Statement of Tom Hash
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U.S. House of Representatives
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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 an 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 its report with its 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