply fire resistant coatings to structural steel because the decision was not consistent with applicable fire codes. DOE finally changed course, and a somewhat limited fire proofing project is now in progress. The project is, strictly speaking, consistent with the applicable fire code, but the selective approach taken requires a detailed load analysis to determine which steel members need to be coated. DOE's contractor has prepared structural design criteria for implementing this strategy across the project and is now in the process of completing the calculations. Installation of the coatings has been started. Recent problems with the installed coatings have occurred due to water infiltration. DOE is working with the contractor to identify appropriate means of repairing damaged areas and resolving a question on the adequacy of the installed coatings.

Conclusion

The Board is fully aware of DOE's desire to build WTP on time and within budget, and for that reason the Board has provided its technical advice at a time when it could best be utilized to achieve a safe design. To the best of my knowledge, the technical accuracy of the advice provided by the Board on WTP has not been disputed. In any large, complex, costly project, the failure to address technical issues quickly, from the beginning, can have serious consequences later. It is these consequences that the Board has endeavored to prevent.

Thank you for the opportunity to report to you on the Board's work to ensure that the protection of the public and worker health and safety is an integral part of the WTP design and construction process. I will be happy to answer any questions you may have.

DEPARTMENT OF THE ARMY CORPS OF ENGINEERS

COMPLETE STATEMENT

OF

KIM CALLAN, P.E., C.C.E,
CHIEF OF COST ENGINEERING DIRECTORY OF EXPERTISE
PROJECT MANAGER OF INDEPENDENT REVIEW TEAM
U. S. ARMY CORPS OF ENGINEERS

BEFORE

THE SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
COMMITTEE ON APPROPRIATIONS
UNITED STATES HOUSE OF REPRESENTATIVES

ON

TECHNICAL SUPPORT TO THE DEPARTMENT OF ENERGY

OFFICE OF RIVER PROTECTION FOR WASTE TREATMENT FACILITY

April 6, 2006

Mr. Chairman and distinguished members of the Subcommittee:

I am honored to be testifying before your subcommittee today on behalf of the U.S. Army Corps of Engineers, on the Department of Energy's Hanford Waste Treatment and Immobilization Plant Project. My name is Kim Callan, and I am the Corps project manager for this review effort.

U.S. ARMY CORPS OF ENGINEERS REPORT TITLED "INDEPENDENT REVIEW OF WASTE TREATMENT FACILITY ESTIMATE AT COMPLETION (EAC) 2005", DATED MAY 05.

The Department of Energy (DOE), Office of Engineering and Construction Management authorized DOE Office of River Protection (ORP) to fund the U.S. Army Corps of Engineers, Walla Walla District, to conduct an independent review of the 2005 Estimate at Completion (EAC) report for the Hanford Waste Treatment and Immobilization Plant (WTP) prepared by Bechtel National Incorporated (BNI). The objectives are to determine the accuracy and viability of the 2005 EAC report and the effectiveness of the existing management controls.

In December 2000, DOE-ORP awarded BNI a contract to design, construct, and commission the WTP using a design-build approach under a cost-plus-incentive fee contract. Since project inception, cost and schedule have continued to increase. On January 7, 2005, DOE requested BNI to prepare a high confidence level estimate at completion, using historical information and a defensible and credible construction schedule using two strategies: Scenario A – unconstrained funding and Scenario B –

Description	EAC 2005 Estimated Amount (Scenario A)
	$M
To-Date as of Dec 2004	5,040
Increases in EAC from 2004 review	
Non-Newtonian Mixing	190
Hydrogen in Piping and Ancillary Vessels	90
Design Evolution	459
Revised Ground Motion	753
Fireproofing of Structural Steel	68
Performance Related Changes	150
Pricing Related Changes (95M in misc)	125
Misc. Other Adjustments	136
S/T Increases	1,971
Contingency	700
2005 EAC Total	**7,711**
Technical and Programmatic Risk Assessment (TPRA)	79
Fee	225
Transition	50
Total Project Cost	**8,065**

constrained funding of $690 million per year.

The independent review (IR) team reviewed the 2005 EAC between March 14, 2005, and April 30, 2005. An initial draft 2005 EAC was received on April 4, 2005, and the final 2005 EAC was received on April 22, 2005. The IR team approach was to evaluate procedures and methods used for developing the 2005 EAC cost and schedule. Due to the magnitude of data, along with the short suspense, the IR team focused on high-impact, high-cost areas. The IR team reviewed over 260 documents, interviewed representatives from DOE-ORP and BNI, and took part in numerous briefings on technical and/or programmatic subjects.

The 2005 EAC shows the estimated total cost of each scenario is significantly higher than the March 2003 total cost of $5.78 billion, and the estimated completion date has extended beyond July 2011. The IR team's development of WTP cost, as shown in table 1.1, and BNI's scheduled contract completion dates for each scenario are as follows:

Scenario A – WTP total project cost equals $8.065 billion, schedule complete date March 17, 2014.

Scenario B – WTP total project cost equals $8.348 billion, schedule complete date July 2015.

Note: Tri-Party Agreement milestone for completion of hot commissioning is currently set at January 31, 2011.

The majority of cost increase and schedule slippage was due to technical issues, such as: non-newtonian mixing; hydrogen in piping and ancillary vessels; revised ground motion (change to seismic criteria); and fireproofing of structural steel. Other increases were due to design evolution, BNI contractor performance related changes, and commodity and plant equipment pricing increases. The following are three examples of significant increases in this EAC:

The overall increase was 3,548,000 in engineering labor hours from the December 2004 Trended Performance Measurement Baseline (PMB) to the 2005 EAC.

The construction cost, as defined by the EAC, which includes non-manual and manual labor and portion of other construction direct cost, has increased 60 percent ($895 million) since the December 2004 Trended PMB, for a net change from $1,483 to $2,378 million.

The key commodity – concrete embeds, increased from 5 million pounds in the December 2004 Trended PMB to 10 million pounds in the 2005 EAC.

The scope of this review did not include validating the processes used in the "Site-Specific Seismic Site Response Model for the Waste Treatment Plant, Hanford, Washington" or the resulting recommended revisions to the response spectra that form the basis of the Revised Ground Motion (RGM).

KEY FINDINGS/OBSERVATIONS

Several potential high cost impact and schedule issues (mainly seismic-related issues and Scenario B Schedule) are not at an adequate level of detail to validate this 2005 EAC cost and schedule. Given the conservatisms built into the seismic-related estimates and schedule, the 2005 EAC cost appears to be a bounding[1] estimate.

There is a concern, however, that the 2005 EAC has not fully estimated potential cost growth. This project requires aggressive management by DOE and BNI, sufficient annual funding, and contract incentives to control cost and schedule growth.

The IR team considered programmatic issues that may arise outside of DOE's immediate control [e.g., RGM]. The IR team's independent assessment of DOE's Programmatic Risk identified $1.3 billion (at the 80 percent confidence level) in addition to the forecasted total project cost. This $1.3 billion should not necessarily be included in the proposed Total Project Cost for the WTP Project, but DOE-ORP, DOE Headquarters, and Congress should be aware that potential cost and schedule risks remain beyond those already captured by the BNI 2005 EAC.

Management Controls, Contract Incentive, and Risk

Both DOE and BNI will need to be more proactive in their management approach to determining revised ground motion for the WTP.

For example: DOE and BNI limited their challenge of the Defense Nuclear Facilities Safety Board (DNFSB) RGM position. It appears that both DOE and BNI, in responding to the increased seismic requirements could have responded to DNFSB by conducting a parallel, non-critical path analysis. The design was already conservative, and if seismic threats exist, it is imperative the project be accelerated to empty tanks as soon as possible (tanks and their contents represent the immediate risk in a seismic event), rather than further delay and increase the cost of the project to do more analysis at this time.

Continued cost growth, extended schedule completion dates, and the on-going performance trends exhibited on this project indicate the acquisition and contract strategy is not working as originally envisioned.

The current contract does not provide sufficient incentive for BNI to control cost and schedule.

The complexity of this project is extremely high. Excellent communication and aggressive management are key drivers for the cost and schedule control of this project. Improvements need to be made to improve BNI performance measures.

Potentially significant cost and schedule risks remain beyond those already captured in the 2005 EAC. Potential cost and schedule growth may include:

[1] Bounding – cost falls within the upper limit.

escalation, technical developments, commissioning, and programmatic and regulatory issues.

The IR team believes that it is appropriate to use project escalation rates that reflect current market trends rather than using DOE 2004 rates in calculating escalation at the WTP. The 2005 EAC has been developed using the escalation rate forecasts published by DOE in January 2004. These rates are not reflective of the excessive and abnormal impacts on construction costs experienced in 2004 as construction material prices increased at levels unseen in recent years. Price escalation and rising energy prices have caused a ripple effect on many construction commodities and plant equipment and is not captured by the DOE rates.

DOE-ORP must closely monitor future provisional fee payments; fees paid to date may be approaching the amount BNI may actually earn.

DOE-ORP has made several improvements in its management role for providing oversight on this cost plus contract. DOE needs to ensure sufficient DOE-ORP staff to manage this contract; especially, contract administration of the directed RGM change in accordance with Federal Acquisition Regulations in a timely manner.

DOE-ORP has managed BNI requests for scope change since the 2004 U.S. Army Corps of Engineers review.

For Example: The HYDROGEN IN PIPING AND ANCILLARY VESSELS issue was included in the 2005 EAC by BNI as a technical issue for which the BNI is seeking a contract scope change. BNI states in a letter to DOE-ORP dated February 17, 2005, that they "… have determined that impacts related to unanticipated efforts required to mitigate hydrogen in the WTP are covered under Contract Clause B.10 Fee Risk Allocation. As such, we are reserving our rights to an equitable adjustment for those impacts." However, as with the Pulse Jet Mixers, DOE-ORP does not believe that this issue is a contract scope change, and in a letter dated April 1, 2005, denied the equitable adjustment.

Schedule Development

Scenarios A and B schedules are not sufficiently developed to provide an adequate analysis.

- Scenario A schedule has a high number of constraints (over 1,400), which extended the project length. When asked about aggressive scheduling options for the EAC, BNI indicated that they had not been tasked with analyzing varying schedule methods. By reducing the excess float, a savings of nearly $300 million could possibly be achieved by correcting or modifying the schedule logic.

- Scenario B schedule, which is the “most likely” funding scenario, was a graphical representation of a schedule. The IR team did not receive an acceptable schedule for Scenario B.

The 2005 EAC narrative on “Major Changes from December 2004 Trended PMB” referenced time-related cost impacts. The referenced calculation of cost impacts could not be verified.

2005 EAC Cost Development

The estimating methods used to develop the 2005 EAC cost appear consistent with standard estimating procedures. Tracking cost from a review standpoint is difficult due to the complexity of the cost and accounting system used by BNI.

The IR team found that the 2005 EAC submitted by BNI was not a Class 2 estimate. BNI stated this 2005 EAC is a Class 2 estimate, which incorporates detailed engineering design, site productivity, labor wage rate, escalation, fee, and other factors that influence the job cost. However, the seismic-related estimates of over $750 million are not considered Class 2 estimates. The 2005 EAC specifically identified over $86 million of various rough order of magnitude estimates and a small amount of non-seismic-related estimates, which are not considered Class 2.

CURRENT 2006 U.S. ARMY CORPS OF ENGINEERS SUPPORT AT WASTE TREATMENT FACILITY

Based on the Corps 2005 review, the Department of Energy, Office of Environmental Management has requested the U.S. Army Corps of Engineers to conduct additional independent reviews of the Hanford Waste Treatment and Immobilization Plant project for the following: 1) development and implementation of the revised seismic design criteria, 2) activities to gather additional geophysical data to confirm the revised seismic design criteria, and 3) validate the updated 2005 Estimate At Completion.

Task 1: Through independent analysis determine the basis for the revision to the seismic design criteria.

Phase 1: The U.S. Army Corps of Engineers will provide a review of the ORP plan to perform additional deep borings at WTP. The current ORP proposal of five new bore holes drilled down 1,500 linear feet will be evaluated. U.S. Army Corps of Engineers experts in geotechnical investigations will provide independent comments to DOE on this course of action which is meant to augment the seismic information gathered to date. In order to perform this review, site-specific ground motion data previously collected at the Hanford Site will be examined by the independent U.S. Army Corps of Engineers review team.

Phase 2: The U.S. Army Corps of Engineers will conduct a review of the scope, schedule and cost for the Department of Energy subcontractor to drill up to five boreholes and conduct the seismic analysis. The U.S. Army Corps of Engineers will provide independent recommendations on the scope, schedule and cost effectiveness of this approach.

Phase 3: The U.S. Army Corps of Engineers will have personnel in the field as the drilling is accomplished and work with Department of Energy subcontractor if refinements of the drilling activities are necessary.

Phase 4: Upon completion of the actual drilling, the U.S. Army Corps of Engineers and their nationally recognized technical experts will evaluate the data collected by the drilling contractor. Independent recommendations on the use of the collected data will be provided to DOE.

Phase 5: The U.S. Army Corps of Engineers will accomplish the ground motion experiments. After analyzing that data the U.S. Army Corps of Engineers will consider any modifications to the seismic design criteria.

Phase 6: Using the data derived from the seismic experiments the U.S. Army Corps of Engineers and their technical experts will evaluate and determine if this new data would materially change the seismic design criteria currently in place. The U.S. Army Corps of Engineers and their experts (along with ORP and BNI) will discuss these results with DNFSB.

Task 2: Provide assistance to the Department of Energy for design reviews of ongoing design activities against current seismic design criteria to assure code compliance is being addressed, while cost and schedule impacts are being minimized.

Phase 1: Using nationally recognized experts, review the previous reports which served as the basis for the revision to the seismic design criteria. The previous reports were in response to the concerns expressed by DNFSB. Determine the overall margin of conservatism and the likelihood the criteria bounds the expected results from the gathering of additional geophysical data. The U.S. Army Corps of Engineers will prepare a Phase 1 report that summarizes these findings and determinations.

Phase 2: The U.S. Army Corps of Engineers will support DOE in the assurance of quality for the progression of BNI structural analysis and design, as revised and modified in Seismic Design Criteria Revision 10. The U.S. Army Corps of Engineers external IR will assure that the design complies with the code requirements, ensuring the safety of WTP structures, systems and components, and at the same time, maintaining efficient design practices to minimize the impact to the cost and schedule of the project. The U.S. Army Corps of Engineers independent review will ensure that the BNI seismic re-design processes are performed in an effective manner.

The objective of these independent oversight reviews of the BNI re-analysis and design is to determine that designs are code-compliant ensuring the safety of WTP, and at the same time an appropriate level of design is performed that minimizes the impact to the project without adding undue layers of conservatism. This will be accomplished through a review of the design procedures used by BNI engineers. In addition, the U.S. Army Corps of Engineers will perform a review of selected specifications, design criteria, drawings and calculations which represent the structural designs of WTP structures, systems and components.

The review team will identify, where possible, key analytical and/or design assumptions and discuss their validity. The team will recommend changes where prudent to reduce project risk or significant over-design.

Task 3: Conduct an independent validation[2] of the 2006 Estimate at Completion. Completion Date: July 2006

This review is a follow-on study subsequent to the U.S. Army Corps of Engineers May 13, 2005 report of the April 2005 Estimate at Completion. The basis for this independent validation review began with a Waste Treatment Facility 2005 Estimate at Completion dated September 30, 2005 for three of the five facilities.

Based on recommendations within the May 2005 U.S. Army Corps of Engineers report DOE-ORP tasked WTP Contractor to update the 2005 Estimate at Completion dated December 31, 2005.

As the Independent Validation Review of the updated December 2005 EAC progressed, a Congressional fiscal year (FY) 2006 funding reduction to $521M resulted in the need for an additional revised EAC. At the direction of DOE, WTP Contractor is preparing that EAC, which is due May 30, 2006.

Thank you, Mr. Chairman and Members of the Subcommittee. This concludes my statement. I will be happy to answer any questions.

[2]By definition, "validation" is a review of the contractor's methods used to calculate cost estimates. It entails the review of cost drivers and high cost areas to determine if methods described are being used. The review team will make an assessment as to the level and amount of review required to validate a final estimate. During review, consideration will also be given to scope and schedule. Within the validation report, the Team will provide any findings, observations, recommendations and conclusions.

Statement of Tom Hash
Chairman, Bechtel National, Inc.
Before the Subcommittee on Energy and Water Development
U.S. House of Representatives
April 6, 2006

Mr. Chairman and members of the subcommittee, I am Tom Hash, Chairman of Bechtel National, Inc., the prime contractor to the U.S. Department of Energy for the Hanford Waste Treatment Plant project. In this role, I am responsible for the engineering, procurement and construction of this vital project, which will be the cornerstone of the Hanford cleanup mission.

The Hanford Waste Treatment Plant is a complex of facilities being designed and built to treat highly radioactive waste stored in 177 aging underground tanks. Some of the tanks date back to World War II and 67 have leaked an estimated one million gallons of waste. This waste, the legacy of 50 years of Cold War plutonium production for nuclear weapons, threatens the nearby Columbia River and the millions of people living downstream. The Waste Treatment Plant will immobilize this waste using a process known as vitrification, which mixes the solid and liquid waste with molten glass to create a sturdy waste form capable of safely isolating the waste from the environment.

The Waste Treatment Plant consists of a Pretreatment facility to separate the waste into high-level and low-activity waste streams, a High-Level Waste Vitrification facility containing two electric melters, a Low-Activity Waste Vitrification facility with two additional melters, a full service Analytical Laboratory and scores of support facilities. Together these facilities make up one of the world's largest radioactive and chemical processing plants.

Bechtel is a global engineering and construction company with more than 100 years in the business. We have designed and/or built more than half of the nuclear power plants in this country. In December 2000, when we signed the contract to design and build the Hanford Waste Treatment Plant, we knew this job—a first-of-a-kind project the size of at least two commercial nuclear power plants—would be a challenge. We also knew the U.S. nuclear industry's capability had atrophied somewhat, but we could not – until procurement and construction were underway – see the full extent of the atrophy.

In hindsight, the challenges were bigger than we expected. It has taken us several years of experience – while overcoming major technical hurdles – to know enough to forecast the likely cost and duration of this vital project. And those forecasts have now been meticulously reviewed and validated by two independent panels of the foremost experts in our industry.

In my testimony, I will address the challenges we have faced on this job, how I believe we have performed against those challenges, and the strong steps we're taking with the Department of Energy to put this project on a solid path forward.

We have faced three key challenges on the Waste Treatment Plant project.

First, we had to repair a nearly non-existent U.S. nuclear supply chain. We have had to mentor suppliers, teach them how to comply with stringent nuclear quality standards, and, in some cases, have had to purchase nuclear-grade equipment and supplies overseas because they were no longer made here in the U.S.

We have also had to train a new generation of employees in how to work to nuclear standards. We have put them through a rigorous training regimen, emphasizing strict adherence to procedures, fostering a questioning attitude, and stressing open lines of communication to raise issues to senior management.

The challenge of resurrecting a nuclear skill base is not just limited to our suppliers and employees. It extends to our regulators as well who are facing the challenge of ensuring a solid regulatory framework for activities not undertaken in the U.S. in over 20 years. We have multiple strong regulators, unlike the single strong regulatory entity we had when building nuclear power plants, and they have worked diligently to interpret new building and environmental codes and regulations in the envelope of nuclear standards. The involvement and scrutiny of the regulators on this project is necessary to hold us, and the industry, to high performance standards.

The second challenge we have faced is that the Waste Treatment Plant is a first-of-a-kind facility at the frontier of science and engineering. As is said in the nuclear power business, the Hanford Waste Treatment Plant is Serial Number 1. While the Energy Department proved the concept of vitrification at Savannah River and West Valley, those facilities were much smaller and less sophisticated than the Hanford plant. West Valley only processed homogenous high-level waste and did not face the heterogeneous mixture of high level and low-level waste faced at Hanford. At Savannah River, there is not yet a facility for pretreatment of waste to separate the high level from the low level waste, which has been the most challenging aspect for WTP. So these facilities were not true pilot plants and the Waste Treatment Plant is not simply a scale up. No other radioactive waste processing plant in the world comes close in size or technical complexity. As a result, in some cases, problems do not reveal themselves until others have been solved.

The third key challenge is "change." The Waste Treatment Plant project today is a very different project than what we signed up for in 2000. Plant capacity has been significantly increased to enable DOE to eliminate a multi-billion dollar Phase II vitrification plant that was planned for the future in order to have sufficient capacity for the total mission. The Pretreatment capacity was increased 40 percent and the High-Level Waste facility glass production was increased by a factor of four (4).

Other changes in the plant requirements include:

- Increased fire protection requirements
- Changes in the process technology, such as changes to the pulse-jet mixer design
- 38 percent increase in the seismic criteria used in the engineering calculations in designing the plant

- New regulations, such as 10 CFR 851, which place new rules on worker safety at DOE sites and on suppliers and subcontractors doing work for DOE projects.

We are very proud of Bechtel's performance on the design and build contract overall, but we have learned uncomfortable lessons along the way.

We identified and brought to DOE's attention execution mistakes in engineering, procurement, and construction. These included a well-publicized calculation error in the design of structural steel in the Laboratory; supplier weld quality issues on six of the 90 stainless steel vessels in the plant; a problem with a concrete placement early in the project that had to be corrected; occasions when our engineers did not follow our own procedures; and procedures themselves that needed to be improved.

While problems like these are not unusual for large complex construction jobs, we do not take comfort in that. These were real shortcomings, they erode the confidence of our stakeholders, and they do not meet our own standards. We have fixed each of these problems and learned from them.

It's important to note that these incidents have not been significant drivers of increasing costs; in total they have amounted to less than one percent of the approximately $3 billion spent to date, which is actually well below average for the engineering and construction industry.

Now I'd like to address our cost estimates. Clearly, the challenges of this project were bigger than we estimated and our estimates came up short. In hindsight, it is clear that this generation of workers and suppliers, while among the best in the industry, were simply not experienced enough to meet today's exacting nuclear standards to achieve the results we originally expected. Further, we did not foresee changes in scope and requirements that substantially affected the project's cost and schedule. But we could have factored in greater allowances for the uncertainties that accompany first-of-a-kind projects.

We also initially underestimated the amount of steel, concrete, piping, and equipment that would be needed as the plant's design evolved. Initially, our estimates were necessarily based on 5% plans. Today, those plans have matured. In hindsight, however, we could have provided larger allowances in our estimate for inherent uncertainties based on immature designs. But no one in the industry was able to forecast the extraordinary extent of global price increases in commodities since 2000.

So, clearly, our earlier estimates did not predict what WTP would look like or cost today. But I want to emphasize that this cost growth is not the result of mistakes in either engineering or construction execution.

Bechtel has done some things very well that are relevant to today's discussion. We have solved some very difficult technical challenges in this first-of-a-kind project. For example, the pulse-jet mixers are by far the largest ever designed, and are being used in a unique application. These mixers are vital to keeping the viscous, high-level radioactive wastes in a fluid-like form suitable

for processing into glass. We have also made the concept of the "black cells" viable throughout the plant. The black cells are areas where no human will ever enter so the equipment must not require maintenance, repairs or replacement. And our engineers have made advances in understanding the complex chemistry of mixed radioactive wastes, which gives us much greater design confidence than was possible six years ago.

The job is progressing. The Waste Treatment Plant design is now over 60 percent complete and construction is more than 25 percent complete. We are solving problems in the sequence that supports the schedule so that when we do construct, we get it right. Our conservative design has enough built-in margin such that implementing the new seismic criteria did not require us to tear anything down – which prevented this change from becoming a far worse problem.

Bechtel, with DOE, is taking several strong steps to improve risk management and cost-and-schedule estimation. We chartered two teams of industry and academic experts, including our competitors, to review the process design to ensure that the plant will operate as intended and that the cost estimates are solid. The independent "Best and Brightest " technical review team validated the design and concluded that no new technologies are required. The team identified 17 issues and 11 potential issues that, when addressed by DOE and Bechtel, will improve the operability of the plant. This plant will work!

The cost and schedule review team concluded that the Estimate-at-Completion that Bechtel produced in December was generally defensible and achieved and 80% confidence level. The team recommended that Bechtel increase allowances for the possibility of future economic inflation, the availability of a skilled workforce to operate the WTP, and to provide more conservatism to address future uncertainties WITHIN the remaining work scope.

The Cost review team also made several recommendations to incorporate risks presently outside the scope of work that have been captured in the Technical and Programmatic Risk Analysis (TPRA). Examples include operational enhancements recommended by the technical review team and potential new regulations. Further, the cost review team recommends that the DOE increase the TPRA allowance by another $1.0 billion to account for other potential costs due to the complexity and duration of this project.

Both team reports are being factored into the Estimate at Completion that is due to DOE on May 31 and both reports have been made publicly available.

History of Cost Estimates

Before I discuss the path forward, let me summarize how the project has matured to the point where we are today.

In December 2000, when we were awarded the contract, the design was less than 5 percent complete, no procurement had been done and construction had not started. The WTP had a completion date of 2011 and DOE was planning to build a separate Phase II, multi-billion dollar plant to come on line in 2018. While the legally binding agreement with the State of

Washington required the waste to be treated by 2028, the Phase I/Phase II schedule did not complete tank treatment until well beyond that date. Funding for the Phase I WTP project was planned at $690M a year and the project planning anticipated carrying over unspent funds in the early project years to cover costs during the later peak construction years. The total project estimated cost for Phase I was $4.2B, of which the contract cost was $4 billion, and $.2B for government technical contingency.

In March 2003, the design was less than 40 percent complete and procurement was less than 10% complete, and less than 15 percent of the construction had been completed. Of significance, the design of the plant had changed significantly to increase throughput. The capacity in the High-Level Waste facility was increased by a factor of four and the capacity in Pretreatment was increased 40 percent. These improvements provided a facility design that could help meet the deadlines, while eliminating the Phase II project, saving billions of dollars in construction and future operating costs. At this point, the cost estimate was $5.4 billion, including $0.55B set aside for contingency plus an additional $0.1B identified for government technical risk. The total project estimated cost was $5.5B. Annual funding was still set at $690M, but it became clear that funding in excess of that amount would be needed both to stay on schedule and meet DOE's commitments.

By December 2005, design on the project was more than 60 percent done, more than 40 percent of the materials had been purchased and construction was more than 25 percent complete. However, between March 2003 and December 2005, the project cost and schedule estimates increased further due to: a significant increase in the seismic design requirements; final development of the pulse jet mixer technical solution; an evolved design that required more materials, equipment and labor; global price inflation; an increase in the contractor contingency; the impact of funding constraints and cuts; and increases in the government allowance identified for technical and programmatic risks. The December 2005 Estimate at Completion reflected these major changes and events resulting in a cost estimate of $8.77B, which included $1.04B in contractor contingency. With the government TPRA contingency, the total project cost was $10.5B.

In March 2006, the cost "best-and brightest" review team released it's report with it's primary recommendations to be for DOE to transfer some of the highly probable technical and programmatic risk previously listed in TPRA into the contract scope and that an additional $1B discussed previously be added to the TPRA planning. Next month, Bechtel National, Inc. will revise its Estimate at Completion to reflect the recommendations of the review team as directed by DOE.

Path Forward

Now, for the path forward.

Over the past 18 months, we have strengthened our management team and reorganized the project, making sure we have our very best people on the job. To improve management and communication, we have developed ways to better align and integrate our management control and risk management tools with DOE's reporting tools. We have pushed the design more than a

year ahead of construction to resolve all remaining technical challenges and ensure smooth construction and startup.

To improve our nuclear supply chain capability, we have deployed some of our employees to our key suppliers to ensure they manufacture to the current nuclear quality standards. This investment will not only improve our project, but every future nuclear project built in the United States.

Finally, we will implement the recommendations from the two external expert review teams to ensure we are building a robust plant to a higher confidence cost estimate.

Regarding a specific path forward in 2007, I've attached a chart that summarizes the key tasks we plan to accomplish in FY07 to further advance the WTP project assuming a funding level of $690M.

Thank you for the opportunity to make these remarks.

FY 2007 $690 M Projected Work Plan

Pretreatment (PT) and High Level Waste (HLW) Facilities:

- **Engineering**
  - Design PT wall from 56’ to 77’ elevation
  - Design HLW 14’ elevated slab
  - Resolve Technical “Best & Brightest” Review Team findings
    - Ultrafilter, leaching, and line plugging
- **Procurement**
  - Purchase equipment and materials including:
    - *Equipment*
      - mechanical handling cranes, shield doors, feed preparation vessels, seismic upgrade kits for all vessels, wet electrostatic precipitators
    - *Materials*
      - concrete, rebar, embeds, pipe, hangers, conduit, cable tray, steel
- **Construction**
  - Complete PT walls from 26’ to 56’ elevation
  - Complete PT slabs at 28’ and 56’ elevation
  - Construct HLW walls from 0’ to 14’ elevation
  - Begin HLW slab at 14’
  - Install 7,000 feet of piping in PT black cell and hot cell
  - Install 7,000 feet in HLW
  - Begin seismic upgrade of vessels

Low Activity Waste (LAW)Facility/ Balance of Facilities (BOF)/ Analytical Lab:

- **Engineering**
  - Complete design of remaining steel and concrete
  - Complete design of piping for LAW 3’ elevation
  - Complete design of Glass Former Facility
- **Procurement**
  - Purchase equipment and materials including:
    - *Equipment*
      - mechanical handling cranes, shield doors, vessels, process equipment, electrical and HVAC equipment
    - *Materials*
      - concrete, rebar, embeds, pipe, hangers, conduit, cable tray, steel
- **Construction**
  - Construct Export Bay slab and walls
  - Construct structural steel in Lab
  - Enclose LAW (siding and roofing)
  - Install 6,000 feet of conduit and tray in LAW minus-21, 3’ elevations
  - Install above-ground Pipe Rack
  - Install remaining radioactive transfer lines
  - Install 3,000 feet LAW piping at minus-21’ and 3’ elevations
  - Complete water treatment building and steam plant

This work plan assumes revision of FY07 funding split between facilities (5 Buckets)

Based on May 2006 Estimate at Completion under development

Statement of James A. Rispoli
Assistant Secretary for Environmental Management
U.S. Department of Energy
before the Subcommittee on Energy and Water Development, and Related Agencies
Committee on Appropriations
U.S. House of Representatives
April 6, 2006

INTRODUCTION

Good Morning, Chairman Hobson and Members of the Subcommittee. I am pleased to be here today to discuss the Department of Energy's Waste Treatment Plant at Hanford, Washington.

I plan to discuss our progress on the Waste Treatment Plant project and our plans going forward to completion. While significant design and construction has been completed, the Plant has experienced a series of technology challenges and increased cost and schedule estimates. We intend to change that track record through timely resolution of technology issues, more credible cost and schedule estimates, and stronger project management controls, achieved concurrently with ongoing design and construction progress. Our approach to accomplish this will be through a number of thorough assessments and a comprehensive set of overlapping initiatives that I will describe to you today.

The Waste Treatment Plant (WTP) project being designed and constructed today is a far different complex than that which was being planned several years ago. Of course, we realize that cost estimates have escalated dramatically for the project. Much of this escalation was caused by overly optimistic construction and technology assumptions. Further increases were also caused in large measure by a failure by the Department to require this project to follow the Department's newly formulated (at the time) project management policies. This allowed the project's early warning signs of cost problems to elude Environmental Management's and the Department's project management process. That earlier management error has been corrected. The project is now under close continuous monitoring.

There is no larger or more complex environmental remediation project in the Department of Energy than the Hanford Waste Treatment Plant. It contains more commodity materials than two large nuclear power plants and is currently one of the largest construction projects of any type worldwide. It is the first large nuclear construction project in the United States since the 1980s. It is a one-of-a-kind project with no comparable project to use as a reference. Creating this Plant has required the Department and its contractors to re-establish the capabilities of the nation's nuclear construction industry infrastructure. This is requiring that we overcome problems with a languishing nuclear quality-related supply chain, and identify and train a specialized construction workforce. Your committee can appreciate this challenge more than anyone given your oversight and relationship with the nuclear power industry.

Despite these difficulties, we have achieved substantial progress. Having expended approximately $2.9 billion since inception, the plant design is now 68% complete and construction is about 28% complete. The reconstituted nuclear construction infrastructure at the

Plant, represented by thousands of engineers and craft labor on site, has overcome numerous first-of-a-kind technical obstacles. They have successfully installed about 161,000 cubic yards of concrete, 8,000 tons of structural steel, and 31 miles of piping. All five facilities that comprise the Plant are well into construction, major equipment has been procured and is being installed, and the Low Activity Waste building was "topped off' this past year which means that the structural steel was installed to the highest level for that facility. All of this work has been accomplished in compliance with nuclear quality related standards and within a safe work environment.

We have made major advancements in technology that will improve the Plant. These advancements include the development of an ion exchange material which will more effectively and less expensively remove radioactive cesium from tank waste liquids; the improvement of the throughput capacity for the large glass furnaces making glass out of radioactive waste; and the enhanced blending ability of pumps to maintain a consistent mix of the waste. We anticipate that the benefits from these improvements will avoid the necessity of building a second plant for high-level waste, improve turnaround time, reduce personnel exposure, reduce performance risk, reduce operating cost, and reduce the total number of canisters produced, decreasing the volume of material ultimately sent to a repository for permanent disposal. Additionally, the plant being built today by the current contractor, is far more capable and robust than the plant planned during the prior contract. For example, the prior plant design was to immobilize (vitrify) 1.5 metric tons per day of high-level waste for its design life, thereby vitrifying only 40% by volume of the high-level waste during its design life. As a result, a second plant would have been required under the previous design. The current plant, on the other hand, will be designed to immobilize 6 metric tons of high-level waste per day, and is capable of treating and immobilizing 100% of the high-level waste. The current plant will also be designed to immobilize 30 metric tons of low-activity waste per day, and is capable of immobilizing 60% of the low-activity fraction.

The Department of Energy remains strongly committed to safely and effectively completing the Waste Treatment Plant because it removes one of the greatest risks to public health and safety within the complex. The Plant will treat and immobilize the 53 million gallons of highly radioactive waste stored in aging and leaking underground tanks at the Hanford Site, and only require immobilization of 40% of the low-activity fraction with supplemental systems. The Plant is a critical component of our nation's nuclear waste cleanup program and an important defense against environmental contamination at the Hanford site. The technical approach being pursued in the Plant remains the most viable approach for immobilizing the waste.

IMPLEMENTING A DESIGN/BUILD APPROACH

In general, there are two approaches to contracting for the design and construction of facilities, and both methods are recognized in the government construction contracting context. One is where design and construction are sequential and contracted for separately with two contracts and two separate contractors. This method is referred to as "design-bid-build." In design-bid-build contracting, the drawings and specifications created under the design contract are used as the bid documents in the follow-on construction contract. This method permits competition among construction contractors where a fairly complete design is available.

The second method is to combine the architectural, engineering and construction services required for a project into a single contract. This method is referred to as "design-build." For the design-build approach, a single contractor is responsible for the design and construction to ensure single accountability in both design and construction, and for when the plant is commissioned for operations. For large projects which would take several years to design, the project is divided into phases to shorten design and construction time. A simple functional facility, can be "fast-tracked", with little time between component design and the start of construction. However, complex facilities need adequate time between component design completion and the start of construction. This allows sufficient design on the next component to be completed to validate necessary interfaces.

Under a design-bid-build approach, for large projects, the project can be divided into major components (such as site work, foundations, building superstructure, internal equipment, mechanical, and electrical). When design is completed for a component, that work is bid and constructed. While there is a single designer, there may be multiple constructors. For large complex facilities, there are typically issues of responsibility among the various contractors if the facilities do not function together properly.

For the Waste Treatment Plant, the decision was made to have single accountability, for design and construction, and for commissioning of the plant. The Department wanted to ensure the contractor would be responsible for delivering a facility which would meet the performance specification.

For the Waste Treatment Plant, the "fast-track" approach was not employed due to the complexity of the project. However, after construction got underway in 2002, there were instances where the construction was "close-coupled" with the design. Thus, there were instances where the design lagged on the next component, and the construction progressed to the point where it was coupled too close to the design. We recognized this was a problem, and consciously de-coupled the design from construction. In fact, last year, when it was necessary to verify the adequacy of the design of foundations and building frames, the construction was slowed pending a sufficient backlog of designs.

EVOLUTION OF THE COST AND SCHEDULE

In December 2000, the Department contracted with Bechtel National, Inc. to design, build and commission the Hanford Waste Treatment Plant. An initial due diligence review validated Bechtel's bid price of $4.3 billion and 2007 startup goal. However, as the design progressed, the Department and Bechtel instituted several changes and during the spring and summer of 2002, a number of independent external reviews indicated the estimated cost at completion had risen to $5.5-6 billion. In some cases, the reviews also made many recommendations for improvement in project management and technical approaches. Reviewers included the Government Accountability Office, the Department's Inspector General, the National Academy of Sciences, and the Hanford Advisory Board. In addition the Defense Nuclear Facilities Safety Board raised questions about the seismic basis for the design and chemical process safety concerning hydrogen formation. In April 2003, subsequent to a validating external independent review, the contract cost was increased to $5.8 billion. The increase was a result of increasing capacity of the plant to treat 100% of the high-level waste, immobilize 100% of the high-level waste, and

immobilize 60% of the low activity fraction, as well as cost increases of materials and equipment, and design and construction efficiencies. In the April 2003 baseline, a second high level waste melter was added that increased the throughput from 1.5 to 6 metric tons per day. On the low activity side the number of melters was decreased from 3 to 2 and with vitrification technology advances the throughput for 2 melters remained the same as for 3 melters at 30 metric tons per day. Although several additional project changes were implemented after April 2003, this was the first project baseline approved by the Department after two reviews on-site by an external independent review team. The next year, with further design maturity, the U.S. Army Corps of Engineers (USACE) reviewed the project and estimated the project would cost $6.5 billion.

Bechtel submitted a revised Estimate-at-Completion in April 2005 indicating there were potentially significant further cost increases and schedule delays. Bechtel estimated the cost increases would exceed 25 percent of its current Total Project Cost estimate. The Department of Energy, therefore, engaged the USACE to conduct an independent review of Bechtel's Estimate-at-Completion in April 2005. The USACE issued its report on May 13, 2005 which indicated: 1) several high cost impact and schedule issues were not addressed at an adequate level of detail to validate the estimate, 2) conservatisms built into the seismic-related estimates and schedule appeared to bound the estimate, 3) concern that the estimate has not fully included potential cost growth, and 4) the project required stronger management by the Department and the contractor, continued sufficient annual funding, and contract incentives to control cost and schedule growth. The USACE report also identified approximately $1.5 billion of potential additional cost risk that had not been included in the Bechtel estimate.

Bechtel was subsequently directed by the Department of Energy to prepare a revised detailed cost and schedule estimate. The revised Estimate-At-Completion, submitted in December 2005, estimated a cost of $8.77 billion and a 2016 completion date. Bechtel's report also identified additional Technical and Program Risk estimated at $1.76 billion that Bechtel believes is outside of their project control. As recently identified in the USACE's March 15, 2006 status report, several actions have occurred which have or will affect the Bechtel December 2005 Estimate-At-Completion. Therefore, Bechtel's December 2005 Estimate-at-Completion is being further revised to address the impacts and results of these actions. This revision is planned to be provided to the Department of Energy in May 2006.

The Department took further action to identify specific causes for problems at this project and commissioned a recently completed After Action Fact Finding Review from a non-profit, external firm to provide an independent assessment of the root causes of Waste Treatment Plant project issues.

WHAT WENT WRONG

Based on the root cause evaluation identified in this After Action Fact Finding Review report, and preliminary feedback from these other independent review initiatives, a number of broad issues are coming into focus. While we are still awaiting completion of relevant reports and their review by the Department, I would like to share some conclusions about what went wrong on the Hanford Waste Treatment Plant project with this Committee.

Cost and Schedule Controls Were Not Adequate to Establish and Maintain a Credible Baseline. Unlike other major projects within the Department of Energy, the Waste Treatment Plant had not been subject to the rigors of a formal Earned Value Management System and it had not been subject to the Department's project management methods and procedures promulgated under DOE Order 413.3. A timely baseline control process was not being implemented, thereby allowing a bow wave of design changes and unresolved equitable adjustments to build up to unacceptable levels, obscuring emerging schedule and cost trends, and preventing timely identification of cost variances in components of the work. **Moving forward, I have taken steps to assure that more reliable management system controls are in-place and being implemented.**

Adequate Project Management Oversight Resources and Processes have Not Been In-Place. The management oversight structure of checks and balances within the Department were not being effectively employed. Expert functional resources within Department of Energy Headquarters were not being utilized effectively and field resources were understaffed for the challenging task at hand. **Today, the Department has significant management oversight in place both on-site and at headquarters.**

Technology Resources Have Not Been Adequate To Address First-Of-A-Kind Problems. Of the three process facilities in the Waste Treatment Plant, the Pretreatment Facility is a very large, first-of-a-kind, chemical processing facility to separate radioactive waste. This is the first facility of its kind in the complex that addresses a unique blend of complex radiological and chemical materials. One of the expert review teams we have engaged recently completed a report that identified twenty-eight major concerns and eleven potential concerns within the process flow sheet. The fact that these concerns have been identified demonstrates the benefit of this review, and reinforces the need for increased expert resources and testing capability on a continuing basis. The Department will continue to provide continuous rigorous oversight of technology development and integration of a long-term operational perspective within the project design and construction.

In The Past, "Optimism" Has All Too Often Replaced "Realism" Within Projections. Hindsight shows that original estimates for the Waste Treatment Plant cost and schedule were unrealistically optimistic. Also, the magnitude of the shortfall of the estimates was not recognized during two independent reviews by an external consultant and a U.S. Army Corps of Engineers review team, For example, initial unit cost estimates of both labor and materials were based on historic nuclear power plant construction data and an assumption that historical commercial nuclear costs and efficiencies could be rapidly re-created today. However, after more than two decades of dormancy in the nuclear industry, qualification of vendors and training of workers by Bechtel has proven extremely difficult Actual production trends should have provided early indication, but the issue was not addressed for quite some time because of the flawed project control system I mentioned. Several expert reviews are underway now to address this challenge.

Management of Safety Issues in Design Has Not Received Adequate Attention. Responsibility for the timely resolution of safety issues was not clearly assigned as between the contractor and the Department of Energy, resulting in cost and schedule impacts. For example,

several design issues that contain safety-related consequences, such as fire protective coating of structures or hydrogen generation within piping and valves, apparently lacked a strong driver for rapid and definitive resolution. **Today, new management controls are in place to address safety issues and take appropriate pre-emptive action on emerging issues.**

Complexity Has Increased Over Time and Unanticipated Issues Have Continued to Impact the Project. Advanced testing and modeling revealed new issues and complexities that were not identified in the early cost estimates. Early cost estimates were based on the best assumptions and understandings of risk available at the time. As modeling and calculation capabilities and the state of the art in technology improved over time, new issues that were not considered in these early estimates have been revealed. A prime example is discovery that the Waste Treatment Plant design was based on seismic requirements that do not fully conform to the latest state-of-the-art methodologies. Our expert review teams are studying this subject to address design issues.

SECRETARY OF ENERGY'S ACTIONS

On June 23, 2005, the Secretary of Energy made key decisions to address the projects scope, cost, schedule, contract and management issues. The management actions included direction to: 1) conduct an After Action Review to assess the causes of the project cost, schedule, scope and project management issues, 2) assemble a new headquarters senior level management team to oversee the project with the team comprised of at least six individuals with specialized expertise in cost, contracting, and technical design/engineering, 3) submit the qualifications for a Federal Project Director to the Department's Project Management Certification Board, 4) provide weekly progress reports to the Principal Deputy Assistant Secretary for Environmental Management, 5) schedule quarterly progress reviews with the Secretary, and 6) develop an execution plan and master schedule for all of the major activities associated with the path forward for the project.

Starting in July 2005, the Secretary of Energy has had several discussions with the principals of Bechtel Group, Inc. concerning the status of the project and expectations. The Secretary indicated Bechtel must demonstrate its world class corporate commitment and project management capabilities to this critical project by accomplishing the following:

- Address the current technical issues, increasing the confidence in design, and contain costs and develop a viable schedule.
- Obtain the "best and brightest" from other major firms to critically assess the current technical approach, evaluate the risks, review the cost/schedule and develop recommendations to promptly and dramatically improve project performance.
- Provide the "best and brightest" site project management team (executives, engineers and technicians) for the duration of the project.
- Develop and submit to the Department a complete and credible Estimate At Completion

DEPARTMENT OF ENERGY IMPLEMENTATION ACTIONS

To implement the Secretary's direction, the Department of Energy is directing aggressive initiatives to address all issues associated with what went wrong with the Hanford Waste Treatment Plant. Our objective is to ensure the project is well-managed. We owe this to the Congress, regional stakeholders, and the American taxpayers. These initiatives, contained within three main areas of focus, include:

1. Strengthening the Project Management Process
    - We established a senior-level Oversight Team at Department of Energy Headquarters that is engaged in all facets of the project. This team is charged with oversight evaluation and management in the near term and the long term – throughout the life of this project. In addition, we directed other related Department project oversight offices to conduct rigorous, periodic on-site project evaluations.
    - We have directed the contractor, Bechtel, and the Office of River Protection to adhere with strict compliance to the Department's project management requirements document, DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets* and the accompanying manual.
    - We have directed Bechtel to implement an Earned Value Management System (EVMS) that fully complies with the American National Standards Institute 748-A-1998. EVMS is a proven, industry standard management tool for planning and monitoring project performance.
    - We are upgrading project management capabilities by hiring experienced staff and certifying project managers in accordance with the Department of Energy's Project Management Career Development Program. We are also recruiting and hiring experienced personnel in contracting, procurement, and contract law.
    - We have established a structured weekly and monthly reporting system and a quarterly review process. Senior officials, at the highest levels of management in the Office of Environmental Management and the Department of Energy, are receiving project status updates on a regular basis.
    - Integrated Safety Management culture issues and Quality Assurance deficiencies have recently been identified in several areas of the project. In response, the Department has been taking aggressive actions. Using our nuclear safety enforcement authority under the Price Anderson Amendments Act, the Department has investigated and issued a Notice of Violation for multiple Quality Assurance regulation violations. We have also used our contractual enforcement authority to reduce fees to BNI for below-par safety management performance. EM Headquarters, the Department's Office of Price Anderson Enforcement, and the Office of River Protection are actively engaged in monitoring the BNI analysis of these issues and their corrective actions to address the root causes of these concerns.

2. Addressing Key Technology Concerns
    - The Department instructed Bechtel to commission a broad selection of distinguished external senior professionals from private industry and academia to thoroughly review and inform Bechtel of all technology aspects of the Waste Treatment Plant process and evaluate if the plant will operate as designed.

- This team has submitted a report on February 28, 2006.and the Department has provided copies to this subcommittee and other congressional committees. This report is now under review by the Department. The report concludes that the Waste Treatment Plant has an essential role in cleaning up the Hanford Site and it can operate as designed, if an issue associated with line plugging is resolved. The report also states that if this flaw is corrected, there are no other flaws that would keep the Plant from performing up to expectations and meeting expected design throughput. The report identifies seventeen major concerns and eleven potential areas of concern, and states that all the issues have solutions and can be resolved with existing technology, that is, new technology development, a lengthy and expensive process is not required. Bechtel and the Department are committed to addressing these issues and fixes are already underway. Bechtel is preparing a Project Response Plan that will address all of the report's findings in a thorough and timely manner.
- The Department has separately commissioned the U.S. Army Corps of Engineers to independently review the establishment, validation, and implementation of the revised seismic design criteria, a technology related issue already identified as having a significant cost and schedule impact.
- Bechtel plans to retain a core group of independent professionals from industry and academia to serve as consultants throughout the execution of the project.
- The Department has selected and is bringing on-board an Engineering News Record Top-5 construction management firm to serve as owner's representative and consultant to both Headquarters and the Office of River Protection. This will make available top project management talent in project management, project controls and risk management.

3. Establishing a Credible Project Baseline and Estimate at Completion
   - The Department instructed Bechtel to commission a second external senior professional team from private industry, academia, and Bechtel corporate management with many years of experience to review and inform Bechtel regarding the Waste Treatment Plant December 2005 Estimate-at-Completion (EAC). The scope of the review included the resource loaded project cost, schedule, estimating methodology, contingency management, and overall project management system.
   - The team completed its report on March 31, 2006 and the Department has provided copies to this subcommittee and other Congressional committees. The report, which is now under review by the Department, concluded that the execution plan as written in the EAC is compliant with the project contract. However the strategy for transitioning to long-term operations could be made more effective. The team also summarized that the December 2005 EAC is comprehensive and substantially correct as the project looked in late 2005 but it has been overcome by emerging events. These events include disposition of the issues raised by the external technical review team, decreased project funding for FY 2006, and dividing of WTP into five separate sub-projects. The cost team estimated the project will cost $11.3 billion as compared to the December 2005 Estimate-At-Completion of $10.3 billion; with a completion date for hot commissioning in mid-2018 as compared to the December Estimate-At-Completion date of May 2017 to allow for an additional year for activities classified as unknown unknowns.
   - The U.S. Army Corps of Engineers has been commissioned to provide a comprehensive independent review of Bechtel's Estimate-at-Completion, and if acceptable, to validate

the project baseline cost, scope and schedule. Their interim status report has also been provided to the appropriate congressional committees.

- The Department has implemented a rigorous risk management process that identifies both technical and programmatic concerns, and proactively addresses these uncertainties through the development of mitigation plans to address project issues.

The U.S. Congress, the Department of Energy, its contractors, and stakeholders all are vitally interested in making the Hanford project a success through excellence in planning, designing, construction, commissioning and operations. The engagement of expert reviews and the improvements in project management and oversight I have discussed are intended to bring the project back on track and provide reliable projections of cost estimates and set up a long term framework for project execution. We are committed to ensuring the safety of the Hanford environment, excellence in project and contract management, and managing to a firm technical baseline that ensures the best investment of taxpayers' money. The Department will address and resolve comments from all reviews I have described.

FISCAL YEAR 2007 FUNDING PROFILE

The Department's Fiscal Year 2007 funding for this project is $690 million. The strategy for utilization of funding is to:

- Continue measured construction progress on completing the Low Activity Waste Facility, Analytical Laboratory, and Balance of Facilities, none of which are impacted by seismic concerns,
- Resolve technology related engineering issues raised during current and ongoing reviews, and
- Reactivate construction on the Pretreatment and High Level Waste Facilities for those elements of the facilities that are not impacted by ongoing seismic validation.

CONCLUSION

Completion of the Hanford Waste Treatment Plant project, in compliance with the Department's performance specifications, is the single most important step that remains to protect the public health and safety from radioactive hazards of the Cold War legacy. Waste stored in the oldest underground tanks has previously leaked and some of it has reached the underlying groundwater. The Department's first line of defense against further leaks has been to pump all free liquid from the older tanks into newer double-shelled tanks. An extensive monitoring and sampling program indicates wastes tanks are no longer leaking and that no tank waste contaminants have reached the Columbia River. However, as with any Department activity that involves nuclear health and safety risks, we strive to provide a comprehensive protection plan. For a public risk of this magnitude, a defense-in-depth approach is essential. Therefore, in addition to the first level of defense, extracting all liquids from the Hanford single shell tanks, the second level of defense is needed – that is, to process the entire waste inventory into a stable glassified form to safely immobilize the waste. Finally, the third level of defense is to permanently disposition the immobilized waste in an engineered storage repository. As treatment of waste is critical to success, the Waste Treatment Plant's operation is the key option available to provide this necessary defense-in-depth. The Department is consequently determined to complete its

construction and operation in the shortest time feasible and thereby provide this additional level of protection, as expected by regional stakeholders and the public in general.

In the past, despite its ambitious and well-intended objectives, the Department's desire to achieve project completion 'in the shortest time feasible' has led at times for us to overreach, resulting in disappointing consequences and reflected in the ever higher cost estimates and greater delays. I believe this trend can be reversed by placing the project on a stronger, more credible technical and project management basis. Only by accomplishing this can the Department achieve real improvements in project execution, efficiency and risk reduction.

Shortly after my confirmation and appointment to this position, and in consultation with Secretary Bodman, I initiated a multi-faceted initiative to establish a more credible and defensible cost and schedule baseline, identify remaining technical uncertainties and a path forward for their resolution, and strengthen Department of Energy management processes and controls. This is the program I have described to you today.

Each element within this remedial program has now been started, some are nearing completion, and others are still ongoing. To date, I am pleased with the progress from these initiatives and I believe that, in the aggregate, they will provide a high level of confidence in our technical approach and cost and schedule baseline, clearer understanding of key issues and how they interact, more effective project controls, and a strong platform to resolve future problems that will inevitably arise as the project moves forward. The new framework we have in place provides better vision of future emerging risks so we can mitigate them early, and it enables better identification and management of future baseline variances. We believe the results of the initiatives I have just described will allow the Department to establish a solid path forward for the Waste Treatment Plant.

Along with encouraging preliminary results, a considerable amount of work and a number of critical decisions remain ahead. The Department must complete an extensive review process of each remedial element, address each technical concern, complete implementation of effective project management systems and processes, provide a stronger owner/operator perspective, and make necessary changes to the Waste Treatment Plant contract.

The bottom line is that I have not seen anything from ongoing review efforts that indicate that the Waste Treatment Plant cannot operate and produce vitrified waste within acceptable specifications. Additionally, there appears to be general consensuses among both internal and external reviewers that the problems identified have reasonable solutions that, properly implemented, will allow the Plant to operate at projected performance levels.

It is the Department's intent to communicate any problems identified and their resolution in an open and transparent manner. As the project moves forward and potential new problems arise I will not hesitate to act decisively, and initiate further independent reviews and/or oversight actions, as necessary, to maintain the confidence and integrity of the Department's cost and schedule projections. With a facility of the complexity and first-of-a-kind nature, I know new challenges will arise throughout the duration of this project.

We are confident the technical approach of the Waste Treatment Plant is the viable solution to completing the treatment and immobilization of the high-level waste at the Hanford Site. We are confident we can achieve timely and cost effective completion of the Plant, thereby fulfilling our commitment to both regional stakeholders and the American public.

This concludes my prepared statement. I would be happy to respond to any questions the Subcommittee may have.