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U.S. Department of Energy
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Committee on Appropriations
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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) conservatism 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 consensus 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.