UNITED STATES OF AMERICA

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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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PUBLIC MEETING AND HEARING

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THURSDAY
OCTOBER 7, 2010

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The Board met in the Three Rivers Convention Center, 7016 W. Grandridge Boulevard, Kennewick, Washington, Peter S. Winokur, Chairman, presiding.

PRESENT:

PETER S. WINOKUR, Chairman
JESSIE H. ROBERSON, Vice Chair
JOSEPH F. BADER, Board Member

LARRY W. BROWN, Board Member
JOHN E. MANSFIELD, Board Member

STAFF PRESENT:
TIMOTHY DWYER, Technical Director
RICHARD AZZARO, General Counsel

PANEL MEMBERS PRESENT:
GREG ASHLEY, BNI
DAVID BROCKMAN, DOE-ORP
DONNA BUSCHE, URS
STACY CHARBONEAU, DOE-ORP

DAVID DICKEY, Consultant
INES TRIAY, DOE-EM
DALE KNUTSON, DOE-ORP

PANEL MEMBERS PRESENT (Cont'd):

DAVID S. KOSSON, CRESP

LONI M. PEURRUNG, PNNL

FRANK RUSSO, BNI

PAUL RUTLAND, WRPS

LEO SAIN, URS

ALSO PRESENT:

ADAM POLOSKI

STEVEN STOKES

C-O-N-T-E-N-T-S

P-R-O-C-E-E-D-I-N-G-S

(9:00 a.m.)

CHAIRMAN WINOKUR: My name is Peter Winokur. I am the chairman of the Defense Nuclear Facilities Safety Board, and I will preside over this public meeting and hearing.

At this time, I would like to introduce my colleagues on the Safety Board. To my immediate left is Vice Chair Jessie Roberson and to her left is Mr. Larry Brown. To my immediate right is Dr. John Mansfield, and to his right is Mr. Joseph Bader. We five constitute the Board.

The Board's general counsel, Richard Azzaro, is seated to my far left. The Board's technical director, Timothy Dwyer, is seated to my far right. Several members of our staff, closely involved with oversight, of the Department of Energy's defense nuclear facilities at Hanford, are also present.

Today's meeting and hearing were first publicly noticed in the Federal Register on July 26, 2010, and renoticed for a change of location on September 15th, 2010. It is being held open to the public in accordance with the provisions of the Government and Sunshine Act.

The hearing is being broadcast over the Internet via videostreaming. The link can be found on the Board's Web site. A video recording of the hearing will be made available on the Board's Web site as soon as possible after the hearing is concluded, and will remain available for 60 days. A verbatim written transcript, together with associated comments, will be available for viewing and copying in the Board's public reading room on the seventh floor of the Board's headquarters in Washington, D.C.

In accordance with the Board's practice, as it is stated in the Federal Register notice, we welcome comments from interested members of the public, at the conclusion of testimony for each of the three sessions comprising this public meeting and hearing.

A list of those speakers who have contacted the Board is posted at the entrance to this auditorium. We have listed the people in the order in which they have contacted us, or, if possible, when they wish to speak.

I will call the speakers in this order and ask that speakers state their name and title at the beginning of their presentation.

There is also a table at the entrance to this room with a sign-up sheet for members of the public who wish to make a presentation but did not have an opportunity to sign up previous to this time. We will allow those who have already registered with us--they will follow those who have already registered with us in the order in which they have signed up.

In order to give everyone wishing to speak an equal opportunity, we ask presenters to limit their original statements to five minutes.

The Chair will then give consideration to additional comments, should time permit. Presentations should be limited to comments, technical information, or data concerning the subjects of this meeting and hearing. The Board members may question anyone making presentations to the extent deemed appropriate.

The record of this proceeding will remain open until November 7th, 2010. The Board reserves its right to further schedule and regulate the course of this hearing, to recess, reconvene, postpone, or adjourn this meeting and hearing, and to otherwise exercise its authority under the Atomic Energy Act of 1954, as amended.

Now let me proceed to explain the Board's authority for inquiring into matters that are the subject of this public meeting and hearing.

The Board's enabling statute, now in effect for more than 20 years, is found in the Atomic Energy Act, beginning in Section 2286 of Title 42. One section of this defines the Board's role in the review of facility design and construction.

And I quote. "The Board shall review the design of a new Department of Energy defense nuclear facility before construction of such facility begins, and shall recommend to the secretary, within a reasonable time, such modifications of the design as the Board considers necessary to ensure adequate protection of public health and safety.

"During the construction of any such facility, the Board shall periodically review and monitor the construction, and shall submit to the secretary, within a reasonable time, such recommendations relating to the construction of that facility as the Board considers necessary to ensure adequate protection of public health and safety.

"An action of the Board, or a failure to act under this paragraph, may not delay or prevent the Secretary of Energy from carrying out the construction of such a facility."

The hearing begun this morning forms a part of the Board's continuing effort to fulfill the statutory charge with respect to the Waste Treatment and Immobilization Plant, also known as the Waste Treatment Plant.

The record of the hearing, both oral and written, will be used by the Board to formulate recommendations to the Secretary of Energy for this critical project.

These recommendations may take the form of a formal recommendation to the secretary, or may be transmitted to the department through letters or informal exchanges between technical counterparts.

The Board's oversight responsibilities continue through completion of construction, testing, operation, and eventual decommissioning of these facilities. The Board's statutory charter is like that given to other agencies operating under the Atomic Energy Act--the protection of public health and safety, including safety of the workers.

In the case of the Waste Treatment Plant, however, this statutory charge is made more complex because proper construction and operation of the plant is critical in resolving the underlying health and safety problem, namely, the large volume of toxic and radioactive waste now stored in underground tanks at Hanford.

Many of these tanks are already 67 years old, and most will be almost 100 years old by the end of the projected treatment mission.

Consequently, it is not enough in

this case for the Board to focus solely on whether construction of the Waste Treatment Plant will not suffer accidents harmful to workers or the public. It must operate safely and effectively, for many decades, to remediate the safety hazard represented by tank waste.

The Board has therefore inquired into many issues that involve a mixture of accident risk and successful and efficient long-term operations.

At this time, I'd like to provide some additional background on the history of this project.

The Hanford high-level waste tanks began receiving waste in the 1940's. As the initial single-shell tanks were being constructed, they were designed for about a 20 year life. Over the seven decades of operation of the tank farms, poor chemical and configuration control of the waste has created a much more challenging problem for understanding the chemistry and properties of the waste, as well as getting them mobilized, than exist at other sites such as the Savannah River site and the Idaho Cleanup Project.

Characterization of this waste remains problematic. The first time that a single-shell tank was suspected of leaking was the mid 1950's. Many single-shell tanks have been proven leakers since then. The leakage exacerbates the need to get these wastes out of the tanks and in a suitable form for eventual disposal.

The Department of Energy's solution to removing and stabilizing the waste, to reduce the current and future threats to health and safety, is the Waste Treatment Plant.

The Waste Treatment Plant project was initiated in the mid 1990's. This is the first- of-a-kind project. The Board's formal oversight of the project began, in earnest, after a privatization effort was abandoned in

2002.

The Board has been advising the department about our concerns related to design basis safety requirements, and their potential impact on operational safety throughout the life of the project.

Since initiating the project, the department has pursued internal and external reviews of the project, obtaining advice from experts in academia, the chemical and process industries, and its national laboratories, to help inform the design, the safe operation, and performance of the plant over its projected 40 year operational life.

It is important to note that the department undertook a significant redesign effort starting in 2009. Even though the design of the plant was more than 70 percent complete, the redesign of the plant is now over 80 percent complete, and construction of its pre-treatment facility is more than 30 percent complete.

Recently, the department indicated to the Board that it is transitioning the Waste Treatment Plant from a design and construction project to one of construction and commissioning.

The department has referred to this transition as "pivoting." As such, the department is planning to wrap up its design actions by establishing the final design criteria for the plant's structure, systems and components. The pivot is intended to provide a defined path forward to finish the design of the systems and components that have not been finalized, and to resolve any outstanding technical issues.

The Board is deeply concerned that the plant may be commissioned before several key technical issues are fully resolved. Once operational and exposed to radioactive waste, options for design changes in black and hot cells will be extremely limited, costly, and expose workers to hazardous situations.

To the maximum extent possible, solutions must be accommodated before commissioning. A learn-as-we go philosophy does not seem prudent for this facility.

Given that the project is now pivoting, wrapping up design, and focusing on commissioning, it is a crucial time to have DOE [Department of Energy] explain where they are, where they are going, what remains to be done, and in what time frame.

Also implicit in the Board's statutory mandate is keeping the public appropriately informed of issues affecting public health and safety. Those are the goals of these proceedings.

The proceedings began last month, when DOE pivoted--provided--excuse me--over 200 pages of written answers to Board's questions. These questions and answers are available on the Board's Web site and will become a part of the record of these proceedings.

I want to take a moment to thank the department for its timely response to these questions. Over the next two days, we intend to explore some of these answers to gain a more complete understanding.

However, because of the large volume of information that must be discussed, a lack of further inquiry in this hearing, or in the future, should not necessarily be viewed as satisfaction on the part of the Board with either a previous written or verbal answer.

The Board noted in its transmittal letter of questions to DOE in August 2010, that these questions should be viewed as a starting point for the discussions that will occur during this public meeting and hearing.

There are several areas of the Waste Treatment Plant design in which the Board has concerns with the safety, and its ultimate operation for the decades the plant must operate.

These areas include the ability of the plant to adequately mix the wastes after they are transferred from the tank farms into the plant. The hydrogen control strategy for dealing with the hydrogen gas that is inevitably generated by the high-level wastes. The implementation of safety controls necessary to implement the hydrogen control strategy, and the likelihood that limitations on the plant's operating envelope, resulting from the performance of the plant's misting systems, will result in more demands on the tank farms to deliver waste that meets restrictive waste acceptance criteria, or the need to provide alternative processing capability.

The first session of the Board's hearings, this morning's session, is going to concentrate on potential concerns with the plant's ability to mix waste adequately during plant operation.

We are trying to understand the

ability of the plant to safely, effectively, and efficiently process 53 million gallons of Hanford tank waste containing 176 million curies of radioactive materials, so it can be vitrified for eventual disposal.

This involves the treatment of waste containing high levels of solids. In addition, the mixing systems in the plant's waste receipt and processing vessels need to agitate the waste to prevent flammable amounts of hydrogen gas from building up into solids, and to prevent solids that are rich in fissile materials from accumulating in quantities that could pose a criticality hazard.

The mixing systems also need to be operated in a manner that avoids upsets such as pulse jet overblows. We have requested that the department's experts in mixing from industry, academia, and the National Laboratories participate in this morning's panel discussion.

We will endeavor to learn directly

from the department's own experts about their current safety concerns related to mobilizing, treating, and stabilizing Hanford's unique high-level waste during plant operations, and about how the Waste Treatment Plant design effectively addresses those safety issues.

Let me be clear. These are the department's experts that have been consultants to the project over the last several years. These are not the Board's experts. We have, however, evaluated their input to the department and monitored the department's response to them.

We have also asked for participation from project design person from Bechtel National, Incorporated, URS Corporation, as well as the department's responsible personnel for managing the project.

Since it appears that the department's solution to some concerns will require restrictions on the waste being delivered to the plant, the Board will shift its discussions later this morning to panel members that include representatives from the tank farm contractor and associated federal personnel.

This concludes my opening remarks.

I will now ask my fellow Board members if they have opening remarks before we begin the testimony.

Hearing no such request, I would like to invite the Assistant Secretary of Energy for Environmental Management, the Honorable Dr. Ines Triay, to read a statement from the deputy secretary of energy, the Honorable Daniel Poneman.

She'll be followed by Mr. Dale Knutson, DOE's federal project director for the Waste Treatment Plant, and Ms. Stacy Charboneau, DOE's assistant manager of the tank farms project in the Office of River Project, who will also provide from brief remarks.

Welcome, Dr. Triay.

DR. TRIAY: Good morning, Chairman Winokur, and other members of the Board, the Board staff, and members of the public. We appreciate the opportunity to discuss with you our progress at the Waste Treatment Plant.

I will be reading a statement this morning from Deputy Secretary Poneman on behalf of the Department of Energy.

The Waste Treatment Plant project holds enormous importance for the nation, the region, and the Department of Energy. The department attaches the highest priority to the successful, safe completion of this project, on budget and on schedule.

This hearing comes at an opportune time as we prepare to pivot from design/construct approach to a construct/commission approach to project management at Hanford.

In preparing for this transition, we have sought input from several in-depth, independent technical and management reviews, and have worked diligently to resolve important issues.

The secretary and I are strongly committed to continuous improvement in the execution of our capital projects. As the department's senior acquisition executive, I take full responsibility for delivering our projects, adhering to technical, cost and schedule baselines, and assuring the safety and reliability of our operations. Safety is not just a top priority for the department but an essential element of the design, construction, and operations of each of our capital projects.

As the largest, most complex project in our portfolio, the Waste Treatment Plant has fully engaged the time and energy of the senior leadership of the department. It represents the cornerstone of the department's efforts to address the hazards posed by over 53 million gallons of wastes remaining in aging tanks at Hanford.

Many of these tanks have already served well beyond their original design lifetime.

The secretary and I are also committed to assuring that the department is providing the resources necessary to complete the Waste Treatment Plant successfully. I want to identify some specific examples where we have engaged.

We have taken several actions to provide the appropriate resources, including the following. Assigned two senior individuals in the department to lead construction project reviews of the Waste Treatment Plant; recruited an experienced project manager from the Office of Science, with a strong track record in successful delivering projects, to serve as the federal project director.

Directed that the departmental resources from across the complex, the laboratories, production facilities, and site offices, be made available to assist with the Waste Treatment Plant and technical matters.

We have had a number of discussions with the chairman and key executives of Bechtel, to seek their full commitment to providing resources and focus needed to successful complete this project.

Bechtel responded by assigning to the Waste Treatment Plant a project director with an established successful record in nuclear, chemical, and DOE projects, and operating facilities.

After the most recent peer review of the Waste Treatment Plant, the department chartered a technical review of the project, to determine whether technical issues identified in the previous review of the process technology were adequately resolved; to review the technical design against contract requirements; and to identify potential improvements to the Waste Treatment

Plant, that could result in a net reduction in the Hanford tank waste mission life cycle costs or scheduled duration.

That review has just been completed and a copy of the report has been recently provided to the Board.

We have taken steps to bring a heightened level of focus, discipline, and support to the waste treatment federal project director, and to the tank farm federal project director, as we transition the Waste Treatment Plant project from its design/construct phase to the construct/commission phase.

This means completing design and focusing on construction, and transition to operations, including the system for emptying the tanks and delivering the waste to the Waste Treatment Plant.

The Waste Treatment Plant federal project director has the full support of the Assistant Secretary of Energy for Environmental Management and direct access to me as the deputy secretary.

We're working together, closely, to identify not only project needs, but also site office needs, to prepare successfully to begin the Waste Treatment Plant operations by 2019.

An enormous task lies before us. As illustrated by the issues to be considered at this public meeting, there are numbers of concerns that the department must address to ensure the public and the Board, that we are constructing, and will commission a facility that can be safely operated.

I am committed to addressing the concerns identified by the Board, and welcome the opportunity afforded by this public hearing to do so.

Indeed, without the kind of transparency this hearing provides, our activities cannot gain the full confidence of the public, or fully explain our efforts to those present today, and to the surrounding community. This process itself, and the feedback these hearings provide, will strengthen the department's efforts to do the nation's work, while keeping all eyes on continued improvement, excellence, and safety.

It also supports our efforts to serve as good stewards of taxpayers' resources, and to fulfill our moral and legal obligations to remediate the environmental legacy of our past nuclear operations.

Only through our collective efforts will this project successfully and safely complete its mission to remove the threat of Hanford's radioactive tank wastes, and to protect the public and nearby Columbia River for these and succeeding generations.

I will now yield the floor to my colleague, the federal project director of the Waste Treatment Plant, Mr. Dale Knutson.

MR. KNUTSON: Thank you, Dr. Triay. Good morning, Chairman Winokur, members of the Board, members of the public. Thank you for inviting me to provide remarks today. I would like to share my time with my colleague and the tank farms federal project director, Stacy Charboneau, who will provide brief remarks regarding the tank farms project and those aspects relevant to this week's hearing.

On June 1st, at the request of the secretary of Energy, I assumed the role of federal project director for the Waste Treatment and Immobilization Plant.

This plant is the cornerstone to Hanford's tank waste cleanup mission, and vital to removing the threat posed by Hanford's 53 million gallons of radioactive tank waste.

As the Federal Project Director, I am responsible, and accountable to the taxpayer, as well as the acquisition executive and program secretarial officer. It is my job, and duty, to execute the project and ensure it meets safety requirements, technical, cost, and scheduled performance baselines, and that when complete, it will operate safely and efficiently to successfully perform its mission.

I've been the Waste Treatment Plant Federal Project Director for just over 120 days. When I accepted this job, I made a commitment to the deputy secretary, that I would prepare an assessment of the project and deliver that assessment to him by September 30th, 2010, which I have done.

As part of developing that assessment, and as the FPD [Federal Project Director], I immersed myself in this project, working to assure myself that we are developing a safe, effective, and efficient plant, that our work is technically adequate and that we are ready to pivot our focus towards commissioning.

Over the next two days, you will be reviewing the technical and programmatic detail that I've had the opportunity to assess over the past four months.

Right now, I want to take a few minutes to give you the highlights of my assessment report, defining the "big picture" of where we are and where we are going on this project.

First, we now have a strong structure in place to obtain the necessary team members of this project. That's important as we begin pivoting focus, and allows us to pull from a variety of resources, across the department, as well as industry.

The Waste Treatment Plant project has a long history of internal and external reviews, and from those reviews, a substantial list of recommendations has emerged. I can say, with confidence, every recommendation made to date has been considered, most have been accepted, and all are being or have been appropriately dispositioned.

As part of my review of external flowsheet review team recommendations, we included the assessment of residual risk.

Remaining uncertainties and risks have been identified, and actions are being taken to provide additional confidence in system performance and gain operational knowledge prior to commissioning. The commitment for large-scale testing for pulse-jet mixers is an example of DOE's approach to managing residual risk.

As part of the maturation of the project, the definitive design and safety design basis has evolved with the overarching philosophy and logic, that a heightened degree of conservatism is appropriate during conceptual phases, where details--before details are available.

As a natural progression of the project, the level of conservatism has been appropriately refined. As testing is completed, the design matured, issues resolved, and more information became available through, among other avenues, external reviews.

The last construction project review concluded that the Waste Treatment Plant--I'm quoting--the Waste Treatment Plant can be delivered at the total project cost, if an accelerated funding profile is adopted, no new major technical issues emerge, and the project is proactively managed. End quote.

That is the first time that such a conclusion has been made on this project from an external source. These external reviews provide us with valuable information, highlighting areas of strength and areas require, areas that require more attention, and we will continue conducting these reviews throughout the project. The next one is scheduled for November.

At the request of the Secretary and Assistant Secretary for Environmental Management, a tank waste subcommittee was informed under the Environmental Management Advisory Board. Their first task was to assess closure of the WTP [Waste Treatment

Plant] technical issues raised in 2005 by an external flowsheet review team.

The subcommittee recently completed their assessment and determined that those technical issues were closed, and remaining technical risk is sufficiently low to allow a shift in focus towards commissioning.

Safety remains a priority for the project at this construction site. Late in September, the Department's Office of Health, Safety and Security, notified ORP [Office of River Protection] and Bechtel, that it had certified the contractor in the department's Voluntary Project Program at the star level, the highest such level awarded.

In closing, I want to stress that the safety of our workers, and the public, and protect of the environment, will always be our first priority. We are structured to access and utilize the appropriate team members to safely bring this plant into operations. We are working closely to ensure integration with the tank farms to support operations. We remain focused and committed to addressing and resolving all technical issues, and ensuring this plant is built to safely carry out its mission, removing the threat of Hanford's liquid tank waste.

I welcome this opportunity to update the Board, and the public, on the progress being made toward completing design activities on the Waste Treatment Plant and pivoting the project to a construction and commissioning focus.

I'd like to now turn the floor over to Stacy Charboneau.

CHAIRMAN WINOKUR: Thank you, Mr. Knutson.

MS. CHARBONEAU: I too welcome the opportunity to address the Board today, and provide assurances that the tank farm project is working hand in hand with the Waste Treatment Plant project, aligning our efforts to commission and operate the Waste Treatment Plant in order to complete the Hanford tank waste cleanup.

A safe delivery of over 53 million gallons of waste, currently stored as sludge, salt cake, and liquids in 177 underground storage tanks, to the Waste Treatment Plant, will require extensive infrastructure, including modifications to existing facilities, and construction of new facilities, to complete the tank waste treatment mission.

The requirements for additional facility modifications, or new facilities at tank farms, necessary to achieve waste feed delivery requirements, will be determined after the convergence of two major efforts currently underway.

The first is the tank farms pumping and mixing studies, and the second is the Waste Treatment Plant waste acceptance criteria, data quality objectives process.

The ability to adequately mix and sample waste to meet the WTP acceptance requirements is being evaluated, and will need to be demonstrated. As detailed in the tank farm's project technology developing road map, while this testing is currently underway, the extent of testing will be determined based on waste acceptance criteria requirements, as refined through the data quality objective process and closure of the WTP technical issues.

It is an integrated process, and both WTP and tank farms personnel are participating.

The tank farms project has worked closely with the Waste Treatment Plant project to address and close technical issues regarding wastefeed to the WTP.

Currently, no added acceptance criteria on wastefeed delivery are expected due to mixing concerns. Further, waste particle size and density criteria are satisfied by adhering to the existing interface control document, ICD-19 [Interface Control Document 19], waste acceptance criteria on maximum critical velocity.

The sampling of each feed batch will ensure that the feed delivered to WTP meets the acceptance criteria and remains below the material at-risk assumptions in the safety basis.

Any changes to the WTP criticality safety evaluation report that impact feed delivery will be coordinated with the tank farms project to ensure the changes are attainable.

DOE and its contractors have systems in place to ensure control of safety-related design activities required to implement solutions, and facilitate development of appropriate safety-related structures, systems, and components.

And to mirror Mr. Knutson's statement, as the tank farms federal project director, it is my job and duty to execute the project and ensure it meets safety requirements, technical, cost and scheduled performance baselines, and that when complete, these structures, systems and components will operate safely and efficiently to successful complete the mission.

I'm energized to move the River Protection Project to forward to the next phase. As we plan for commissioning these complex nuclear facilities, I look forward to our discussions during the waste feed preparation panel later today.

CHAIRMAN WINOKUR: Thank you, Ms. Charboneau. I'd like to thank the three of you. This session will continue now with testimony offered by members of the Board's staff. I ask each staff member who offers testimony to begin by stating his name and position for the record.

MR. KASDORF: Good morning, Mr. Chairman, and members of the Board. For the record, my name is Roy Kasdorf. With me are

Mr. Steven Stokes and Dr. Adam Poloski, the staff leads for WTP and mixing. I am the Board's lead for the nuclear facilities Design and Infrastructure Group.

I am responsible for ensuring that reviews of the Board's staff of design and construction projects are completed consistent with the Board's mission.

Over the past eight years, the Board's staff has been reviewing the Waste Treatment and Immobilization Plant pre-treatment facility, design and safety basis development. The staff recognizes that operation of the WTP is vital to the remediation of the Hanford site. The WTP is the primary means for reducing the risk resulting from the storage of high-level waste in Hanford's tanks.

As such, the Board staff recognizes that WTP must operate efficiently and safely over the entire duration of its multidecade mission. The staff's concerns fundamentally relate to safety issues, but many of the safety issues would also result in significant operational problems, such as buildup of material in vessels, plugging or bursting of pipes. Such operational problems would delay processing of the Hanford tank waste.

The Board believes that such delay is a safety concern. This testimony will address the safety-related concerns of the staff associated with pulse jet mixing issues at the WTP. But first, I would like to discuss why the Department of Energy elected to use pulse jet mixers, PJMs [Pulse Jet Mixers], as their primary means of mixing in the WTP, and briefly describe how PJMs work.

The design philosophy for the pre-treatment facility involves the use of black cells. A black cell is a room in the pre-treatment facility that will not be accessible during the designed 40-year operating life of the facility. Black cells contain the vessels and piping that will be used to prepare the waste for processing and subsequent vitrification.

Since black cells are inaccessible, all components located in the black cells must be maintenance-free. That's the reason for the selection of PJMs. They have no moving parts and are maintenance-free.

To operate, PJMs use air to draw waste up into a pulse tube, charging the pulse tube, and then high-pressure air to expel the waste into the vessel, discharging the pulse tube.

The repeated charging and discharging of the pulse tubes provides the mixing energy for each vessel. Proper mixing is necessary to avoid hazards from solids accumulating in the WTP waste tanks.

From a safety perspective, PJMs perform properly when the solids are successfully lifted from the bottom of the vessel and suspended in the waste, or at a minimum, when solids move freely on the bottom of the vessel. Solid suspension is the industry standard. However, the project recently changed their criteria to use bottom clearing, where solids are shown to move freely on the bottom of the vessels but are not fully suspended.

In the opinion of Pacific Northwest Laboratory researchers, this change represents a significant reduction in mixing criteria. Fast-settling particles provide the greatest challenge for the PJMs. The fast-settling solids, which are generally the large, heavy particles, must be lifted off the bottom long enough to allow them to be pumped out of the vessel when the waste is being transferred.

The staff believes that this is the first use of PJM mixing technology involving radioactive slurries with a high concentration of solids with heavy radioactive particles. So it is not surprising that

Bechtel National, Incorporated, BNI [Bechtel National Incorporated], has experienced considerable difficulty developing PJM designs that meet their design objectives and requirements. BNI needed to change the PJM design, as recently as this year, to increase the mixing energy for problem vessels.

Mixing energy can be added--can be increased by adding more pulse tubes, increasing the size of the pulse tubes, or by increasing nozzle velocity of which the liquid is discharged from the pulse tube.

But there are limitations to the nozzle velocities and the size and number of pulse tubes that a given vessel can accommodate.

One other solution is to limit the amount of solids and particle sizes allowed into the vessel by tightening up on the waste acceptance criteria, the WAC [Waste Acceptance Criteria].

This could solve the WTP problems

but may have negative implications for the length of time that the plant may be required to operate, as well as put more burdens on the tank farm contractor.

As I stated, if the solids are not mixed properly, safety issues can result from the accumulation of solids in the pre-treatment vessels. There are three main safety issues. Inadvertent criticality due to accumulation of fissile solids, trapping excessive amounts of flammable gases in the solids later, and PJM overblows, which occur when the air pressurizing the pulse tubes is left on too long and compressed air blows out forcefully into the tank waste contents.

Overblows are potentially damaging to the process vessel, and BNI has limited them to one thousand occurrences during the operating life of the plant.

Without adequate mixing, safe operation of the pre-treatment facility cannot be assured and the mission of the facility would be impacted.

As I mentioned earlier, the design of the PJM system has been very challenging for BNI. The challenges are due to uncertainties associated with waste characterization, the high concentration of solids in the slurries being mixed, and the ability to predict proper scaling factors to correlate PJM testing to actual in-plant performance.

As such, the Board staff is not confident that the ability--that the capability to adequately mix solids in the WTP has been demonstrated. I'll now discus, briefly, some of these uncertainties.

Effective PJM mixing requires that characteristics of the waste supplied to the pre-treatment facility be well-known. The viscosity of the waste slurry, the particle size, and the density distribution of the solids are important parameters, if one wishes to understand mixing capability.

However, the waste characterization data used to establish the WTP design basis uses slurry properties from a 2002 report, that relied on limited data from only a few of the 177 waste tanks.

The limitations of these data have been recognized since that report was prepared. The report noted the need for additional characterization data and stated these slurry calculations must be regarded as "rough guides" because of the apparently wide variation of the data, and the relatively small number of tanks for which measurements have been made.

PNNL [Pacific Northwest National Laboratory] established characterization data that considered 28 of the 177 tanks, in an effort to establish a revised particle size for use in testing and design. However, this PNNL report does not, in the staff's opinion, properly bound the particle size and density distribution from tank farm place due to a variety of problems. For example, the instrumentation used to measure particle size had no limitations that affected its accuracy, and the method used to estimate particle density at a particular size is based on assumptions on chemical composition, rather than measured densities.

Uncertainties in particle size, and densities, density, present significant challenges for defining simulants to use in the testing program, that ultimately define the design inputs and requirements for mixing in the pre-treatment facility.

Using limited tank data can be problematic. In 2009, PNNL compiled viscosity data for 28 waste tanks and found that the earlier 2002 correlations, which was developed from only three waste tanks, significantly underpredicted the viscosity as compared to the measured PNNL values.

Establishing the real logical properties of the waste presents significant challenges to the adequate mixing of the waste in the process vessels. The second area of uncertainty is associated with using PJMs to mix solutions with high concentrations of solids. As early as June of 2000, prior to the establishment of WTP's design basis slurry properties, British Nuclear Fuels, Limited, the original design agent, completed the conceptual design of the PJM for WTP.

In August 2001, BNFL [British Nuclear Fuels Limited] established the technical basis for the adequacy of the PJM concept for the WTP application. This report concluded that testing was required to develop the PJM technology for the vessels that contained a high degree of solids.

BNI has attempted to further develop the PJM technology from 2002 until today. Some important milestones from this period are: In March 2006, the External Flowsheet Review Team released a report that identified mixing issues with PJMs.

In their report, the EFRT [External Flowsheet Review Team] warned that an accumulation of large participles in the bottom of tanks may further reduce the efficiency of PJMs. Accumulation may also cause plugging of the measurement bubblers, removal of those particles will require specific tank cleanup operations that are not planned in the design. The project ultimately referred to this as Major Issue 3, M-3.

In May 2009, PNNL issued a report on resuspension testing of low solids, low solids vessels, which concluded that twelve of the 22 low-solids vessels were prepared to have inadequate mixing performance.

In May 2009, BNI began additional testing but used a different experimental approach which relied on a combination of full-scale testing at the Washington State University, and small-scale testing at Mid Columbia Engineering. The full-scale portion of the testing attempted to measure the area of sediment cleared around a PJM, while the small-scale testing used a prototype, prototypic small-scale vessel.

By the end of 2009, testing results from the new small-scale testing showed the velocity needed to achieve off-bottom suspension was significantly greater than the velocity that had been predicted by PNNL. This was an important finding, since it showed that even more mixing energy would be necessary to complete off-bottom suspension.

In December of 2009, the Consortium for Risk Evaluation with Stakeholder Participation, the CRESP [Consortium for Risk Evaluation with Stakeholder Participation] team, which is a consortium of experts from academia, that provides DOE an independent assessment of mixing, reviewed BNI's testing program and had seven recommendations.

One of the CRESP recommendations stated that the design basis for each vessel should be established on clearly defined mixing requirements with the scaling basis for each requirement founded on physical mechanisms.

From January to June of 2010, BNI attempted to implement the 2009 CRESP recommendations in their small-scale testing program. The testing had already shown that some of the vessels would have problems mixing.

This led BNI to revise the requirements for mixing of these vessels to specify a lower solids concentration--this will lead to tightening of the waste acceptance criteria--and to use less conservative scaling factor for correlating PJM nozzle velocity from the full-scale vessels.

Further, BNI revised the approach for testing the problem vessels to one of simply demonstrating that solids could be transported out of the vessels, so that solids would not accumulate, and that sediment on the bottom of the vessels could be mobilized to release flammable gas.

This revised approach and design criteria deviates from the standard industrial design approach for mixing off-bottom suspension or cloud height. As a result, the WTP mixing system will not be as robust.

Lastly, the scaling factors used by BNI to demonstrate that the full-scale vessels would mix properly, have been questioned by the Board, and others. BNI used the scaling factors to establish the small-scale testing parameters that correlate to actual design parameters.

A typical approach would be to predict full-scale performance from small-scale testing by conducting identical experiments with several test platforms of different scale, and then extrapolating to predict how the full-scale system will behave using scaling factors.

BNI's approach relies on a single, small-scale testing platform, and an assumed scaling factor that includes an exponent of 0.18, that is based on a single journal article that is not directly pertinent to the WTP/PJMs.

This scaling factor assumed by BNI has been questioned by several of DOE's independent experts. In their response to the Board's Question 18, PNNL researchers write, and I quote, "The smaller scale of factor exponent allowed the scaled PJMs to be operated at a higher velocity in the test stand, thus improving the observed clearing behavior. We think the use of 0.18 scaling exponent, which derived from a sheer wall measurement of steady air jets impinging on the flat plate, to unsteady mobilization of solids in the test stands, is not supported by existing data." End quote.

There are more recent compelling scaling factor exponents in the literature but

BNI chose to use a nonconservative experimental basis.

In July 2010, CRESP issued its letter report number seven, following their review of the recent BNI small-scale testing.

This letter contained 13 recommendations, and concluded, and I quote:

"There are several important PJM vessel design uncertainties and definition of operating requirements that remain to be resolved, including revision of the criticality controls, validation of scale-up relations for PJM zone of influence, integrated validation of vessel performance, recovery from a design basis event, and viable sampling strategies, that result in PJM performance and programmatic risk.

"The greatest risk is that the actual zone of influence during WTP operations is smaller than predicted by the current design basis, and therefore, solids accumulation may require more frequent clean-out than predicted.

"Experimental programs that validate scaling relationships for the zone of influence, and the integrated vessel performance at full scale, or near scale, are needed. While none of these uncertainties fundamentally indicate that WPT will not function, provided their is enough flexibility in PJM operation, resolution of these issues may result in pre-treatment process operating at lower waste throughput than currently projected." End quote.

The Board's staff agrees with the CRESP conclusions and strongly supports the need for large-scale testing to reduce the uncertainty in the existing PJM design.

However, based on testing performed to date, full-scale testing may simply demonstrate that the PJMs are only capable of mixing lower concentrations of solids than originally planned. This could impact throughput, extending waste, tank waste treatment, or requiring supplemental tank farms treatment capability.

As we've heard, DOE is pivoting the WTP project from design and construction into construction and commissioning. To address potential weaknesses in the PJM design, DOE recently committed to conduct large-scale testing within the next several years.

BNI has also proposed adding heel dilution and heel removal capability to the pre-treatment vessels, to mitigate any potential accumulation of solids. From the perspective of the Board staff, BNI is moving construction forward, with significant technical risk and uncertainty.

While DOE is committed to perform large-scale testing, before the testing is completed all vessel designs will have been determined to have been confirmation-ready, and the vessels will have been installed.

Without further comprehensive

waste characterization, the uncertainties associated with the range of particle sizes, densities, and fluid viscosities remain. Large-scale testing may only demonstrate that the vessels will not mix solids sufficiently to prevent accumulation and indicate limitations on solids loading, that may impact the project's schedule.

The functional design requirements for heel dilution and heel removal capability have not been established. Criticality safety issues remain to be resolved. The vessel sampling design remains incomplete, and the ability to meet design requirements also remain in question.

The Board staff believes that DOE should establish a credible strategy for dealing with this uncertainty. This strategy might include accelerate characterization of waste from the suspected worst-case tanks and waste types; accelerated--accelerate completion of the large-scale testing in an effort to define the operational envelope for the PJM vessels; design the waste retrieval facility with mixing and sampling capability engineered to protect the operational envelope established by the large-scale testing; and design a small pilot plan capability to verify the acceptance of feed batches to the WTP.

This ends my prepared remarks and we'd be happy to try to answer any Board questions.

CHAIRMAN WINOKUR: Thank you, Mr. Kasdorf. Do Board members have any questions at this time of the staff?

I can assure you, in the last few months, the Board members have had a lot of questions for the staff.

Hearing none, I'd now like to invite the first panel of witnesses from the Department of Energy and its contractor organizations to take their seats. I'm going to take the--an opportunity to introduce them as they come up.

Dr. Ines Triay. Dr. Triay is the assistant secretary of Energy for Environment Management.

Mr. Dale Knutson. Mr. Knutson is the federal project director for the Waste Treatment Plant.

Dr. David Dickey. Dr. Dickey is an expert consultant on mixing, who provided services to the Waste Treatment Plant and tank farm contractor. He was the author of Bechtel's external flowsheet review team concern on tank mixing.

Dr. Loni Peurrung. Dr. Peurrung was the product line manager for environmental products at Pacific Northwest National Laboratory. Dr. Peurrung was responsible for the laboratory's test program to evaluate tank mixing.

Dr. David Kosson is the chairman of the DOE-sponsored consortium for risk evaluation with stakeholder participation. This consortium, drawn from academia, provide the DOE with independent assessments on tank mixing.

Mr. Frank Russo is the Bechtel project director for the Waste Treatment Plant.

Mr. Greg Ashley is the Bechtel manager of engineering for the Waste Treatment Plant.

Mr. Leo Sain is the URS executive vice president for performance assurance and operations.

And Ms. Donna Busche is the URS nuclear safety manager for the Waste Treatment Plant.

Welcome. Does any member of the panel with to submit written testimony at this time.

(No response.)

CHAIRMAN WINOKUR: The hearing record will be kept open for a fairly long period of time, so if you wish to do that at a later time, that will be okay.

Let me say, to start with, that we have a lot of material to cover. The Board has chosen its panelists very carefully and request that panelists alone answer questions that are directed to them to the best of their ability.

If a panelist would like to take a question for the record, your answer to that question will be entered into the record of this hearing at a later time.

And so with that, I'm going to start with the first question. It'll actually be going to Dr. Peurrung. It won't be the last question I have for you today; but the first. And I think we all know that one of the measures that the Department of Energy uses to sense whether a technology is able to accomplish its intended mission, or its intended function, is called the technology readiness level.

And another way I think of that is, what is the maturity of the technology?

In a recent report to the project of this year, PNL researchers wrote the following. It was actually included in an e-mail from Terry Walton, who was the PNNL director of energy and environmental programs, to use Mr. Russo.

He wrote, "There has been a fundamental misperception about the maturity of PJM technology. This is new technology which is unproven for applications involving significant amounts of solids.

So my first question to you, Dr. Peurrung, is: Can you elaborate on that a little bit.

DR. PEURRUNG: Well, the document that you're referring to, Dr. Winokur, was a list of vulnerabilities, and essentially residual risks that we prepared at the request of Bechtel National. What risk we saw remaining, once the major issue, 3-M-3 issue had been closed, and it is true that there is relatively little experience out in the industrial sector with mixers of this type, particularly at these sorts of solids loading. That was not the only vulnerability that was in that document, and it has been made available for the public.

CHAIRMAN WINOKUR: So I mean you certainly agree with the statement made there, is PNNL's perception that this is not a mature technology--

DR. PEURRUNG: No--

CHAIRMAN WINOKUR: --for this intended application?

DR. PEURRUNG: Given the relatively small amount of experience in the industrial community with PJMs.

CHAIRMAN WINOKUR: Okay. And I should ask you that question, Mr. Russo. What is your sense of the maturity of this technology at this time?

MR. RUSSO: It is a new technology. However, it's a proven technology in different applications. The technology has been in use at Sellafield, for, I believe over

20 years, and we visit Sellafield to gain operational knowledge from them in terms of the use of PJMs.

I would like to not that the e-mail that Terry Walton sent to me was at my request, and part of our overall vulnerabilities assessment that drives our residual risk analysis, that we presented to the Department of Energy as part of the closure documentation for M-3.

CHAIRMAN WINOKUR: All right. Thank you for that. And I guess you raise the issue of the use of PJMs at the Sellafield vitrification facility, and it's my understanding, and you just said so, that a team, I guess a team of DOE folks, and contractors, went out recently to visit Sellafield and to get some sense of, you know, the use of this technology for your intended application. Would that be true?

MR. RUSSO: That is true.

CHAIRMAN WINOKUR: And I think the

only panelist we have here, who was actually on that trip, was Ms. Busche; correct?

MS. BUSCHE: True.

CHAIRMAN WINOKUR: And can you provide any insights into what you learned, in terms of the experience of the Sellafield facility in the sue of pulse jet mixers, but more specifically, the intended operation here, at Hanford, which includes the need to mix significant amounts of solids.

MS. BUSCHE: Right. There were some--during our trip, there were some notable differences, right off the bat. In discussions with Sellafield, pulse jet mixers for their range of feed that's presented to their commercial production, is a very, very consistent band, and their solids range is significantly lower, that they would expect to see with their pulse jet mixers.

Their pulse jet mixers were also coupled with a sparger design similar to ours, but they used the pulse jet mixers and the design of their spargers to complete the full mixing of their tanks, and their vessels were significantly smaller in size.

So my main focus, on my journey, was to understand how to control the pulse jet mixers for many of the items that were identified in the opening testimony.

So there were some significant differences. I did learn a lot on how--as we move forward, to develop the control logic for those pulse jet mixers.

CHAIRMAN WINOKUR: What were the range of solids that they were mixing at the Sellafield facility?

MS. BUSCHE: I believe it was around 5 percent.

CHAIRMAN WINOKUR: Right. And did you ask them for any insight into your application here, at Hanford, where the percentage weight salt--weight percentage of salt would be considerably higher?

MS. BUSCHE: Not specifically on

the weight percent solids. No. I did not.

CHAIRMAN WINOKUR: Anything else that they shared with you, that gave you insight into the challenges you would face here at the Hanford Waste Treatment Plant?

MS. BUSCHE: I did inquire, some questions with respect to black cell technology because it is new to me. I've grown up in the DOE business with canyons and cover block. So I did ask, have PJMs failed? Again, they indicated for their range of feedstock, it predominantly was not an issue. But they have had instances where they've had to enter a black cell to repair what they coined to me as a failed vessel, and it was--you know it's--there will be, if we ever have, I think, some good lessons learned from what they had to do to go in and repair that vessel, and it was basically on the cycling of the pulse jet mixers when they got a feed spec that was off their normal input to their production line.

CHAIRMAN WINOKUR: Did you specifically share with them the kinds of operations you were expecting to perform here, at Hanford, and ask for their advice?

MS. BUSCHE: Not specifically, no, is the short answer to that. I did inquire some questions about the overall evolution of the high-level waste facility, not just pulse jet mixers but how did their whole flow work with solids, and there were some discussions of lines, critical velocities going downline. So they were more for my general edification, is was I comparing apples and apples, or was their design dissimilar to what I would expect it, at the pre-treatment facility?

CHAIRMAN WINOKUR: Did you learn anything meaningful there, that would help you in terms of what you're doing at Hanford here?

MS. BUSCHE: The most striking, my take-away, or lessons learned, was a discussion related to plugging of the lines. Did they have any problems? The feedback I gained from the engineers were that their lines are gravity. They don't rely--you know, gravity works to move the solids.

I did indicate that we had long lines of, you know, long lengths of pipe, that we might need to move our solids from vessel to vessel in our process. And his reaction was that that would give us difficulty and maybe a wrong design.

But I'm not the design expert on this panel. It was more for my understanding of how am I going to write the control strategy from when the solids do enter our feed vessels to the day I exit.

CHAIRMAN WINOKUR: Right.

MS. BUSCHE: So I wasn't asking design questions, just trying to understand.

CHAIRMAN WINOKUR: Let me ask you, Mr. Sain. You're a URS executive, and URS is clearly part of the consortium that owns and operates Sellafield. So have you been using the experience that URS has gained over at

Sellafield to inform the Waste Treatment
Plant?

MR. SAIN: Yes, we have. In fact, we actually brought Todd Wright, deputy director, for a visit to WTP, and we intend to continue that relationship.

CHAIRMAN WINOKUR: All right. Thank you. I'll turn now to Ms. Roberson.

VICE CHAIR ROBERSON: Good morning. I'd like to thank you all for being here. I'd like to actually start out, questioning the representatives from PNNL, Dr. Dickey and Dr. Kosson. I'll ask Dr. Kosson, first, if you can briefly describe the nature, extent, and timing of your organization's involvement in forming the project on the WTP.

DR. KOSSON: Certainly, Dr. Roberson. In 2006, CRESP was requested by the then DOE site manager, who was Roy Schepens, and also from headquarters, the then deputy assistant secretary, Mark Gilbertson, to form a technical review team as an external--

external independent technical review team for certain issues that were identified by the EFRT program. Amongst the ones that we were asked to look at was the M-3, or PJM mixing issue.

And as a result of that, CRESP sought out technical expertise to form a panel that then followed the evolution of DOE's responses to the PJM mixing, through to Decem--I'm sorry--till June of 2010.

VICE CHAIR ROBERSON: Thank you, sir. Dr. Dickey, could you share with us the response to the same question.

DR. DICKEY: Could you repeat the question.

VICE CHAIR ROBERSON: Can you briefly describe the nature, extent, and timing of your involvement in advising the project.

DR. DICKEY: I became involved in the project with the FRT in 2005-2006, as a member of the FRT, and as a result of that, after having reviewed the general characteristics of the PJM mixing applied to these tanks, concluded that there were several potential problems in terms of the design or the extent of the mixing capability, and almost any plant processing a variety of materials will experience some possible accumulation of solids, and certainly that was an issue with the--a possibility.

Since then, I have been involved in periodic reviews of the work done by PNNL, the work done at MCE [Mid-Columbia Engineering], and most recently, since about June of 09, worked fairly extensively with BNI to help establish and understand the mixing characteristics of the vessels.

VICE CHAIR ROBERSON: Dr. Dickey, can you please inform the public of your area of expertise and how you came about that expertise.

DR. DICKEY: Yes. My area of expertise is truly industrial mixing. I have, in my career, worked for four, five different companies, or combinations of companies, that have worked with both liquid and dry powder mixing equipment, slurries and things of that sort, and have done extensive work in small-scale testing and scale-up to industrial scale equipment.

VICE CHAIR ROBERSON: Thank you, sir.

Dr. Peurrung, can you characterize the nature, extent, and timing of the involvement of PNNL with the project.

DR. PEURRUNG: Well, Pacific Northwest National Laboratory has been supporting the Waste Treatment Plant project for more than 10 years now, back to 1999, which included support to its predecessor, BNFL Limited.

We've been providing a variety of science and technology support, including experimental testing performed at our facilities, and other sorts of modeling and consulting services, not only to resolve this particular issue on adequacy of mixing, but also several other issues. M-1, the pipeline plugging issue. M-12 on the adequacy of scale-up for some of the chemical pre-treatment approaches, as well as other issues that the WTP project has brought to us for consultation.

VICE CHAIR ROBERSON: And Dr. Peurrung, I know you're representing your organization. How many scientists stand behind you?

DR. PEURRUNG: Hundreds, literally hundreds of Pacific Northwest National Laboratory staff have worked on this project over the years.

VICE CHAIR ROBERSON: Okay. Thank you.

Dr. Kosson, have you been able to maintain an understanding or awareness of the progress on the project relative to the areas you've advised?

DR. KOSSON: Over the period of time that we were engaged with the review of the project, we had periodic meetings with DOE and their contractor staff. We reviewed thousands of pages of technical material that they provided to us, both from the contractors and from DOE, as well as outside technical material from the peer review technical literature.

VICE CHAIR ROBERSON: Okay. Can you specifically tell us, based on that awareness, what concerns raised by your organization remain unresolved.

DR. KOSSON: I think that your staff member quoted our CRESP report accurately, earlier, about the nature of them. That the final conclusion that we had, that he quoted, and obviously we stand behind, that there are several important PJM vessel design uncertainties and definitions of operating requirements that remain to be resolved, including revision of the criticality controls, validation of scale-up relationships for PJM zone of influence, integrated validation of vessel performance, recovery from a design basis event, and viable sampling strategies that result in PJM performance and programmatic risks.

The greatest risk is that the actual zone of influence during WTP operations is smaller than predicted by the current design basis, and therefore the solids accumulation may require more frequent clean-out than predicted.

I think that's a very succinct summary, and we still have that.

VICE CHAIR ROBERSON: Okay. Thank you.

Dr. Dickey, I assume you have also remained aware of the progress of the project on concerns raised by yourself in the flow review team.

DR. DICKEY: Yes. I have been very active in that part of it, and have certainly approached it from a little different perspective of very much a combination of academic and industrial performance, on both the mixing characteristics and the scale-up, and I would be the first to admit, I think, that I have learned a great deal from the beginning of this project, and would very definitely state that there are significant differences in the way the PJMs operate versus other types of mixing equipment, and even other types of objectives for the mixing equipment.

VICE CHAIR ROBERSON: Okay.

Are there concerns, that you have been a part of raising, that remain unresolved today?

DR. DICKEY: My concerns I think fall outside of the basic operation of the mixing equipment. They're certainly the kind of thing that, as has been brought up, of being able to ensure that the feed to the WTP falls within the required specifications, and that the operation of the plant will be such, that the vessels involving PJMs do not experience higher levels of solids concentration than the designs have been tested and evaluated for.

VICE CHAIR ROBERSON: So let me make sure I understand. Under the assumption that the tank farms can meet the specifications, the WAC specifications, and that the design operates as specified, you don't have any open concerns about mixing?

DR. DICKEY: Not about the mixing part of it.

VICE CHAIR ROBERSON: Okay. Dr. Peurrung, the same question to you. And we have time. You can be specific, please.

DR. PEURRUNG: Okay. All right. Well, you know, Pacific Northwest National Laboratory was asked by the project to do some scale testing, originally, we began those discussions in 2007, to look specifically at the adequacy of mixing, and at the time we were asked to rate the tanks, how well the mixing systems would perform in those vessels.

And we did that testing in 2008 at three scales, so that we could try to derive these scaling factors for the tanks, to scale up to full scale. The testing we did was limited to noncohesive materials and we didn't use waste simulants. We were using a couple different sizes of mono-disperse beads.

The mixing criteria, at the time, as the staff discussed, were to make sure that the material was at least suspended off the bottom of the vessels, and also that the pump inlet concentration was no more than 20 percent, because it was felt that higher solids loadings than that would clog the pump inlets.

So we performed that testing and we developed a couple of correlations, one physics-based and one statistics-based, and we've benchmarked the correlations from the scaled testing that we did to some other data that we've done from testing for the project much earlier, that used a more complex simulant.

And from benchmarking the correlations, which we found to agree with previous data quite well, we concluded, as the staff mention in their report, that, well, four of the vessel types appear to be adequate against both of those mixing criteria. Two of them are marginal and seven of them failed to meet those criteria, and we published that in a report. The final version of that report came out in 2009.

We did have that report independently, technically reviewed, at our own expense. We're aware that since that time, since the time of the report, that there have been changes made to the mixing system designs, in some cases physical changes, in some cases changes in the operating conditions and the material that may be sent to vessels.

We're also ware that they've

changed the mixing criteria from an off-bottom suspension approach to the bottom-clearing approach, looking at zone of influence, and as we stated in our answer to Question 18, we do believe that this represents a lesser mixing criterion.

We felt that even just critical suspension was essentially a minimum criteria for mixing. But we recently actually had the opportunity to take our scale-up correlations and test them in the system that was set up at Mid Columbia Engineering with a more prototypic system, and we did actually find that they work quite well, now that we have corrected, made some corrections to them that account for operating a more prototypic system.

They still predict to us that against the mixing criteria that we support, that we feel are conservative and appropriate for the plant, that substantially higher velocities are going to be needed in order to achieve suspension in the vessels than is currently planned in the designs, to our understanding of those designs.

VICE CHAIR ROBERSON: Okay. Now Dr. Dickey, throughout this hearing, we're going to explore some of those concerns, the concerns, previous and current on the project, and I understand the assumption that the feed will meet whatever specification there is. But as a mixing expert, can you tell us what the assumptions are about mixing, that make you comfortable.

DR. DICKEY: I think that's probably the right starting point, because what evolved out of this project, the concern that I had raised with the EFRT was the accumulation of solids. The net effect of this, and some of the things associated with the way we characterize the mixing, came about really by focusing on two primary objectives.

One was no accumulation, and the other was mobilization of a settled bed of solids. Those two items were completely different approaches, and as I mentioned earlier, part of the things that we learned about this.

What we found, or what my initial concern was about accumulation, once having seen how PJMs operate, in simplest form, the PJM is capable of lifting the solids off of the bottom during the power stroke, and then there's a refill period during which the rapidly-settling particles return to the bottom of the tank.

The initial concern was that, in effect, you were only able to withdraw solids that were lifted off the bottom for no more than a quarter or a third of the cycle, and the rest of the time these solids that had the potential for accumulating would rest on the bottom.

After some initial testing, we actually found that almost the reverse happened. That when the pulse fired, there was sufficient material lifted off of the bottom, that you actually withdrew a high concentration of the rapidly-settling particles, and a higher concentration of all of the particles. In effect, what ended up happening was almost--and I say almost--to the point of not suspending the particles very well, actually gave you a higher percentage of the rapidly settling difficult-to-suspend particles actually leaving the vessel when you were doing a pump-out.

The net effect is that this change from off-bottom suspension to on-bottom motion actually appears to be an effective way of avoiding some of the problems with accumulation of solids.

The tests that were conducted were conducted along those lines. The simulants that were used, and some of the things that were measured--and this has evolved, over even the test program over the last year, of the kind of thing of testing with a tungsten carbide material that more nearly matches what a crystalline plutonium oxide material might look like.

Those were found to come out, preferentially, as a result of the operation of the PJM mixers. So it appears that, based on everything that I've seen as far as the technology and the technique, that this has been a logical shift in the way we went about doing it.

All of those tests, and all of those evaluations were done on the basis of the one-third scale-down exponent, which said that the tests that were run in the small scale were run at greatly-reduced velocities compared to the design velocity, the anticipated velocity, the full scale.

That's the way--and I teach a course on scale-up--says go in, define what you want to do, and figure out what you need to test. The problem that's arisen is the understanding of this .18 exponent, and I kind of was backed into that one.

My approach was to take a look at the material sitting on the bottom of the tank, more nearly represents the kind of situation that existed in the non-Newtonian study. The non-Newtonian study would have indicated that equal velocity would have been adequate to resuspend or mobilize this material that was sitting on the bottom.

That would have resulted in a zero exponent. That would have resulted in the test being run at the corresponding velocity, the full scale. My recommendation was to use a one-fifth exponent, partially influenced by this about .2 that came out of the theory, but, really, as a conservative exponent as opposed to using equal velocity. So that the resuspension or the mobilization of settled material really came about at the higher test velocity but not for the purpose of establishing whether or not you were suspending the solids.

VICE CHAIR ROBERSON: Okay. Well, we're going to explore the concerns that you guys have summarized. I think for me, at this point, I'd like to go to Mr. Russo.

Mr. Russo, I assume you are familiar with concerns raised by these experts in the organizations they represent.

MR. RUSSO: Yes.

VICE CHAIR ROBERSON: Is there any concern, that they have raised to the project, that you disagree with, you think is erroneous, or wrong?

MR. RUSSO: We are aware of all the concerns that have been raised by all of our expert panels and consultants. All have been captured in our vessel analysis data sheets. We have done our analysis of those concerns in conjunction with our testing, and prepared what we considered a residual risk for each of those concerns, for each of those vessels, vessel by vessel, and presented that as part of our closure packages to the

Department of Energy.

We also, in our closure packages, in recognition of their concerns, and our own desires to advance the operability of the plant, we also recommended the larger-scale testing protocol to deal with some of the scaling questions, clearly, to deal with a simulant that would be representative, because we feel that the simulant, for Newtonian, particularly, starting with water, might be overly conservative, and some of our consultants have shared that concern.

When we did agree on the actual particle distribution, the PNNL reports that were referred to earlier, talked to a particle distribution that went out to 200 micron, and our testing criteria for Newtonian went out to 700 micron.

So we feel that the large-scale setting will address some of the concerns raised by our own analysis and the analysis of our outside support consultants.

VICE CHAIR ROBERSON: Okay. And so let me just make sure I understand. It isn't, at this point, that you disagree with any concerns raised by these experts?

MR. RUSSO: No.

VICE CHAIR ROBERSON: Okay.

MR. RUSSO: I don't think we disagree at all. I think to the point, it's how you then deal with those concerns, how you analyze them in risk space, and then looking at the suite of risks, including the risk to the actual $12.263 billion ceiling that the Congress has put on this facility, you measure those risks, you evaluate them in a very dispassionate way, that's our job, and we present that information to the department, as both owner and regulator, to ensure that they fully understand the risks, and we provide them our recommendations on how to deal with them including the large-scale testing.

VICE CHAIR ROBERSON: Let me just ask, because I understand what you just said, but I guess what I'm trying to get to is: Are there concerns that have been raised by these organizations--and I'm going to use your vernacular, that you've put in to the, we'll figure that out later, bucket, because you don't consider it to be as significant as maybe they did?

MR. RUSSO: I wouldn't call it to, we'll figure it out later, vernacular. There are concerns that need to be addressed. The small-scale testing platform, no matter how we configure it, will leave some individuals with concerns.

So we then look to, from a overall project perspective, what is the best way to address our own questions of operability and our own recommendations to the department on how to balance the capital investment with the operating parameters that you can perform under.

I would like to state that from a BNI perspective, we are very confident that the PJMs meet their functional requirement. They will adequately mix, they will deal with hydrogen, they will mix to the point that we can work our process flowsheet and make quality class.

We have included the hill dilution and removal that you spoke of earlier, because while we believe, and are very comfortable, that we will not get the kind of accumulation that would lead to a criticality, we recognize that something that's going to be sealed off for 40 years, even if there is the ability, potentially, to get into it, is not preferred.

And as a result, we felt that the heel dilute and removal process, with the ability to put cameras in service ports, would provide a higher degree of confidence for both our co-located worker and the public, that we can achieve the mission.

When you then look at what large-scale testing will do assuming that you accept my premise that we are comfortable the PJMs will perform its functional requirement, what we'll do is determine if there are any operational limitations.

And I say, if any. Our own assessment says that we will be able to perform, as designed, to the mission life cycle. But we recognize that that's a very controversial subject. So a large-scale test will provide a high degree of confidence, both in the physical design that we are very comfortable with, the internals of the vessels, as well as the operating parameters that those vessels will have to perform under.

VICE CHAIR ROBERSON: Okay. And I have one last question, so I cannot hog all the time for my colleagues. Madam Secretary-- and I apologize in advance, Mr. Knutson. Either one of you can answer this. I will probably give deference, based on your newness to the project. I asked the same question of the Department of Energy in regard to are you familiar with the concerns raised by these individuals and the organizations they represent, and are there concerns that they've raised, that you believe are invalid or erroneous?

DR. TRIAY: I will start with my answer, and then I would like to take the opportunity to have Mr. Knutson complete, and give his own perspectives as a extremely experienced federal project director.

First off, I think that it is important that we go back to the response that we have already shared with you.

The strategy that we have designated to confirm the adequacy of the design is a phased approach. Phase I is the closure of the EFRT issue, and achievement of the targeted technology readiness level based on our issue response plan.

Let me stop here for a moment to discuss the fact that the technology readiness assessment process is a process that the environmental management program has fully embraced as part of these capital projects, and the way that the technology readiness assessment process works, is that once the issues associated with a technology are identified, a maturation plan is put in place to take the technology from one level of readiness to a higher level of readiness.

That maturation plan exists for the pulse jet mixers and that is exactly in the process that we have been in, in order to ensure that the readiness level is appropriate from the perspective of the Department of Energy.

Phase II in our strategy to close this issue is the closure of additional issues identified with the pulse jet mixing control covers, suction line sign and sampling systems.

Phase III is the completion of the design change process to implement any required vessel or supporting system changes, and confirm the design of the post-jet mix vessel system. The reason that is important is because the decision that the Department of Energy concurred with the design authority on, was to proceed with the design of pulse jet mixing, and the Department of Energy has laid out a very careful phased strategy to close on this particular issue.

I would also like to point out that the Department of Energy, at the request of the secretary, chartered an environmental management advisory board, Tank Waste Subcommittee, to look at the closure of all of the issues associated with the EFRT review.

And that group of experts also came to the conclusion that we should press forward with completion of EPC. I also would like to make some comments with respect to waste characterization.

Now, you know, based on the comments made by the experts, that we have some concerns with respect to waste characterization. They assigned expert in waste management. Process knowledge is something that is an integral part of determining how waste is going to be characterized. And I would like, at the time that Mr. Rutland joins us in the next panel, to spend some time going through, in some detail, the waste characterization efforts of the Department of Energy and its contractors.

In short, we have a model that is correctly predicting our observations. It is not appropriate, because we have process knowledge, to simply say we have a very small sampling subset, because the process knowledge actually allows us to determine the specific, it's said, of samples that are going to be taken, and have those represent the conditions of the waste--

CHAIRMAN WINOKUR: Dr. Triay, we're going to be covering a lot of that material, I think, in the next session. Could you summarize your comments now? I think we have a lot of material to cover, and we'd like to move on from there.

DR. TRIAY: The summary of my comments is that we have a phased approach for the closure of this issue, and that our colleagues at PNNL have stated that they have looked at the results up to Phase I, not anything past Phase I, and I think that that is very important, to look at the issue holistically, rather than just the snapshots that our experts have looked at.

VICE CHAIR ROBERSON: Okay. Thank you, Madam Secretary.

MR. KNUTSON: May I?

VICE CHAIR ROBERSON: Briefly, please. Yes.

MR. KNUTSON: Thank you for allowing me to chime in here just for a moment. From a project perspective, part of the assessment that we did over the last four months was to evaluate the concerns, and to understand that none of them, from a DOE perspective, had been put into a bucket of "deal with it later."

I think it's also important to recognize that during this assessment process, we actually looked at design modifications that had been initiated as a part of the concerns being recognized and realized, and the mixing power was increased, distribution of mixing power was improved, reduced solids loading, heel dilution capabilities right at access ports, right--these were all points that were made following some of the prior commentary.

I think it's very important that the record reflect that we do recognize the concerns and we have accepted the concerns. We are addressing the concerns, and part of the commitment for large-scale testing is for the purpose of ensuring that a higher level of confidence results in our understanding of how these machines actually operate.

VICE CHAIR ROBERSON: Thank you, sir.

Mr. Chairman, I'm going to hold any further questions for the moment.

CHAIRMAN WINOKUR: Okay. Thank you. Gee, that was kind of whirlwind tour. I think I'd like to kind a step back and spend a little more time discussing Phase I and Phase II testing, so at least I understand where we are.

One of the questions the Board asked was Question 18, that PNNL provided a response to, Dr. Peurrung. And I think we've already gone over your background and your involvement in the process, and what were the goals of that testing again, very briefly?

DR. PEURRUNG: Well, as I said, originally, when the test specification was written, the first objective of the test was to rate the mixing systems. It was basically a pass/fail on whether they would perform against the criteria that were developed along the way to planning the tests.

CHAIRMAN WINOKUR: And we've

talked about the two criteria that you felt were the most important, right?

DR. PEURRUNG: Right. And the criteria were something that were developed over time. I think none of us had any intention that we were going to create completely homogeneously mixed tanks. But by the time we began testing, in 2008, BNI and PNNL had agreed that the appropriate criteria were off-bottom suspension and pump inlet solids concentration.

CHAIRMAN WINOKUR: And the off-bottom suspension is an industry standard; right?

DR. PEURRUNG: It is.

CHAIRMAN WINOKUR: Okay. And how do you go about going from small vessels to larger vessels? I mean, is there a scaling fact, there's something you have to figure out to do?

DR. PEURRUNG: There is. We did testing at three scales. We had, I believe, a 15-inch vessel, a 34-inch vessel and a 70-inch vessel that we did testing in in one of our facilities, the Applied Process Engineering Laboratory.

And from taking those three data points, it allows you to get a curve that you can project out to full scale.

CHAIRMAN WINOKUR: So you need more than one vessel size to be able to figure out a scaling factor, right?

DR. PEURRUNG: Typically, unless you're going to use some sort of conservative rule of thumb that comes from industry.

CHAIRMAN WINOKUR: And I wanted to go over -- I think we've already mentioned, and I'm going to enter it into the record, some sections of this report, WTP RPT 182 Rev. A, and there are some sections that deal with some vessel evaluations and rating of WTP vessels.

DR. PEURRUNG: Correct.

CHAIRMAN WINOKUR: And I'm looking

at the figures here, and I can kind a see on the X and Y axis, these two different variables you're talking about.

DR. PEURRUNG: Correct.

CHAIRMAN WINOKUR: And I see a solid suspension metric on the X axis, and what's that telling you in terms of the critical suspension velocity?

DR. PEURRUNG: So the two axes on the figure that you're looking at, one is comparing the velocity that the mixing system is designed to, the maximum velocity, against what we calculate is the velocity required to pick a cloud of particles up off the bottom and suspend them.

And so if that ratio -- the ratio of those two velocities is greater than one or less than one, that tells you whether you are meeting or not meeting those criteria.

Likewise, the other access then looks at inlet concentration compared to 20 percent.

CHAIRMAN WINOKUR: All right. So we have many vessels here where, for the solid suspension metric, were less than one. Let's take a vessel like FRP 2 which is the--I guess it's the receipt tank for low activity waste. It's got a value of about .3. So what does that mean in terms of the critical suspension velocity?

DR. PEURRUNG: In both of these cases, you're looking for--one is your, just your "break even" point. Okay. If it's greater than one, then you're doing well. If it's at one, then we deem that to be marginal. If it's less than one, then you're failing to meet the criteria.

So you've only got 30 percent of the velocity that you need in your mixing system design, if your criterion is .3, that is required, actually, to suspend the material.

CHAIRMAN WINOKUR: So what that says is that if you needed, if you had a tank and you had 12 meters per second, which is the maximum speed you could try that, that if it was .3, you'd need 36 meters per second or jet velocity to get to the critical suspension velocity?

DR. PEURRUNG: Again, against the, the vessel, I should caveat this by saying we had a design at the time, this was more than a year ago, we had operating conditions at the time and waste characteristics at the time. But yes, when we presented that information it was against a certain set of assumptions about how those mixing systems would be designed and operated. But essentially, your conclusion is correct.

CHAIRMAN WINOKUR: And in many of the cases where these numbers are less than one, there'd be no way in these vessels to get these kinds of velocities. I mean, there are limitations in terms of what the vessels can actually do.

DR. PEURRUNG: We're aware that

there are some challenges in redesigning the vessel mixing systems, yes. That is not our particular area of expertise, to determine how to change those designs.

CHAIRMAN WINOKUR: Oh, I understand that, but I'm just trying to get an idea of what some of those numbers mean.

Now on the Y axis, we're looking at this solids concentration. So let's say you have a number like .1 which you have on some of these graphs. What does that mean?

DR. PEURRUNG: In that case, then you'd be saying that the solids concentration at the bottom is greatly exceeding this 20 percent mixing criteria that we had at pump inlet. That is, essentially all the solids have fallen to the bottom of the tank and the concentrations there are much too high.

Again, the one would be the value of, okay, it's at 20 percent. Numbers less than one tell you that your solids concentrations are higher than that.

CHAIRMAN WINOKUR: And so what we have here, at least in the spring of 2009, based on your testing, is we have many vessels, very important vessels like HLP 22 [High-level Waste Lag storage and Feed Blending Process System], which is the feed receipt vessel for high-level waste. We have ultra filtration vessels. We have low activity waste vessels. We have overflow vessels.

I actually have a cheat sheet here that would tell me what they are.

But many of them are in this lower quadrant where the number is less than one for both of these metrics.

DR. PEURRUNG: Correct.

CHAIRMAN WINOKUR: And based upon that, you actually have a table, and based on that table, you characterize whether vessels are adequate or inadequate.

DR. PEURRUNG: Correct. Against the design, the waste characteristics and the operating conditions at the time.

CHAIRMAN WINOKUR: Absolutely. Absolutely. And of course these vessels, many of them, I think you say in your report, are simply inadequate at that time.

DR. PEURRUNG: Correct. The numbers that we gave were that four appeared to be adequate, two appeared to be marginal, and seven appeared to be inadequate, according to our scale tests.

CHAIRMAN WINOKUR: And you actually say, and I think you've said some of it, that you understand that changes have been made to these vessels, right?

DR. PEURRUNG: Correct.

CHAIRMAN WINOKUR: But you do write in your response to the Board, you say in some cases they increased the number of pulse tubes and/or nozzle diameters.

You also say operating conditions have been changed, such as reducing solids concentrations.

DR. PEURRUNG: Correct. Or perhaps fill height.

CHAIRMAN WINOKUR: All right. So changing solids concentrations would mean that these vessels aren't being required to mix as large a percentage of waste solids as they had before?

DR. PEURRUNG: Correct.

CHAIRMAN WINOKUR: Okay.

And as a result, you write, nine of the vessel types originally evaluated as marginal or inadequate, four of the designs or operating conditions for the vessels have been improved since PNNL completed Phase I testing. You're saying "approved" but you're not saying that you think they adequately or robustly mix. True?

DR. PEURRUNG: I think our analyses show that we've moved some of them that were marginal--that were inadequate are now essentially marginal.

CHAIRMAN WINOKUR: Marginal. And

then you write: However, there are still deficiencies with the technical basis for both Newtonian and non-Newtonian vessels.

DR. PEURRUNG: Correct.

CHAIRMAN WINOKUR: Okay. So this is where you stood at the end of Phase I testing for the project.

Excuse me. I'll ask the questions. Thank you.

And then we move on to Phase II testing, and I'm going to come right to you, Greg, so you'll have your chance to speak.

And we start doing Phase II testing at Washington State University; right?

MR. ASHLEY: Correct. And at MCE.

CHAIRMAN WINOKUR: I don't think they're on. That's on.

(Microphone adjustment.)

CHAIRMAN WINOKUR: Yes. All right. So I wanted to talk about the fact that the project--so PNNL's involvement with the project ends, and then the contractor--you are going to start to do some experiments.

MR. ASHLEY: Correct.

CHAIRMAN WINOKUR: You're going to do full-scale and small-scale experiments, and you start out I think doing some experiments at Washington State University. Can you describe those experiments.

MR. ASHLEY: The experiments at Washington State University were looking at radial jets. They were--the primary purposes of those experiments was to measure zones of influence, and if you think about the zone of influence that as a jet impinges on the bottom of the vessel, what is the effect, what is the radius of the effect that that jet has on the bottom of the vessel.

CHAIRMAN WINOKUR: Right. And so what's happening here is that you're kind a beginning to use this bottom clearing, or the zone of influence as a metric to give you a sense of how well you're mixing.

MR. ASHLEY: I think it is important

to talk about--there's been a lot of discussion about, you know, suspension of particles and bottom clearing, and it's important to note that there are different effects. That the behavior in these vessels is complex. Okay. At the time that we were dealing the experiments at PNNL, we were learning. We were learning a lot about how the PJMs work.

We have the luxury, of we do get a lot of expert consulting advice and opinions, and they're not always in agreement, as you might imagine; but we did begin to learn that there are different phenomena that are of interest in terms of the performance of the PJMs. Different phenomena associated with our ability to pump solids out of the vessel.

CHAIRMAN WINOKUR: Right.

MR. ASHLEY: Different phenomena that are associated, if we have settled solids, how are we mobilizing those solids to release gas, which is one of our safety criteria.

The purpose of the experiments with radial jets was really to understand how effective those jets are in terms of mobilizing solids on the bottom of the vessel.

CHAIRMAN WINOKUR: Right. And based on this work, I think you determined the scaling factor of 0.18, which has been mentioned before, and this was derived from a PRA [Probabilistic Risk Analysis] model. Can you talk a little bit about that.

MR. ASHLEY: Okay. That model is, is--the model is available, it was originally based on air jets. That model was the basis for establishing what those radial zones of influence may be. Obviously, we have fluid jets, you know, the settled solids, so there are correlations, and we need to verify the use of the PRA correlations in terms of predicting what those zones of influence might be, which is one of the reasons for doing those experiments at various scales, including full-scale experiments up at WSU [Washington State University].

CHAIRMAN WINOKUR: Now I don't know if we covered it before, but you're finding a scaling factor for jet velocity's at .18, and I think the folks at PNNL had one, .33; right?

MR. ASHLEY: This is where we need to really be clear; okay.

CHAIRMAN WINOKUR: I haven't even asked the question yet.

MR. ASHLEY: Well, .33 for solids accumulation is what has been used, okay, in determining whether solids accumulate on the vessel. The velocities were scaled using .33. For determining whether we're able to get bottom motion, the scaling, as Dr. Dickey explained, the scaling coefficient that was used was .18.

This is for movement of solids on the bottom of the vessel. .33, though, was used to determine scaling the jets for solids accumulation.

CHAIRMAN WINOKUR: So Dr. Dickey, you believe that, I mean that for these bottom-clearing experiments, you believe that the appropriate scaling factor for jet velocity is .18?

DR. DICKEY: Basically, what it comes down to is you're dealing with a different phenomena. All you're trying to do is mobilize the solids. You're not trying to get them off the bottom. You just simply want to be able to erode the settled bed away, and erosion tends to be almost an equal velocity characteristic, as opposed to being one where you have to change the velocity in going from the small to large scale.

If I may, let me make one other point of clarification here, because to some degree, it is my responsibility. We came at this with the idea of this off-bottom suspension criteria. It is truly much more of an academic criteria than an industrial criteria. I'll explain in a moment.

What it is, it's a very clearly observable phenomena in solid suspension. You can tell when you get everything off the bottom. From an industrial perspective, the company that I worked for, for a long time, had a one to ten scale for mixing characterization, one being the minimum acceptable, ten being the maximum practical.

Off-bottom suspension, on the scale of one to ten, was a three. There were plenty of consistent conditions that were widely used, industrially, that did not meet the off-bottom criteria, and that's basically the methodology and the direction that it was headed in terms of this on-bottom motion criteria.

CHAIRMAN WINOKUR: So you're comfortable with a .18 scaling factor for that phenomena?

DR. DICKEY: No. To get the part-- in order to scale up for particle suspension, you need to use a one-third exponent. The only place that you're using the .2, .18 exponent, is when you're looking at a yield stress material settled on the bottom equivalent to a DBE [Design Basis Event] situation, and what you're doing is you're looking at just getting the particles to erode away, and move enough, that you can release hydrogen. It's a completely different problem, a completely different phenomena, and the scale of approach was taken as being a different approach, much more like trying to move a non-Newtonian material.

CHAIRMAN WINOKUR: I think we can agree, and tell me if I'm wrong here, Dr. Peurrung, that using off-bottom suspension is certainly a much more challenging and rigorous criteria than using bottom clearing.

DR. PEURRUNG: Clearly.

CHAIRMAN WINOKUR: But what I understand you saying, Dr. Dickey, is you believe that a value of .18 for bottom clearing for zone of influence experiments would have been appropriate.

DR. DICKEY: Yes, I guess if I believed that the zone of influence was all that was important for solid--

CHAIRMAN WINOKUR: I understand. We haven't gotten to that yet. But okay. So here we have, Dr. Dickey, a situation where we're using, in these experiments--at Washington State University we're going to use zone of influence bottom clearing with .18 scaling, and we're going to be using the .18 factor. Okay? And do you sense that's going to give you a good measure of whether these vessels are going to be able to mix appropriately and perform their function?

DR. DICKEY: No. I don't think it'll mix appropriately.

CHAIRMAN WINOKUR: Okay. Now I want to go back, and I want to get you in a second, Dr. Kosson. I want to go back to you about this .18 value. How did you determine the .18 value from that data set? How was that done?

MR. ASHLEY: Well, the .18 value was determined, obviously, in consultation with our consultants, and also review of the literature, and, you know, one of the purposes of running multiscaled experiments at WSU was, once again, to confirm what the value should be. If you look at the jets that were run at WSU, a full-scale jet was run. It's a flume test, so it was just simpler to run a full-scale single jet test.

Now, once again, the purpose of that test, of those tests, were to confirm what coefficient should be conservatively used for simply the zones of influence, which would be used to evaluate bottom clearing and not suspension.

CHAIRMAN WINOKUR: Okay. let me ask you, Dr. Kosson, have you looked at the data from the zone of influence studies that were performed? And can you comment on whether or not, from that data, you could derive this scaling factor of .18?

DR. KOSSON: Yes, we have looked at the zone of influence studies that have been performed, and I think it's important to recognize that there are several different functions of the mixing that are being confounded in this discussion, potentially. One of the zone of influence functions is in order to disrupt the bed to liberate hydrogen that may have accumulated in it during a design basis event. A second factor of the zone of influence is dealing with the bottom clearing, or resuspension effects that are necessary for making sure that solids do not accumulate in the vessel where they are.

CHAIRMAN WINOKUR: Right.

DR. KOSSON: Another function of the mixing is to provide a understood mixture that you're passing to the next vessel as part of your downstream processing, or to your next stage of processing.

CHAIRMAN WINOKUR: Right.

DR. KOSSON: Each one of those can have very different requirements. The zone of influence testing for the design basis event focuses on you now have a potential for a more completely settled, or a greater percentage of the bed settled due to the design basis event than you would have under normal operating strategy.

So at that point, your goal is to disrupt that bed to liberate any hydrogen that may have accumulated in pockets, so that you don't end up with a safety hazard, because the inability for hydrogen to be adequately cleared from the vessel.

Under that condition, you can have, in some of the vessels, depending on the specified weight percent, a considerable amount of settled solids, up to several feet of settled solids on the bed is potentially an option.

And the testing that was done under zone of influence testing was--at full scale, was done with a limited particle size distribution, particle type, and only a limited solid depth settling.

So the zone of influence transfer, or scaling, and the ability to scale that to the full vessel, was one of the issues that we questioned.

For the off-bottom suspension, or the zone of influence that's looked at there, the issue is twofold. One is to be able to remove the particles from the vessel, so that you don't have accumulation in the vessel.

The conditions under the MCE testing, what they call Phase II prototypic testing, demonstrated at that scale, that that could be carried out for the vessels as they went through their design process and the experimental data gathering.

When you take that information, though, and recognize the complex geometry of the vessel, and the fact that there are different phenomena involved, some which scale reasonably, some which don't scale at all reasonably, that when you integrate it all together, that's why we thought it was very important that large-scale testing be carried out to validate the scaling basis for that clearing. Some of it's the suction height and the like.

For the third function of passing downstream what you are processing, and providing feed to the next stage of processing, what is required there depends very largely on your process control logic, which had not been well-established at the time that we were going through the review that we had.

What was established was that as you do the clearing from the vessels, that there's bottom-clearing results that they can clear the bottom at that scale, and that also the faster settling particles will be transferred downstream, disproportionately, early on in the process, the clearing vessel.

CHAIRMAN WINOKUR: Let me ask you, Greg, At MCE, when you did these tests, and these were small vessel tests, did they attempt to look at off-bottom suspension?

MR. ASHLEY: Yes. The cloud height was measured, similar to the PNNL tests that were done in the Phase I. That was one of the measurements. So as Dr. Dickey said, that is a classic visual measurement associated with mixing, with various scales established based on how high the cloud heights. So we did measure the cloud height as we did the testing.

CHAIRMAN WINOKUR: And did you find that the jet velocities necessary to do that were greater or less than what the folks at PNNL measured?

MR. ASHLEY: We actually found that the velocities required were higher, okay, which also drove us to the need to improve the performance of certain vessels.

I think as was mentioned, we are

doing substantial modifications to some of our high solids vessels. You mentioned the HLP 22 vessel, which is the primary feed receipt level for the high-level waste.

If you can just simplistically look at that, we're increasing the power in that vessel by 50 percent. We're going from 12 PJMs, 12 pulse tubes, to 18 pulse tubes. The velocity in that vessel is the 12 meter per second velocity at full scale.

So our finding was to assure that we don't retain solids in that vessel, that we required adding that additional power to that vessel.

CHAIRMAN WINOKUR: My understanding was that to get off-bottom suspension, the jet velocities were actually higher than the ones that PNNL measured.

MR. ASHLEY: The correlations have been reconciled, and I believe, I'm not absolutely sure, but PNNL is reviewing, or has reviewed the reconciliations.

Once again, there is a difference in, you know, the MCE facility was a prototypic facility, the pulse jet operation was prototypic, whereas the Phase I testing at PNNL was not fully prototypic. So there was an exercise to reconcile the differences in that correlation.

CHAIRMAN WINOKUR: What I'm trying to get a measure of is that--and I have to ask the experts again. From what I've read and understood, you need to have off-bottom suspension if you want to have, I mean, adequate mixing, and convince yourselves you're not going to get solids accumulations in the bottoms of vessels.

Dr. Peurrung, do you think that's a reasonable conclusion?

DR. PEURRUNG: I'm sorry. Could you say the question again.

CHAIRMAN WINOKUR: The question is do you need off-bottom suspension? Is that what you really need to measure if you can adequately mix this varied waste in these vessels?

DR. PEURRUNG: That was the criterion that we selected at the time, and we believe that that is an appropriately conservative criterion.

CHAIRMAN WINOKUR: Right.

And Dr. Dickey, would you agree with that?

DR. DICKEY: I'm going to introduce one other quirk in this whole thing. The one other factor that's involved with this is the fact that these are basically batch vessels, and as a result, yes, the suspension is purely on bottom motion when they are full vessels. All of the PNNL studies were basically done with full vessels. What ends up happening is when you get down past about half full, where you're down half or quarter full, these vessels do have off-bottom suspension.

You don't have as much to mix, you have better access to them, and they actually get to that point. Again, it's one of these things, when you look at the whole process and try to assess how this is going to really operate, I don't think we're cheating here. I think we're going at this on a very practical scale, of using fairly conservative scale down, scale up criteria, of looking at all the aspects of what's going on, of focusing basically on the question that was asked at the beginning. Will this accumulate material? And I don't think it will.

CHAIRMAN WINOKUR: So you think, from what you know, these vessels will adequately mix?

DR. DICKEY: Yes, provided, you know, something, other upset in the plant doesn't occur, and I guess I'll toss in the one other caveat here, is that there are things that we have learned out of this that would cause efforts to go back, and I think PNNL raised the question about pumping and transfer. We now have experimental data that tells us, if you put 5 percent into the tank, what's the concentration going to be, momentarily during a pulse, on an average during the first quarter pump-out? The data's there. We need to close the loop and make sure that it's being used properly, and being applied in the places it needs to be applied.

The test results are very, very worthwhile, and very, very useful in terms of not only they demonstrated the ability to mix, or at least transfer, and they give us some kind of an idea of what we actually have to measure and observe.

CHAIRMAN WINOKUR: I think we're going to have to finish up at some time, but I wanted to just get one more thing in place. You also did some pump-out tests too; right?

MR. ASHLEY: That's correct. In fact, when we talk about--you know, the off-bottom suspension is an observable criteria. A real criteria is no solids accumulation. Pump-out is a measurable criteria, and that's why, as we went from the Phase I testing at PNNL, we relooked at that time--in fact, our criteria for solids accumulation was what we called a de minimus criteria. Okay. You know, some can say, well, what is de minimus? We changed. Our criteria is currently a no accumulation criteria.

We went to a pump-out because that is a measurable criteria. In fact, as Dr. Dickey said, what happens is the phenomena does change as the vessel level decreases. Jet velocities increase as vessel level decreases. It's a function of the fluidics, or the pulse jet technology.

So we felt that the pump-out was a true measurable criteria, where we would look at the distribution of solids remaining in the vessel, look at the distribution of solids that came out in the first quarter batch, that came out in the first half batch, that came out in the three-quarter batch, and then look at the remaining distribution of solids left in the heel.

Typically, during normal operation we won't bring these vessels all the way down to an empty status. They'll be brought down to roughly a quarter batch status.

So that was a measurable criteria, where we could look at what are the constituents in the portion of the batch pumped out, and what are the remaining constituents as we draw the vessel down, all the way, to what would be the low level during operation.

That was a more positive quantitative criteria, rather than an observation that particles were moving, they're off the bottom. Those are observations. This was quantitative criteria for acceptance.

CHAIRMAN WINOKUR: Now when you did this pump-down test, when you did the pump-down test, you did not have off-bottom suspension; correct?

MR. ASHLEY: No. The pump-down test we had, the pump--

CHAIRMAN WINOKUR: You were using the scaling factor of 0.33. Was that true?

MR. ASHLEY: That's correct.

CHAIRMAN WINOKUR: And for those jet velocities, did you have off-bottom suspension during the testing?

MR. ASHLEY: There's off-bottom suspension. Our suction lines are off the bottom of the vessel. Okay. They don't come--suction lines are not out of the bottom of the vessels. Some of them are as low as three inches off the bottom of the vessel.

For a participle to come out, some time during the PJM cycle, that particle is off the bottom of the vessel, and that is why this is a--the pump-out test is a very good measurement for our ability to clear the solids from the vessel.

CHAIRMAN WINOKUR: Let me ask the folks at PNNL, what your sense of these experiments were, which included a full suite of tests at MCE as well as the pump-out experiments.

Was that pretty convincing data for you?

DR. PEURRUNG: Well, and I'd like to add, to clarify a little bit, we were not initially involved in Phase II testing, but we were asked by the project, in December of 2009, to get involved again, after they'd done their tests, and found that the correlations were predicting--or actually, underpredicting how much power it took to move material around.

We got involved again, and we've been participating and advising on these tests along the way. I remember, when I heard about the pump-down test, in some ways I thought, well, that's not a bad criterion, in some ways, to figure out if you can get the material out of there.

It does not necessarily ensure that

material is, at all times, well-mixed in the tank. But it does at least allow you to get at, can you get material back out of these vessels?

However, at the same time, I would point out that we expressed some concerns to the project about, that these pump-down tests, how prototypic the systems were, that were providing suction to their test vessels, and we believe that the scaling of the pump-down may be fairly complex.

And so again, it is something that probably bears a further review as far as what the appropriate scale-up of--against those criteria are.

CHAIRMAN WINOKUR: Did the folks at PNNL share any of this with you, Mr. Russo? Their concerns.

MR. RUSSO: Yes. Again, on, I believe somewhere around June 17th, when we were getting towards closure, and I had not seen any recent data from PNNL, I went to visit Terry Walton and the Lab Director, Mike Kluse, to solicit their most current, and as we've discussed, their most current was a little bit dated and they told us so. Vulnerabilities.

So we had all that information, analyzed it against the work that had preceded since their full involvement, and incorporated it into our risk analysis.

If I may, one other point that I'd like to clarify from your opening remark. The large-scale testing will be completed before the vessels are installed.

So our current schedule now is that of a large-scale testing completed, nominally, some time in mid 2012. Vessel installation is now scheduled for 2013. So we will be able, if there are any--and again our confidence is there won't be--but if there are any modifications required to an internal component of that vessel, we will have that opportunity to do before the vessels are installed.

CHAIRMAN WINOKUR: I think that's good. I'd like to read you from the article. There was an article in Weapons Complex Monitor and it talked about an assessment that Terry Walton, who you just mentioned, PNNL's Director of Energy and Environment programs, sent to you. I have it as June 6. But I don't really know. It doesn't really make a difference what it is.

And here's what he says.

"Phase II testing conducted at Mid Columbia Engineering facilities modify the vessel designs and operating conditions which includes solids concentrations--which we haven't spoken much about--nozzle velocities, number of PJMs, bottom clearing, for HLP 22, UFP 1, FUP 17 and FRP 2, with the goal of showing the minimum tank requirements for bottom material movement, post-design, basis event restart, and nonaccumulation of solids during pump-out.

"The changes to the mixing systems in the vessels appear to just meet the minimum tank mixing requirements during the testing. This razor's edge approach means that any small change in a key testing element could result in a vessel that does not work at full scale in the plant."

Then he goes through telling you many of PNNL's concerns about the simulants. I know you know about that. He questions a lot of things about the Phase II testing that was done at Mid-Columbia Engineering, the use of the PRA model, and so on and so forth.

And I'm not completely clear, I'm getting that from you Dr. Peurrung, I mean that assessment. I may have misunderstood some things you said. So what I hear Pacific Northwest National Laboratory saying is that based on all this testing, they still have a lot of concerns about whether or not these vessels can adequately mix.

There wasn't a question there; but

please respond.

MR. RUSSO: So again, I guess the best response is that those concerns were immediately provided to our vessel assessment team. They went through and evaluated each of them, put them into the realtime data that we were collecting from testing that had completed some time in late April, early May of `10, consulted with, among others, folks from PNNL, folks from--both Dr. Dickey and Dr. Henschel, reviewed the CRESP data and got their inputs on that information, and, in essence, determined that the vulnerabilities were such, that they needed to be included in our vessel assessment reports that we submitted to the department.

I think a clarification that is important--and I'm speaking as the contractor, federal--contractor project director. Our job for the Department of Energy has many facets. We are accountable for a budget. We are accountable for a schedule. We are accountable for a plan.

First and foremost, a plan that meets the functional requirements, that protects the co-located worker and protects the public.

The science, to applied science, to design determinations, and the risks associated with each of those, need to be measured against how you could mitigate those risks, and are there reasonable mitigations? And it's not I'm going to just push the problem down the road. If there are reasonable mitigations, if you can manage to maintain the project schedule, and therefore the project budget, and address those concerns, that is our obligation, and that's why part of our conclusion--and I think Greg Ashley and I have been stating this to you in previous meetings--is that a large-scale test would answer, scaling, simulant, is it truly razor edge, or was there conservatism built into our testing, that extrapolated to a degree of razor's edge, all legitimate questions that must be answered, but must be answered within the context of a holistic project.

CHAIRMAN WINOKUR: Let me ask a follow-up question. Then I'm going to turn the floor over Dr. Mansfield. I've been hogging this thing too long.

You have a Technology Steering Group which Dr. Mansfield will talk to you about, that did the vessel assessments, and they say that they have a high degree of confidence, that at least for the 33 Newtonian vessels, that you have robust mixing.

MR. ASHLEY: Yes.

CHAIRMAN WINOKUR: Okay. And robust would be defined as...?

MR. RUSSO: Meeting the functional criteria, which is getting the movements on the bottom, so that you have no hydrogen generation, getting adequate mixing, so that you are, as you're working down to the next tank, and the next tank, are creating quality glass, and ensuring that you have the ability to determine if you are getting any accumulation, to avoid criticality, if you do.

CHAIRMAN WINOKUR: And PNNL is online with that? You're--you'd be comfortable with those conclusions?

DR. PEURRUNG: Yes. I think, at this point, PNNL has a, you know, has made its recommendations about approach, and has made the project aware of some of the--of its concerns about its assumptions. We're not asked to help make--to make that decision. We're not a signatory to those vessel assessments.

And so we're not on the record, one way or the other. Our role is to provide technical insight into the behavior of the material, and we have a series of products where we've made our concerns available to both the contractor and to the department.

CHAIRMAN WINOKUR: Based on the

technical knowledge that you presently have available, and the studies you perform, to the Newtonian vessels you've looked at, as well as some of the data you reviewed in Phase II testing, convince you that these vessels mix robustly?

DR. PEURRUNG: Not per our definition of robust mixing.

CHAIRMAN WINOKUR: And what is your definition of robust mixing?

DR. PEURRUNG: Our definition of robust mixing means off-bottom suspension.

CHAIRMAN WINOKUR: Okay. All right. I think I'll turn it over to Dr. Mansfield. Thank you very much.

MR. DWYER: Mr. Chairman, if I could just interrupt briefly for one clarification. Frank, you said that the testing will be completed, the large-scale testing will be completed mid-2012?

MR. RUSSO: Large-scale testing will go on indefinitely. The tests that have to be run, that confirm the internal designs, which again we feel, as the design authority, are highly probable to be confirmed, will be completed in the 2012 time period. After that, there's a myriad of additional testing that we would say would go on indefinitely, including operator training testing, that you can use the large-scale facility to perform.

MR. DWYER: That commitment is as of when? When did you decide that was the schedule, if I could--

MR. RUSSO: We have a body called the Issue Resolution Team, and both Dale and I chair that, and when any technical issues come up that can't be resolved at the working level, between either our folks, or the department and our folks, it comes to that body. When they came to us about three weeks ago, they indicated that a unscrubbed schedule, meaning just a notional schedule, would have that testing done in `13. The part we need for the installation of vessels.

An immediate look at the construction schedule indicated that `13 was too late. We had them go back, look at what they would have to do. The long pull in this obviously is the selection of a simulant, and the agreement that that simulant is representative. But with that as the caveat, they came back and said 2012 was a doable date for the early tests, that would confirm that there is no further modification to the vessel internal.

MR. DWYER: Okay. That's rather important to us, because in the answers to the questions that have been the initiation of this hearing, no date or schedule was provided, and, in fact, one could have inferred that the testing was going to be done in the completed constructed facility. So that's not the case. You're going to do it somewhere else and the necessary parts will be done by the middle of 2012?

MR. RUSSO: That's correct.

MR. DWYER: Thank you. Thank you, Mr. Chair.

CHAIRMAN WINOKUR: Dr. Mansfield.

MEMBER MANSFIELD: Thank you. Many of my questions have been covered by what's been said already. I just want to make sure, for the record, that the PNNL report referred to, the 182 report, that's the M-3 mixing report?

DR. PEURRUNG: That's the report we did on phase testing--

MEMBER MANSFIELD: In spring of `09?

DR. PEURRUNG: Yes. May 2009.

MEMBER MANSFIELD: Yes. Fine. Okay. I'll have some questions about that.

But first, I'm getting a confused picture of what--of how you move particles out of tanks. From what you've said so far, Mr. Dickey, Dr. Dickey, it's sufficient to clear the bottom, because then the currents from the pump suction are going to take the particles out of the bottom, regardless of how far up in the tank they're suspended?

DR. DICKEY: No.

MEMBER MANSFIELD: That's not true. Okay.

DR. DICKEY: Not true.

MEMBER MANSFIELD: Then what does clearing have to do--for instance, what does the cleared area compared to the pump suction area, and pump--and that pump suction you had available, have anything to do with particle removal?

DR. DICKEY: Basically, the problem is that the zone of influence, the bottom clearing must be sufficient not to leave dead zones on the bottom, where particles do not move at all.

MEMBER MANSFIELD: Okay.

DR. DICKEY: And then what has happened--and this is again evidenced more by the experiment than any theory--that once you get the particles sufficiently in motion, that they are lifted far enough up into the tank, such that they are at the level of the pump suction.

MEMBER MANSFIELD: And how many pump suctions are available for, say, HLP-22?

MR. ASHLEY: There is a single pump suction.

MEMBER MANSFIELD: Single pump suction.

MR. ASHLEY: Yes.

MEMBER MANSFIELD: So the particles 40 feet away are going to see sufficient motive force from the pump suction to migrate all the way over to the pump suction inlet and be removed?

DR. DICKEY: Yes, and if you even listen to some of the people that watched the particles, looked like they even slide down the slope in a dished head, so--

MEMBER MANSFIELD: I'm sure they will. I'm sure they will. But they slide down the slope, and they're still half the diameter away from the pump suction. I'm not--I don't have a picture of how the particles on the bottom are going to move, when they have been plowed out in a zone of influence up the sides of the wall, or up into gliding zones from multiple PJMs, how they're going to get to the pump suction. Is that--nobody else has a problem with that?

DR. DICKEY: I could say they do but I won't--no. They really--it is one of those kinds of things, that you impart sufficient motion to the particles. You're not trying to remove the last particle that's there. You're just simply removing more particles than you put in, and that does seem to happen, and that's the reason for the pump-out.

MEMBER MANSFIELD: Okay. Then why do you need to suspend particles very high, at all? What's this issue of--why do you need the one-third scaling, if the particles only have to move a few inches off the bottom in order to be sucked into the pump suction?

DR. DICKEY: Well, they have to be moved far enough off the bottom.

MEMBER MANSFIELD: A new--not a few inches? How many inches? How far?

DR. DICKEY: Well, you have to have them suspended long enough above the 3 inch, or wherever the pump suction is, for that period of time to draw a sufficient number of them out, because they're going to all fall back down again. Some of the rapidly settling particles will be back on the bottom for a significant portion of each cycle. So you have to lift them far enough, that they are being drawn off for a sufficient period of time.

MEMBER MANSFIELD: But you're doing it with multiple pulses?

DR. DICKEY: Yes.

MEMBER MANSFIELD: Okay. So you've always got another--

DR. DICKEY: You're seeing a pulse every five minutes or so, and you're pumping out over an hour, kind of thing, so yes, you will see many pulses.

MEMBER MANSFIELD: How do you scale the pump suction inlet geometry in issue?

DR. DICKEY: Well, the first step was to make it just geometrically similar. In other words--

MEMBER MANSFIELD: Geometrically similar in...?

DR. DICKEY: In a small scale. In other words, the large scale--

MEMBER MANSFIELD: In area?

DR. DICKEY: The large scale is 3 inches off the bottom. You reduce it in proportion of the scale of the tank.

MEMBER MANSFIELD: Linearly? By area?

DR. DICKEY: Linearly. And then the rest of it, we've gone around, we've looked at various ways of scaling that characteristic. The primary characteristic that was selected was a minimum velocity, to make sure that the particles were moving out of the vessel through the piping, in effect, and--

MEMBER MANSFIELD: So pumping velocity.

DR. DICKEY: The pumping velocity. And then we looked at it from the standpoint that that velocity seemed appropriate for capturing particles and not dragging them in from too far away.

MEMBER MANSFIELD: So what you're telling me, that suspension farther above the ground, above the bottom of the vessel, then is associated with zone of influence clearing--

DR. DICKEY: Yes.

MEMBER MANSFIELD: --is still necessary?

DR. DICKEY: Yes.

MEMBER MANSFIELD: And so scaling by a gravitational settling number, for instance, is still important? Or whatever.

DR. DICKEY: Yes, yes.

MEMBER MANSFIELD: Okay. You mentioned that industry normally requires fairly large-scale testings before they'll make an investment in a large, in a big process, installation. What percent--what scale do industries usually do? Five percent? Ten percent?

DR. DICKEY: I would have gone exactly the other way. That very, very often, the scales are very substantial.

MEMBER MANSFIELD: Very substantial.

DR. DICKEY: We were very successful at doing scale testing in a 3 foot diameter tank, to scale up to 80 foot diameter vessels, fairly routinely, and I think Mr.--or Dr. Eccleston would have commented along the same lines, that they have done tests in basically laboratory glassware and designed full-scale 10-, 15 foot diameter reactors.

MEMBER MANSFIELD: So factors of 10 or 20 scale-up, in length, are not uncommon at all?

DR. DICKEY: Not uncommon at all.

MEMBER MANSFIELD: Any way that, if

you're taking solids off the bottom, the way that you indicated, is there any--the smaller particles get taken off more easily and large particles get left behind for the end?

DR. DICKEY: The smaller particles will be suspended more nearly uniformly, so that if you put in 5 percent small particles, you're going to be drawing off 5 percent small particles. If you place large, high density, rapidly-settling particles in, and if you put 5 percent of those in, you would most likely be drawing off 10 or 15 percent.

And it's a matter of how much of a gradient you'd have with the different particles.

MEMBER MANSFIELD: Okay. Thank you. Thank you, Dr. Dickey.

Mr. Ashley, I want to ask some questions about the Low Order Accumulation Model that's important for certifying tank mixing design. That's correct, isn't it? You will be using LOAM [Low Order Accumulation

Model], L-O-A-M, to certify tank designs?

MR. ASHLEY: No, no.

MEMBER MANSFIELD: You won't?

MR. ASHLEY: LOAM was used as another method, in addition to the small-scale testing, was used as another method to provide competence in the ability to meet the mixing criteria. Specifically, LOAM was used to look at the accumulation, the solids accumulation criteria for the vessels.

MEMBER MANSFIELD: So what will you use to certify the vessel design, if you're not going to use LOAM?

MR. ASHLEY: Well, currently, as was established in our issue response plan, the IRP, as closure criteria 5, was the use of CFD [Computational Fluid Dynamics] and the V&V [Verified and Validated] of CFD to provide final design confirmation of the vessels. Now we have, as mentioned earlier, we have--are going to perform large-scale tests, which will provide us another opportunity to collect data in support of final design confirmation of the vessels.

MEMBER MANSFIELD: Okay. Later, we will talk about hydrogen pipes and ancillary vessels. I was under the impression there, that LOAM is used in the design criteria, in the design QRA [Quantitative Risk Analysis], instead of--

MR. ASHLEY: No.

MEMBER MANSFIELD: That's from C.

MR. ASHLEY: No. LOAM has no role in the hydrogen and piping ancillary vessels.

MEMBER MANSFIELD: Okay. Why don't you go on to somebody else, Mr. Chairman?

CHAIRMAN WINOKUR: All right. We may come back to this for just a little bit, but I think for the time being, we're going to go to Mr. Bader.

MEMBER BADER: Good morning.

MEMBER MANSFIELD: Go ahead. That's all I have.

MEMBER BADER: Okay. Dr. Kosson,

I'd like to start out by going to one of your recommendations, and that was your recommendation number ten. And in this you were talking about the need for--that the preliminary CSER, Criticality Safety Evaluation Report, needed to be revised, and include workable and validated methods for criticality controls.

As a first question, could you summarize what you think that revision should incorporate?

DR. KOSSON: There are multiple ways that, or approaches that could be taken to criticality controls. However, I think what's most important here is understanding why we wrote that recommendation, because the current CSER, which my understanding is is scheduled to be revised before the end of this calendar year, explicitly was predicated on sampling accuracy and precision of plus or minus 5 percent of the vessel contents.

And that sampling accuracy and

precision in a pulse jet mix vessel, with the sampling strategy that was being proposed, we--our opinion was that that was not workable, that was not achievable within those tolerance limits. Therefore, as an underpinning of the current CSER, that was not a valid assumption. That's--we believe, based on other experience, that the sampling accuracy directly out of the pulse jet mixers would be much less precise to representing what is in the entire vessel, because of the mixing issues that were discussed earlier.

However, the alternative strategies can potentially include the sampling and understanding of the criticality controls prior to getting into the pulse jet mix vessels, and that's one of the options, I understand, that's currently being contemplated, and there are other options for that.

The other issue that we raised, and were concerned about, was the potential for either particle settling-based segregation, or chemical-based segregation, if specific neutron poisons were extracted, preferentially, during the processing. In our opinion, the current CSER did not adequately address those issues, but as we understood from the comments earlier, that those issues are being looked at as part of the CSER revision that's in process right now.

MEMBER BADER: So just as a matter of interest, what would you estimate the difference in accuracy would be, if you were measuring at the outlets of the vessels?

You said you can't maintain the plus/minus 5 percent. What do you think it might be?

DR. KOSSON: The stratification in the vessel, and the oscillations that occur, will result, in part, due to the pulse jet mixing, if it's maintained in a cyclic fashion, which is currently the way most of them are designed, versus whether there are other types of pulse jet mixing strategies.

However, we believe, based on prior experience, that 20 percent would be optimistic, but that there is not a good experiential basis, in actual test data, to even predict how close it will be. That that's one of the things that we felt was very important, if criticality controls are reliant on sampling from the vessels themselves, that demonstration of the precision of that sampling, and the accuracy of that sampling is an essential ingredient in full-scale or large-scale testing.

MEMBER BADER: If I understand your answer, this is the kind of narrow band that's not something like an instrumentation or a band, it's caused by the nature, it's that plus the nature of the process itself.

DR. KOSSON: Yes, sir.

MEMBER BADER: Dr. Dickey, would you agree with that, or would you like to add some insights?

DR. DICKEY: Yes, I would agree with the basic concept of it. I would qualify that with saying that the small particle sizes, and the liquid, can probably be sampled rather effectively, probably within the plus or minus 5 percent. But certainly the dense, rapidly-settling particles, that may be fissile material, would be very difficult to sample, unless the timing were such that you could time it with the pulse, or something of that sort.

MEMBER BADER: That should be an interesting problem, to try and check timing with the pulse.

DR. DICKEY: I would agree. I fully agree.

MEMBER BADER: Okay. So back to what Dr. Kosson said, you're in agreement? Is that a good--

DR. DICKEY: Yes. I'm in agreement.

MEMBER BADER: Okay. Dr. Peurrung, would you like to make any comments on that?

DR. PEURRUNG: No. I essentially would agree with Dr. Kosson and Dr. Dickey.

MEMBER BADER: All right. Ms. Busche, you knew this was coming.

MS. BUSCHE: Yes.

MEMBER BADER: Is that consistent with what you understand, and then my question, second question would be, what is the implication, having to deal with the plus/minus, say 20, 20 percent, at best?

MS. BUSCHE: I do agree. I think with the technical challenges that we have in actually developing a Criticality Safety Evaluation Report for the final pre-treatment facility. In doing so, we are addressing some of the segregation, where we are with poisoning. That is one technical component of that, and that is, I think, to clarify, we are on target for that for the end of the year. We are not on target for the end of this year, to actually have the revised Criticality Safety Evaluation Report.

MEMBER BADER: I'm going to go into some of the other things that I think--

MS. BUSCHE: Right. So to address those--and I think my candid answer at this point in time is somewhat I don't know. We're evaluating the results of the vessel assessment summary report, so that we can clearly understand the nature and the location of solids, not to oversimplify that, but so that we can actually determine what is our path forward to do that analysis. We don't know. We're in the process of evaluating those vessel assessment summary reports to develop that.

MEMBER BADER: Would it be fair to say that it has to be somewhere other than on the outlet of the vessels, in your opinion?

MS. BUSCHE: I don't understand the question.

MEMBER BADER: In other words, would you want the sampling to be done either in the receipt vessels that are being talked about, being built in the tank farms, the batch vessels, or--go ahead.

MS. BUSCHE: A fundamental tenet of our criticality safety strategy, going forward, has to be that criticality is incredible in our facility.

MEMBER BADER: I understand that.

MS. BUSCHE: It has to be, to meet the fundamental tents of 420, cause we have no mechanism to monitor, once it's in the plant. So to do that, it will be, I believe, a--I'll call it a specific administrative control on the waste acceptance criteria, that we will, through our pre-feed qualification program, have to verify that criticality is incredible, by the construct of that final criticality safety evaluation, once it's done.

So it will be based on the pre-feed qualification sample taken at tank farms in whatever mixing efficiency. We will have to factor that in to our analysis.

MEMBER BADER: Would it be fair,

then, to say, if you're sampling in the tank farms, if there is any accumulation of material inside vessels in the pre-treatment facility it makes it very hard to maintain that criticality is incredible.

MS. BUSCHE: Yes. The current results--

MEMBER BADER: That was--

MS. BUSCHE: Yes. My current--yes, it would. My current understanding is a result of the testing that we've completed to date, is solids do not accumulate, but there are still some uncertainties that I believe we are going to evaluate. We've done pieces, in parts, but to make sure we have the comprehensive answer, that's where the large-scale testing will come into play.

MEMBER BADER: So it seems to me that what again--and this is not unusual--you're dealing with a low probability, very high impact situation. So that, to me, would also say that what you really have to do is to be sure that there is no accumulation in vessels, to an incredibly high degree.

Is that a fair statement?

MS. BUSCHE: Absolutely. That was the testing criteria that we put forth as part of the final phases of M-3. That was our safety criteria; yes.

MEMBER BADER: Okay. And I would then go back, and say you've heard the discussions here, and there is--probably the best way to characterize it is agreement among some of the--your experts, as to whether that's possible or not possible.

MS. BUSCHE: Correct. I mean, I--and I don't disagree with them. I mean, I'm not a--

MEMBER BADER: Yes.

MS. BUSCHE: I can't really challenge their pedigree. In going through the vessel assessment summary reports, there's quite a few parameters associated with solids, that we're trying to figure out our nuclear safety control strategy for the entire plant, that those will play into.

So whatever those uncertainties are, that we believe, through analysis, we can demonstrate criticality is incredible, will need to be protected with a technical safety requirement.

MEMBER BADER: Well, and just to make it even more interesting, I would think that there--well, we've heard about some--I've just heard about some testing from Mr. Russo, that's going to be completed, 2012. But the large-scale testing, I understand, can't start before 2013; is that correct?

MR. RUSSO: No. What we're doing, we are doing a series of tests, and I'll answer your question by saying that the elements of the large-scale testing that affect the physical design of the internals of the vessels, will be completed by mid-2012, which is approximately a year in advance of the critical path date to install those vessels and still meet the regulatory milestone.

MEMBER BADER: So you're starting the large-scale testing--

MR. RUSSO: Large-scale testing--

MEMBER BADER: --a year earlier than we had previously heard?

MR. RUSSO: I believe that to be correct, because again, when Dale Knutson and I had our IRT [Independent Review Team] meeting, a couple of weeks ago, and the team came in with a very notional schedule, we asked them to go back and see if they can improve it for the first test, and the sequence of tests, large scale, so that we can do the various confirmations of the vulnerabilities that you've heard discussed, and not necessarily full agreement on here today.

That test would be performed in advance of the installation of the vessels that are the HLP-22, HLP-27, the ones that are in question in terms of accumulation.

MEMBER BADER: All right. Ms. Busche, let me come back to you.

First of all, I think it's good news that the large-scale testing is starting earlier, because just looking at the information that'll be gathered from that, would you believe that the large-scale testing really needs to be completed, particularly in terms of vessel clearing, before you can definitely write your criticality report?

MS. BUSCHE: The final criticality evaluation report?

MEMBER BADER: Final criticality.

MS. BUSCHE: Yes. Okay. We will be updating, because we're on the preliminary stage--

MEMBER BADER: Sure.

MS. BUSCHE: We will be updating based on what we know today, which I believe will give us better insight, as those test results are coming in, as to where the final criticality evaluation will be.

MEMBER BADER: So if the--and now my memory is that the large-scale testing will continue until into 2014, and possibly up to 2015. Has that changed?

MR. RUSSO: No. The current thinking is that that testing, in terms of the operability of the plant, and the internal designs, will go on indefinitely. There's no reason not to keep that as a mockup for the operators, for future dates. Once the investment is made, we are in discussions with the tank farm right now, in terms of, does that have utility to them, and they've indicated, you know, initially--and these are how do we get the best value to the taxpayer for the investment of the large-scale test? It actually serves to help operator training and operator management of the control system.

So from a testing--

MEMBER BADER: Mr.--hold on. Hold on, Mr. Russo.

MR. RUSSO: Yes, sir.

MEMBER BADER: I don't think indefinite testing, or testing that continues for an indefinite period helps Mrs. Busche.

MR. RUSSO: Again, let me clarify that point. I'm sorry. Ines says that it's the Latin in me sometimes.

The testing to validate the operating parameters of the plant will be done before 2014 is over. The testing or the utilization of that same facility, that same large-scale capability, as a mockup for operator training, is the second component. That's not testing. That is just how they use it as a operator training device.

MEMBER BADER: Is it reasonable to say, that by the end of 2014, or the beginning of 2015, Ms. Busche will have the data she needs to write the final report, the criticality evaluation?

MR. RUSSO: Yes.

MEMBER BADER: At that point, how

far away are you from initial "hot testing"?

MR. RUSSO: Hot testing?

MEMBER BADER: Yes.

MR. RUSSO: In the pre-treat, you're still over three years away.

MEMBER BADER: All right. So that really is a pretty critical piece of information. Would it help to accelerate the testing, from a criticality point of view?

MR. RUSSO: The--

MEMBER BADER: Let me put the background on that.

MR. RUSSO: Yes, please.

MEMBER BADER: I mean, this is something that simply can't be left to any chance at all. The earlier you do it, if you find something unexpected, the more time you have either to address it through a change in the plant, which is unlikely, given your own words, or in the tank farms.

MR. RUSSO: So the only caveat--I would agree with that premise but I also believe it is extremely important, and if history is anything, you learn from it--that before we finalize the criteria for a large-scale test, we need to get agreement amongst our consultants, and at least full knowledge by you, the Board, as to what the simulants will be. Are those simulants truly representative? Is there a suite of simulants that would have to be used to demonstrate the questions that still remain, the vulnerabilities that still remain?

What is the appropriate scale-up factor? So my point, Dr. Bader, is that the schedule is very much predicated on getting a scope definition that will not have any unanswered questions, for the very reason you stated. Donna Busche must have clarity.

MEMBER BADER: So those tests have to, beyond any reasonable doubt, lay to rest the question of buildup of material in the vessel; is that correct?

MR. RUSSO: Presuming we can reach

agreement, we believe it's going to be a very complicated task to define a simulant that will satisfy the various expert bases, that will have--

MEMBER BADER: The size and density of particles.

MR. RUSSO: Cohesion.

MEMBER BADER: Cohesiveness.

MR. RUSSO: Cohesiveness, right.

MEMBER BADER: And then you have to also go into operation, simulation of operation.

MR. RUSSO: Right. And one of the reasons that--

MEMBER BADER: Mult--

MR. RUSSO: Go ahead. I'm sorry.

MEMBER BADER: Multiple batches run through the test. You're going to have to also look at bubbler and PJM control strategies. The effects of pipe and pump inlet and outlet effects. Sampling system. You've got to verify the sampling system.

You have to demonstrate your heel clean-out and inspection system, whether you can actually see something with those cameras.

Now I go back--and again, talking about the extension--really, this is an incredibly--it is a test to the operating system, and capability, in order to make it meaningful. I would say that the other thing that you're going to need to demonstrate is that for probably the first time in the history of this project, that a success-driven test really actually is successful, without major hiccups, because it looks to me like, with the schedule you've got on these tests, if anything goes wrong of any substance, and there's an issue, and if nothing else, some of these earlier tests that were supposed to demonstrate that mixing occurred actually and successfully in the way they were supposed to, what they proved was there were issues.

So it's not at all a certainty that you can do this as a success-driven test, and it is a very complex, very lengthy test.

Ms. Busche, if all these things were done at the time you succeeded, or these tests came up with good results, you would then be able to write your final criticality evaluation report; is that a fair statement?

MS. BUSCHE: Correct.

MEMBER BADER: Is there anything that we've touched on that would be needed in addition to what we've just gone over?

MS. BUSCHE: From the criticality safety perspective, no. I think that the fundamental criteria is no accumulation in the vessels, based on the current geometry that we have. So we have to preclude accumulation in the vessels.

MEMBER BADER: Do you think all the different things that were mentioned are needed?

MS. BUSCHE: We need to refine or reduce the amounts of uncertainties to provide, I believe, the flexibility we're going to need in the operations envelope, and it'll go back to the pre-feed qualification as to how we set the controls to preclude criticality in the plant.

MEMBER BADER: Do you--

MS. BUSCHE: I will--go ahead.

MEMBER BADER: Do you think there will be a reasonable basis for establishing the facility, the control philosophy and the operating and control instrumentation set?

MS. BUSCHE: There will be a basis. It may be conservative until we get plant operation then to conclude what testing would not--we could not gain from testing. So I will have to err on the conservative side when setting that control, if we have uncertainties that aren't answered by that large-scale test.

MEMBER BADER: Dr. Kosson, having heard all this, is this the kind of a test program you had in mind?

DR. KOSSON: The test program, as you've mentioned, is necessarily complex, and it's unfair to characterize a test program until you've had the opportunity to review a detailed written scope of that test program. So I really don't think that I can comment on it at this time. I've not seen any outline, even, level of what the full scope of the program would look like, and as we all know, all of the--whether it satisfies the needs or not is in the details.

MEMBER BADER: Dr. Dickey, comments?

DR. DICKEY: Certainly the things that you mentioned sound like they have to be part of the program, and things that need to be resolved, and that's certainly the kind of thing that I would see out of a large-scale test.

MEMBER BADER: Dr. Peurrung.

DR. PEURRUNG: I have no additional comments.

MEMBER BADER: Mr. Russo, you mentioned that you would consult with your experts. Do you believe you need to bring them in, and as you said, get agreement from your experts on some of these things?

MR. RUSSO: Absolutely. I think we need to demonstrate public confidence. We need to bring in the best minds in the country, and that's why Deputy Secretary Poneman put out the letter he put out to all the National Laboratories, and the other sites, indicating that this was one of their number one priorities. We also believe it's going to be very important to have your staff involved in, not the determinations, but a quality check on those determinations, in terms of, particularly in my mind the simulant selection, but also the scaling, so that as we progress through the testing, we can all arrive at a sense of confidence together.

MEMBER BADER: At this point, I think I've used enough time.

CHAIRMAN WINOKUR: All right. Thank you, Mr. Bader.

Mr. Brown.

MEMBER BROWN: Yes. Thank you, and first, I'd like to thank the witnesses for being here this morning and being so responsive to the questions.

You've addressed a number of the issues that I was going to ask before I got a chance to ask them, but I will go through some of them again, just to make sure I'm clear on these points.

One of the points I would raise: it seems to me, from what I've heard thus far, that Mr. Knutson's statement, opening statement, where he said you were taking the advice of your experts, and you were addressing all of them, I'm not sure if I'm confident yet, but I've heard a lot of things this morning that suggest that some of the concerns, which I'll go through here in a minute, are being considered.

One of the things you said, Mr. Ashley, earlier, was that you were increasing the power into the vessels by--on the order of

50 percent. Is that correct?

MR. ASHLEY: That's correct. HLP-22, for example, the design prior to going through the small-scale testing, and, you know, measurement of performance against requirements, had 12 PJM pulse jet tubes. The design that we are going forward with has 18 pulse jet tubes.

MEMBER BROWN: But we need to understand that there's a limit to how much you can increase the power into those vessels. This isn't open-ended, where you can just keep going; is that right?

MR. ASHLEY: That's correct. There are physical limitations. For example, the increase in the pulse jet, number of pulse jet tubes, takes up volume in the vessel, thereby reduces the batch, the available batch size of that vessel, to a small extent. That's been evaluated.

We've evaluated that with the tank farm. We also have limitations in terms of the air that we have, in particular the important to safety air. We also have current limitations in the design of our vent system. All of our vessels are vented to assure the release of gas, the dilution of gas. So there are points at which increased power in these vessels would cascade into other potential changes.

So we are--we do have to consider that when we consider the additional capability that we can provide in these vessels. As I said, the testing provided--testing and all of the assessments and analysis provide us an indication of what was acceptable to meet requirements in terms of moving forward with the design of these vessels.

MEMBER BROWN: And another one of the limitations is your emergency power, because these have to operate during a loss of power to the plant; is that right?

MR. ASHLEY: That's correct. AS I

said, we only have--right now, in the design, there is a certain number of compressors that provide important to safety air, those compressors are, in a loss of off-site power, are run from a emergency diesel. So that is an element of the design that has to be considered as we consider the modifications to these vessels.

MEMBER BROWN: The subject we've been talking mostly about this morning is accumulation of solids in these vessels, and Ms. Busche and others have addressed why that's important not to allow that to occur.

In response to the Board's questions, there were other options to just eliminating the possibility of accumulation. I mean, there is the feed that you put into it. There's also what some people have referred to as a Plan B, where you are able to muck the vessels out or monitor the vessels during operation, and I'd like to touch on those subjects for a second.

The options for the input into the vessels--and I guess this is going to be directed at the three experts, and then I'll, if anybody else wants to comment.

But my question is the feasibility of controlling these characteristics, and the technical gaps that remain in implementing some of these ideas, and I'm asking this now, it may be more appropriate in the tank waste section that's coming on a little later. But I don't think all of you will be here then. So I'd like to ask the questions now.

What are the challenges in changing the rheological properties of the waste, prior to feeding it into the plant?

Dr. Peurrung.

DR. PEURRUNG: We have done some work with rheological modifiers. There are materials that you can use to change the rheology. I think I'm somewhat more concerned about the match between the particle size and density distribution of the tank waste as they currently exist and the waste acceptance criteria as identified in ICD-19.

MEMBER BROWN: Dr. Dickey.

DR. DICKEY: Well, I guess one of my pet concerns goes back to sampling, since I've also been involved in looking at some of the mixing problems in the tank farm, and sampling of solids of rapidly-settling particles is still a variable in the tank farm because they're using rotating pumps, and so it'll go through cycles as well. The sampling's going to be critical.

MEMBER BROWN: So whether you're talking about the tank farms or the vessels, it's a very challenging sampling, getting an accurate sample is a challenging--

DR. DICKEY: Particularly in rapidly-settling particles.

MEMBER BROWN: Okay. One of the things you said earlier, and I hope I'm not falsely encouraged, but I think I understood that this testing program that has gone on has gone--you've gotten different conclusions than maybe what you expected, with regard to the heavier particles. I thought you said that they had--you didn't expect them to be, with pulse jet mixers, to be drawn out of the system, and I think at one time you said faster than what's going in.

DR. DICKEY: That's very true. The concern would have been that you couldn't get the particles suspended long enough, or at a high enough concentration, to draw them out during the power cycle, the power part of the pulse, and what appears to happen is because they are in the lower portion of the tank, and they are at a higher concentration, they seem to be drawn out preferentially over the small particles during a typical cycle.

And so what was learned by the testing was that when you pump the first quarter of a full tank out, you pump out more than the first quarter of the rapidly-settling particles. Matter of fact you--

perhaps as much as half.

MEMBER BROWN: And you suggested--you said the other particles-

MEMBER BROWN: And you suggested--you said the other particles, the smaller particles were more homogeneous, so you're getting pretty much--

DR. DICKEY: Same concentration.

MEMBER BROWN: Same concentration. That's encouraging to me.

DR. DICKEY: Oh, it was very encouraging to me.

MEMBER BROWN: So it suggests to me, that maybe this testing program might actually be achieving something very worthwhile and useful.

DR. DICKEY: Well, and I would add one other comment to that. The large-scale test would have been very, very difficult to, shall we say, visually observe off-bottom suspension. Now to PNNL's credit, they have used a type of device to measure, you know, concentration of particles sitting on the bottom, and been able to correlate that with the off-bottom suspension. But this matter of being able to run a test, to look directly for accumulation, to be able to do a pump-down and see what you draw out, in the large scale, has got to be a very, very powerful test, to see whether you can prevent accumulation.

MEMBER BROWN: Dr. Kosson, can you comment on changing rheological properties of the waste.

DR. KOSSON: There is a wide variety of waste composition in the tank farms, as well as additives, as Dr. Peurrung mentioned, and therefore the strategy of how to manage the rheological properties most likely would include some management of the feed vector in terms of the blending strategy and the solids content moving into there.

Part of all of this is not only having acceptable targets but being able to verify that you have appropriate targets, and that you can maintain them during actual operations. That goes very centrally to the pre-qualification program of how the waste is qualified, tested and analyzed, prior to going into the system, because there are certainly high degrees of uncertainty of the characteristics of the waste throughout the waste tank farm. We know there's great variability there.

That is why, in our report, we emphasize the need for tracking what the pre-qualification requirements are, and to make sure that the program tracks with that, so that it can meet the actual operational constraints.

MEMBER BROWN: Thank you. The other things that have to happen at the front end of this process are blending, or reducing the batch size, or returning feed, or diluting feed, or feed sampling.

Any comments on the challenges for the tank farm in those areas, that you'd like to make?

DR. DICKEY: I think that some of this comes out of the ability to analyze and characterize the waste, ahead of its processing, and to look at the things that can be done. I think there--my understanding is that there are opportunities, and the kinds of things that have been done, as far the simulants that have been used to test the waste processing characteristics should, in combination with the waste characteristics, be possible to accomplish. The sampling's probably the biggest part of it.

MEMBER BROWN: Dr. Peurrung.

DR. PEURRUNG: I'll just step in and add that we have been supporting the tank farms contractor, Washington River Protection Solutions, on the development of an approach to qualifying, certifying the waste before it goes to the plant. We're actually using an experimental apparatus we developed for closure of issue M-1, and some of the sort of ultrasonic approaches that Dr. Dickey mentioned, to look at, to ensure that material wouldn't be settling, or helping WRPS [Washington River Protection Solutions] understand how to use those technologies and then apply them for the purpose of qualifying the waste prior to transfer.

MEMBER BROWN: I think Mr. Russo had mentioned earlier, that the challenges of getting a surrogate, and I would point out that most all of the discussion this morning has been about testing with surrogates.

There isn't any testing with real waste, is there? Mixing? So this is the surrogate issue, that you raised, is a very important issue.

Could I run through a couple quick points that I had made to myself and that maybe-

DR. TRIAY: Mr. Brown--

MEMBER BROWN: Yes?

DR. TRIAY: --I believe that you

asked us whether one of us wanted to make a comment.

MEMBER BROWN: Yes. Dr. Triay, please.

DR. TRIAY: Thank you. I just wanted to emphasize a couple of things. I mean, I think that you mentioned, what I think that you call Plan B, you know, and I just wanted to make sure that the Board understood that the adding vessel inspection and hill removal capacity is part of the decisions that have already been made, and they are part of our response.

But I also wanted to comment on the fact that you said that the concerns of the experts, you wanted to be assured, you know, that we were going to take those concerns to heart, as Chairman Winokur mentioned, these experts that have been asked by our contractor, and the Department of Energy itself, to help us in ensuring success in this mission.

And we would be more than willing to put on the record, for the Board, how we are addressing the issues that have been raised by the experts, which we take extremely seriously, and are an integral part of the disciplined approach that we're taking to projects with management process. So we are more than willing to do that, so that you can specifically see how we are addressing those concerns.

MEMBER BROWN: Thank you. Thank you. Well, I know there are a lot of experts that you consult with. We just happen to have three here.

Can I ask you that question, Dr. Peurrung. The issues that you raised, or that you're aware of, that PNNL has raised, do you believe--or have you seen evidence that they are being addressed adequately by the project?

DR. PEURRUNG: I'm aware that there are risk-tracking tools and things where, for example, the vulnerabilities issues that we raised. I'm aware that the project is tracking those. I have not yet seen formal resolutions of all of those comments yet, and I've seen the documents but they haven't been shared with me.

MEMBER BROWN: These are difficult issues that are being addressed here, but I think the first thing is some sort of transparency and receptiveness on the part of the person you're writing these reports for, that they recognize the problems that you've raised and then have done something to try and address them. Whether it's adequate or not, the "proof will be in the pudding." But is that the general sense? or not?

DR. PEURRUNG: The general sense I have is that the project is taking our advice into consideration, and is then proceeding to move forward, make their own decisions based on their own judgment, and create the closure packages, and so forth, that they see fit.

We have not been mostly operating in

a mode where we've gotten direct responses to our concerns.

MEMBER BROWN: Thank you. Thank you. Dr. Dickey.

DR. DICKEY: Well, I guess the simple answer is if I'm still sitting there, there is certainly the recognition of what the EFRT commented about what's going on, and I would have to say that while at times I felt the response was slow, of the concerns that were raised a couple of years ago, that has kind of forced us into some very rapid response here at the end, but the response has been there. So it's a qualified yes.

MEMBER BROWN: Okay. Thank you. Dr. Kosson.

DR. KOSSON: I think it's important to point out that CRESP is advisory to the Department of Energy and not to the contractor, in the role, the way that we're set up. We have provided our comments to the Department of Energy, and we have not had a formal response back from them. From past history, it's been very evident that they take all of our comments very seriously and evaluate them.

But as is also documented in their response to your questions, that they path forward on them is not clear yet, other than the fact that they're tracking them and carefully considering them.

MEMBER BROWN: Thank you. I had a number of questions here for Mr. Ashley, but I'll eliminate most of them. Will this testing program--and that's what I'd like to shift to now, the large-scale testing issue--will it include scope for the ability of cameras to detect the presence of hills, and prototypic conditions in hill removal with cohesive sediments?

MR. ASHLEY: Yes. The design of the test platform will ensure that we can test the inspection, and hill dilution, and clean-out capabilities of the design.

MEMBER BROWN: Okay. And will the testing include scope for the ability--excuse me. Could I ask the experts. My three experts here. The large-scale testing program. What are the critical things that have to come out of that program?

What are the gaps in understanding, or that remain unresolved? And this may be repetitive from what you've said before but--

DR. PEURRUNG: We are actually asked that question as part of Question 18, that was directed to the laboratory, and our response at the time was it depends--you know, whether to do large-scale testing, to some extent depends on what you want to get out of it. You know, first and foremost, I think we would support additional changes to design, to try to improve the robustness of the system. If you believe that the primary place of uncertainty resides in the scaling logs, and if you are going to choose these scaling factors that are perhaps not as conservative, then you may need to do that full-scale testing in order to either validate how well the system does perform, make sure it actually--your performance falls into the range that you need.

If you--if the system is more robustly designed, though, the degree of uncertainty that you have doesn't really matter as much. And so to some extent, we feel that large-scale testing may or may not be needed. We would prefer to see some changes made to the system.

That said, there are some uncertainties on how some of these materials behave. The scale of behavior is complex, and there are areas in which, if you are limited in the changes that you can make to the system, you're going to have to do those tests in order to forecast how the system will work, and ensure that it will be adequate, or to establish the envelope of operability that you will have with the existing system.

I'm sorry. One more point. You asked what's critical, and I believe the selection of simulants, surrogates, as you say, is going to be critical.

You're going to need to be able to demonstrate that this will work on tank wastes that are highly heterogeneous, both from tank to tank and within the tank, and we do include cohesive materials as well as noncohesive materials.

MEMBER BROWN: One of the questions in my mind is, I'm not sure how you can get to simulants if you don't know what you're simulating, and I'm unclear on how well we have characterized the wastes in the tank farms. That's a subject we'll talk about later, maybe.

But first, you have to understand what you're simulating, and then you can try and simulate it, and in some cases, it seems to me that we don't have a really firm "handle" on the characteristics of the waste.

DR. PEURRUNG: And that would include both physical and chemical characteristics and how they vary over the course of pre-treatment, because you're not looking just at as-received waste, but also waste as in process.

MEMBER BROWN: And Dr. Dickey, would you care to comment on the objectives of large-scale testing, in particular, the challenges. You talked about sampling, and is this a critical--or how important is testing the sampling capability in these large-scale tests?

DR. DICKEY: I think sampling is very, very important, but I also would have to say that since, I guess, my recommendations are on the line as far as the scale-up, I certainly would like to have a much better verification of that, since that's a real opportunity here.

And I guess in response, that we keep coming back to the simulants and the characteristics of it, one of the things that I would have liked to have seen out of the MCE testing, was more with different combinations of materials, such that we could understand-- I'm coming at it from a mixing performance of saying one of the objectives would have been to define what the mixing capabilities are for different particle sizes, different densities, different concentrations, different degrees of cohesiveness, such that you could take any waste out of the tank farm, children it, and say for sure, yes, this particular mixing operation can be successful.

Basically coming at it from the other direction of saying what are the capabilities of the mixers in the WTP, and then being able to take a weight sample and say yes, that could be processed.

MEMBER BROWN: Yes. From what I understand, and I don't follow this as close as maybe I should, but the testing program hasn't, to date, hasn't had congealed wastes in the bottom of the tank, and then led off the PJM to see whether it would, in fact, break those up or disperse them.

DR. DICKEY: No; those tests were run.

MEMBER BROWN: Were they?

DR. DICKEY: They actually--they found out that they couldn't get the stuff to settle in 24 hours, and so they actually made up samples of material with less water than was required, and pretty much laid the stuff into the tank, and got it to the point where they had 200 Pascal yield stress and restarted the mixers, and found out of that--I've forgotten exactly which one of the vessels, but they found that by firing groups of PJMs, that they were able to more successfully remobilize the material.

So one or two tests, is that sufficient? That's where I guess I would raise the question. But it's the kind of things that, no, the tests were run against the expected characteristics of the waste coming out of the tank farm.

MEMBER BROWN: Dr. Dickey, just to clarify, the tests you're talking about are the tests where the increased--the decreased viscosity, or if you will, the property was obtained by compaction; is that correct?

DR. DICKEY: Not by compaction but simply by allowing the yield stress--this is kind of the function of the material--to get it to the point where it did have the cohesion characteristics, even though the simulant, when allowed to settle, didn't reach that level of cohesion.

It wasn't by compaction. It was just by partial hydration.

MEMBER BROWN: Okay. Thank you. I agree with you. It seems to me we need--we certainly need to look at the off-normal events as in a normal fashion, I guess, in the testing program, where there's nothing much to lose except money and time.

I read the EFRT reports and PNNL reports, but I read every word of the CRESP reports, and I'd like to quote a couple things from the CRESP reports, just to put into the record, to emphasize my concerns.

In July of this year, the number seven letter that CRESP wrote, said that "Uncertainty will remain about PJM performance until extensive experience has been gained through testing full-scale, prototypic PJM vessels, and actually operation of Waste Treatment Plant."

The important phrase there, it seems to me, "end operation of the Waste Treatment Plant." All this testing will not, because it's simulates, really resolve all the questions, I don't think.

We want to resolve as many as possible. But would you care to comment on that?

DR. KOSSON: Yes, please. Thank you. The testing that you do at large scale would hopefully confirm that the vessels can meet the functional requirements that are part of the design basis for the vessels. It also, you would hope, would confirm the bounding functional requirements as you go through them.

There are a lot of uncertainties about the actual characteristics of the waste in the tank farm, and therefore you will not know, until you actually have experience, what the actual margin will be between your functional bounds that you have in your tanks versus the nature of the wastes that you desire to feed to it, based on what you pull out of the tank farm.

At that point, if the wastes that you pull out, or that you're sampling as you go, are fully within the design margin that you have with it, then you're fine going ahead. If they're not, then you have to look at options that allow you to modify the waste feed to bring them within those functional requirements.

So there is not the ability, at this time, to reduce the uncertainty of the waste characterization, readily. There is a plan that is evolving to reduce the uncertainty of the ability of the tanks and what their functional bounds are. How much you test those tanks will determine how much confidence you have on what the actual operational margins and bounds are, as Dr. Dickey said a few moments ago, and that becomes a tradeoff between how you balance those.

But ultimately, there are going to be uncertainties that you're going to have to address as you understand more about those wastes, and at that point, I believe that having validated models helps you address that without having to go back to full scale, because you're going to need to have ways to address uncertainties as they arise during the several decades of facility operation.

MEMBER BROWN: Thank you. Thank

you. The other quote that I'd like to put into the record is from your recommendation from CRESP's. It's not Dr. Kosson's, it's CRESP Recommendation No. 1. Where he described full scale as one-eighth scale, or larger, on a volumetric basis.

And the recommendation said that "Near full-scale vessel testing facilities and simulation capabilities should be available for design confirmation, and during the full life cycle of WTP operations."

And that's what I keyed on with Mr. Russo's comment, that you are not just testing, you're going to build a facility that would be available for what other purposes?

MR. RUSSO: We're working wit the tank farm right now to scope out all the purposes that it could have, certainly, to understand how you do the waste preparation before it comes over to our facility. There could be some symmetry there.

Again, as I mentioned earlier, the

whole mockup on operator training, you know, that facility, after we're done testing, would have real value to people who have to go in and operate within the plant, in the real plant, after it's fully operational.

So those are a couple of examples that we would take out of the CRESP report, as how we would want to utilize it. I'd like to defer to Greg for a second, cause I think he can give you a more detailed summary of some of those things since he's working them realtime.

MEMBER BROWN: Thank you. Mr. Ashley.

MR. ASHLEY: Yes. We have formed a team with the tank farm and are doing some of the early planning, to determine, you know, what the purpose of the test is. Obviously, you never run a test until you first identify what gaps you're trying to fill. We have taken all of the expert suggestions, recommendations, issues and concerns, and applied those in a matrix fashion, to determine which ones could be addressed--

MEMBER BROWN: Will that be available to us?

MR. ASHLEY: We'll make that available to you. Absolutely. We apply that in a matrix fashion to determine what a large-scale test could do in terms of advancing our knowledge of how these mixing systems will perform during the operation of the facility. We're also looking at that facility also providing information relative to tank transfers.

We're looking at, really, what are the edges--and I think Dr. Dickey pointed out--what are the edges of operation? What are the true margins that we would expect. Once again, that's based on simulants but it provides a better understanding, during operation, of the margins that will be available.

There also has been discussion--and

everybody talks about the risks being on the underestimation, or overestimating performance. There also is the opportunity associated with this large-scale test, Our simulants have been in water, in effect, particles in water, so be believe also that there is the opportunity to show that, through this testing, that we actually have additional margin as opposed to what we have currently determined through our testing and through the assessments that we performed.

MEMBER BROWN: Thank you.

Mr. Chairman, I have three more questions, if that's all right.

CHAIRMAN WINOKUR: Yes. Fine.

MEMBER BROWN: Okay. The first one will be for Mr. Knutson, then Mr. Sain, and then Dr. Triay.

Mr. Knutson, much has been made of this pivoting of the project. I haven't seen the project move, in any way, so I'm not sure what--what I understand the pivoting is, is a-

-well you tell me what "pivoting" means.

MR. KNUTSON: Thank you, Mr. Brown. I think it's important for people to recognize that projects of this scale need to actively transition from engineering through construction, to commissioning, to operations. There's a tremendous amount of inertia and momentum that has to be built, to be able to make those transitions occur effectively.

What I mean by "pivoting" is that this project has been in the engineering and construction phase for a decade, and it is now time to start adding the piece called commissioning, and ultimately start up and readiness for operation. That's the pivot that I envision as part of this pivoting message.

MEMBER BROWN: Thirty years of my childhood was spent in the Navy and I was on three commissioning crews of ships, and throughout the building of those ships, we had operators standing there, doing the testing program, doing the planning, the operations. It seems to me that it's very important that you focus on--at some point in time you've got to focus on operating this plant, the operating procedures, the training of those operators, and such.

I mean, how far out are we until the plant becomes operational, at this point?

MR. KNUTSON: I think it's very important for the record to show that there are portions of the facility that will transition to operations as early as 2012. Things like the motor control centers and some of the switch gear buildings will become operationally ready in the next couple of years. So we are immediately upon that time.

MEMBER BROWN: Do you have the operating procedures written for those facilities that will come online in 2012?

MR. KNUTSON: We have the plan and the schedule associated for bringing those facilities online in 2012, and it includes operating procedures, the training requirements, and the start-up and commissioning responsibilities, that have to be translated into people.

MEMBER BROWN: But those procedures aren't written today?

MR. KNUTSON: I'll defer the public record to answer that specific, with a detailed date.

MEMBER BROWN: Yes. I'd be interested in where we're at in the timeline of developing, writing procedures which can then be validated in the plant by the operators actually going out and putting their hands on the breakers and valves, and things.

MR. KNUTSON: My point, for the record, was to make sure that everyone recognizes that it is not too late. It's not too early. It's time. It is time to be doing that now, not waiting far into the future.

MEMBER BROWN: Thank you. Thank you. Let's see. Mr. Sain.

MR. SAIN: Yes?

MEMBER BROWN: A quick question, kind of in preparation for the next session. But from the point of view of the tank farm operator, what is the ideal waste acceptance criteria?

MR. SAIN: Well, the ideal waste acceptance criteria is on that you can meet. But--I couldn't resist that. And let me give you a perspective because, you know, this isn't the first time that I've personally heard a lot about, you know, what we know about the waste in the tank farm, and I'll remind you that I have a lot of experience at Savannah River.

MEMBER BROWN: How many years were you at Savannah River?

MR. SAIN: I've been at Savannah River, on and off, for almost 20 years. I was actually there at the site for 12 years. And you know, that's the site that had a PUREX [Plutonium Uranium Extraction] process. It was certainly PUREX here. A lot of similarities. I can tell you that we disposed of--and the Board knows this--Tank 17-1 and F, which is the tank of -- to the tank farm. We're disposing of some plutonium to the tank farm, and, you know, we seem very capable of being able to mix sludge batches and feed DWPF [Defense Waste Processing Facility], and know what we're sending to DWPF.

And I propose, that as a company, you know, we have provided that expertise to the tank farm at Hanford. We'll continue to do that, that is my job, and we, I believe, know a lot more about characterization of the waste in TOC [Tank Operations Contract] at Hanford than is probably understood at this time. And hopefully, later today, as we get into some of that, Paul will be able to go through some of that.

But obviously we need to know what's in the waste that we're going to send to WTP. We need a waste acceptance criteria that's feasible to be met from the standpoint of criticality. You've already been talking about that. I agree, totally, that for a plant like this, it's got to be credible.

You know, I'm very familiar with sending to a plant-

MEMBER BROWN: If I could interrupt for a second.

MR. SAIN: Yes?

MEMBER BROWN: How many--the chairman mentioned single-shell tanks and leaking single-shell tanks at Hanford, in his opening comments. How many of those single-shell tanks have been emptied at Hanford?

MR. SAIN: I don't know the answer to that.

MEMBER BROWN: Okay.

MR. SAIN: But we certainly have people here that can answer that.

MEMBER BROWN: Okay. And I guess my last question is for Dr. Triay. I'm sorry to interrupt. We'll catch up with you, I'm sure, in a few minutes. But could you confirm for me that DOE is committed to this large-scale testing program that's been described by Mr. Russo and others.

DR. TRIAY: Absolutely. The Department of Energy has committed to the large-scale testing. As a matter of fact, it's part of our response. The schedule that has been given by Mr. Russo is the schedule of the Department of Energy.

And I'd just like to make absolutely certain that we all understand that the Department of Energy is extremely committed to addressing the concerns that have been expressed, that we have a strategy that consists of a disciplined phased approach, and fidelity to the technology readiness assessment process.

And we have had independent verification that we are moving in to close this issue in a viable and effective manner. And I really want to make sure that the Board understands that the concerns that are expressed by our experts, and the amount of expertise that the secretary, and the deputy secretary, have asked the entire complex to support the Waste Treatment Plant with, is something that will lead to a successful tank waste cleanup.

MEMBER BROWN: Thank you, Dr. Triay.

Mr. Chairman, that concludes my questions.

CHAIRMAN WINOKUR: Thank you. We're going to move on to the next panel in a moment. I'd like to just ask one or two brief questions. I think Mr. Bader has one.

You said a few things here, Dr. Dickey, that I probably just don't understand. But it's very important that there's no accumulations in these vessels; right? That's a key feature. No accumulation of solids in the vessels.

DR. DICKEY: That's the top of my list.

CHAIRMAN WINOKUR: And you talked about the pump-down test, about the fact that you were surprised that the denser, the heavier particles were swept out quickly, and you said--and I may have misunderstood--that they were like preferentially taken out of the system, right?

DR. DICKEY: Yes.

CHAIRMAN WINOKUR: And so my simplistic thinking is they were taken out because they were down there.

DR. DICKEY: That's right.

CHAIRMAN WINOKUR: So it's very hard for me to follow the reasoning here, where, based on that testing, we're not going to have serious concerns about solids accumulations at the bottom of these vessels, because when I look at the pump-down data, it doesn't go to zero. I mean, there's something left over.

DR. DICKEY: Yes, but it's a lower concentration of what's left over. You're taking out more than you put in, which as long as everything's moving on the bottom, it may not come out in this batch but it will the next.

CHAIRMAN WINOKUR: Yes.

DR. DICKEY: You're not accumulating. That's the critical factor. There's not stuff being left behind from the previous batch, and in effect what ends up happening, is you're actually putting material in that actually has a higher concentration of what's left in there.

CHAIRMAN WINOKUR: And I think some of the things Dr. Mansfield was getting at, if we were thinking about a 40 foot diameter tank, a big tank, I mean, is there the opportunity, in your opinion, that there could be regions where, if you can't adequately suspend these particles, that you're not going to begin to get accumulation of solids down there?

DR. DICKEY: Well, this gets back to the fact that what you're trying to do is to make sure that everything is moving, and that's your bottom motion throughout the entire vessel. You don't have a place where the material is not ultimately swept up into the flow of the mixer. It may circulate out at the perimeter for three or four batches. But that's not saying that it's staying in there permanently and it's not saying that it's accumulating.

CHAIRMAN WINOKUR: All right. Thank you. One more quick question for you, Mr. Ashley. I guess the LOAM model is really what you used, in the end, to do calculations to close the M-3 issue. Is that correct?

MR. ASHLEY: As I mentioned earlier, that was one of the assessment tools that we used as the LOAM model, and that was for evaluation of accumulation, solids accumulation.

CHAIRMAN WINOKUR: And embedded into this equation is .18 scaling factor. Is that--

MR. ASHLEY: No. There is no scaling embedded in the LOAM model.

CHAIRMAN WINOKUR: There isn't?

MR. ASHLEY: The LOAM actually uses the actual test velocities and evaluates against the actual tested velocities. It does not use scale velocities.

CHAIRMAN WINOKUR: All right. Thank you very much. And Joe, do you have a question? Mr. Bader.

MEMBER BADER: Yes. A quick question for Mr. Russo. When will the detailed large-scale testing program be available to review? Hopefully, in a near final but not final draft, please.

MR. RUSSO: So again, I think the key element of answering your question is to get to a scope definition that we can get at least consensus on amongst our experts. Assuming that takes us about a month to two months to achieve that, and we would have to bring them all together and work that very hard, to get that done.

The second element would then be defining the physical properties that would be needed in the equipment. We could have that done in short order. I would tell you, a first draft of something that we have consensus on, without agreement on simulant necessarily, at that point, could be done within three to four months.

And then while we're going and doing the physical work to solicit the tank, find the tank, get the equipment installed, we would have to work with all due haste to get that simulant defined because getting the physical simulant made, once it's defined, is another long pole in the cycle.

So a schedule nominally within a couple a months, and then an overall definitive plan, when we know the lead time of the simulant, would be probably within ten months.

MEMBER BADER: Presumably, you would

test a number of simulants.

MR. RUSSO: Absolutely. One of the questions is just how you would set up your simulant suite to get to a test result that people can look at and say we have significantly reduced the risk.

MEMBER BADER: Thank you. I have one question for Dr. Triay, and for Mr. Knutson.

You've heard the discussions. You've heard statements, just recently, from Dr. Dickey and Dr. Kosson, about testing the mixing, to see what it's capable of, and then matching batches against that from Dr. Dickey. You've heard a statement from Dr. Kosson about the possibility of needing to modify the feed to accommodate what you see as a result of the full-scale testing.

How would you--at the highest level, how would you summarize what you've been hearing in terms of the capability of the Waste Treatment Plant as defined by the full-scale testing?

Mr. Knutson, would you like to-

MR. KNUTSON: Dr. Bader, if you could just repeat that last bit. There was quite a preamble that led to that and I'm trying to keep it all in context for that last bit, of what the question is actually focusing on.

MEMBER BADER: By the time the full-scale testing is completed, and I'm assuming you'll find a few things that needs to extend it, and things like that, you're going to be very close to hot functional testing.

And we've already heard statements, that it will be very difficult to make any major modification to the plant at that point. How are you going to relate what you see from the full-scale testing to the capacity and capability of the plant?

MR. KNUTSON: Okay. So I think it's important for us to recognize that we will not be close to hot testing, and in the process of completing the elements of the large-scale test that are critical for design or for evolving the criticality safety report. We will be in approximately three years of a window for commissioning of--or hot commissioning of the pre-treat facility.

I characterize the path forward as one in which we recognize that there are five large facilities associated with this project, pre-treat being one of them, pre-treat being one that is a very complex facility.

We characterize that the risks and the issues associated with the concerns that have emerged from our experts are important and they've been recognized, they've been tracked, they've been captured in our risk registries. I believe our external experts associated with project management have evaluated the risk registries and have identified it as best in class, in terms of its ability to characterize and keep track of what the issues are and how that relates to implementation of the baselines, and its effect on cost and schedule.

I believe it's also important, for the record, to show that there has been no disagreement amongst the experts, that for a vast majority of the wastes, the PJM systems are going to work just fine. There are elements of sludge and heavier particle distributions for which there is some discussion and some legitimate concern.

And we need to be able to continue to focus on that. We need to be able to address it. And that's what the large-scale testing program is set up to do. The testing program is aligned with the design schedule, so that outputs from the large-scale testing do dovetail with the design schedule, and our job is, as the Department of Energy, and certainly as the federal project director, is to make sure that that alignment remains robust.

MEMBER BADER: So if you saw test

results that indicated you needed to modify the internals of the vessel, you feel there is still time to do it?

MR. KNUTSON: I do; yes.

MEMBER BADER: Interesting. Would you also look at the option of resolving the issue by doing something else on the tank farms? Would that be one of your alternatives?

MR. KNUTSON: I don't have the opportunity to look beyond what I currently have in my plan. I can tell you that simply throwing things over the fence into the tank farms is not a particularly useful solution, because, ultimately, it comes back around to the issues of being able to commission, start up and operate. But based on the four months that we've been able to work together to understand what the issues are between the Waste Treatment Plant and the tank farms, the issues of our waste acceptance criteria and the feedstream deliveries from the tank farms appear to be a very solid, very robust relationship, that can be implemented on the timelines that we're asking for.

MEMBER BADER: Let me ask Mr. Sain one last question. I remember a discussion we had, years ago, and you said the tank farms solves the sins of the plants that are built to treat the waste. Does that still hold?

MR. SAIN: It's definitely a complex business. But I think it's one that we clearly understand. Having responsibility, URS for Savannah River and Hanford, and been a good working relationship with Frank at WTP, I think really pays off.

MEMBER BADER: Mr. Chairman, I'll stop there.

CHAIRMAN WINOKUR: All right. Thank you very much. I'd certainly like to thank you, Dr. Peurrung, Dr. Dickey, Dr. Kosson. I appreciate your time, appreciate your insights. They were invaluable. I though it was a great exchange. I learned a lot and I'm sure all the Board members did.

So that was wonderful. And I know we're going to be dismissing you, Mr. Russo, you, Mr. Ashley, and I think the others will unfortunately have to stay for a while longer.

But we're going to call up the second panel now, and that panel would include the addition of Mr. Brockman, who's the manager of DOE's Office of River Protection; Ms. Stacy Charboneau, who we heard from before, who's the assistant manager of the tank farms project in the Office of River Protection; and Mr. Paul Rutland, who is the mission analysis and strategic planning manager for Washington River Protection Solutions.

MEMBER BROWN: Mr. Chairman, while we're waiting, do you mind if I ask two follow-up questions to Mr. Knutson about follow-up to Mr. Bader's comments.

CHAIRMAN WINOKUR: Let's let everybody get seated here for one second and you can do that.

Okay.

MEMBER BROWN: Mr. Knutson, you made the comment, a couple seconds ago, that the majority of the experts agree that--or don't disagree that most of the waste, or some large fraction of the waste can be adequately handled with the PJMs as they are. I think that--is that what you said, or did I misquote you?

MR. KNUTSON: Well, there may be an oversimplification in there, but I believe that there is a large fraction of the waste that needs to be treated from the tank farms, for which the PJMs, and the design of the Waste Treatment Plant, right now, are--is not controversial.

MEMBER BROWN: Do you have any idea of what percentage that is?

MR. KNUTSON: I'll defer to other experts for that, but perhaps Greg Ashley could answer that as part of the public record and as deferred question.

MEMBER BROWN: Okay. And the other thing, we've talked about the large-scale testing and Mr. Bader asked would you be able to make changes to the PJMs, etcetera, and you said yes.

It seems to me there'd have to be pretty rigid metrics along the way, if the intent is that you allow yourself enough time before the vessels are in place, or finished, to make changes.

Have you got a set of rigid metrics in your own mind, or that this has to be achieved in the testing program in order to go forward, or it raises an alarm that you are not going to be able to complete the testing adequately, to then make changes?

MR. KNUTSON: My comment comes from the perspective that, I think as the Board recognizes, we have another construction project review coming up in November, and one of the expectations of that construction project review is that we would have restructured the way we approach the operational readiness review process.

We would have restructured the way we looked at facility start-up and commissioning on parts of the project that aren't pre-treat, and by doing that, provide ourselves additional time for dealing with issues such as a surprise in the large vessel test activities that support pre-treat.

By doing that, we're able to work a large fraction of the issues well off the critical path. It's a very significant opportunity that the project should realize, and it allows us to provide another window of opportunity to deal with topics of uncertainty, should such a negative risk event occur.

MEMBER BROWN: So a critical path has been identified for this large-scale testing?

MR. KNUTSON: I won't go so far as

to say a critical path for large-scale testing. I can say that the near-term activities are directly tied to the design activities that require the input.

MEMBER BROWN: Thank you Mr. Chairman. That's all my questions.

CHAIRMAN WINOKUR: Dr. Mansfield.

MEMBER MANSFIELD: Thank you, Mr. Chairman. First, I'd like to set the stage, I'd like you to describe a bit about how the tank farms are going to have to operate. You're going to have to prepare waste batches, and it's the sludge batches I'm most worried about, because those are the ones that aren't necessarily easy to process.

You'll need to dilute them; right? So you'll have to--first, you have to get them out of the tank; right? Do you have to dilute them to do that?

MS. CHARBONEAU: The plans, as they are today, are essentially that we will have a set number of what we will call staging tanks to feed the WTP, and for the sludge, in particular, the tanks that we have in mind currently have a quantity of sludge in them or we'll plan to have a quantity of sludge in them such that the amount of sludge in those waste tanks will be mixed. And I don't know if "dilute" is the right answer for that.

Basically, the amount of sludge in that material, we will add the appropriate amount of supernate to motivate that sludge.

MEMBER MANSFIELD: Okay. You'll add supernate. These will be single-shell tanks; right?

MS. CHARBONEAU: No. I'm sorry. The feed tanks for WTP are double-shell tanks.

MEMBER MANSFIELD: Okay. So all of the sludge is in double-shell tanks now?

MS. CHARBONEAU: No; it is not. So we have many years of retrieval activities--

MEMBER MANSFIELD: So you're going to retrieve it from the single-shell tanks, to get it--to retrieve it, you've got to dilute it to move it, don't you?

MS. CHARBONEAU: For those--

MEMBER MANSFIELD: The sludge--

MS. CHARBONEAU: A couple answers.

MEMBER MANSFIELD: The so-called peanut butter sludge.

MS. CHARBONEAU: Right. So for those tanks that are, I'll say sound, single-shell tanks, we add supernate to motivate that sludges, or salt cake, quite frankly, and for those that are assumed leakers, we actually add very little liquid to those tanks, and right now, we're designing a system that's an eductor system. So very small quantities of liquid will be added for those tanks.

MEMBER MANSFIELD: Okay. So this will end up in a staging tank where you're going to now have to do things to do it, to make it meet waste acceptance criteria. Do you have any line-plugging problems when you're moving this sludge around?

MS. CHARBONEAU: Currently, today,

we do not experience line-plugging problems. It's pretty low, the percent solids that we're moving today.

MEMBER MANSFIELD: These are going to be--okay. But in the future, are you going to--will the waste be sufficiently dilute, that you won't have some of the line-plugging problems that sometimes happen with less dilute material?

MS. CHARBONEAU: I'll defer to Paul in a second, but we have the ability to flush lines, should we have a line-plugging issue within the tank farms, as we're retrieving waste or moving waste between our single-shell and double-shell tanks. Paul, if you had something to add.

MR. RUTLAND: Our integrated grade waste feed delivery strategy has been evolving over the two year since we've taken over the tank farm contract. Initially, when we took over the tank farm contract, the plan, at that time, including in System Plan Rev 3, was to pile waste into tanks up to 200 inches, and try to retrieve and feed from those tanks to the WTP. Our initial assessment, when we took over the job, was that we didn't believe you could mobilize that amount of sludge in a double-shell tank system.

So in our integrated waste feed delivery plan, we have identified five HLW [High-level Waste] tanks that we are calling our waste feed staging tanks, and those tanks will stage approximately 70 inches of sludge, which, if you do the rough math, basically correlates to about 16 weight percent solids that we'll be feeding to the WTP.

MEMBER MANSFIELD: Directly?

MR. RUTLAND: From those staging tanks; yes. The key thing to remember is that the sludge that is in those tanks will be a combination of sludges that we've mixed together, and blended together, in order to produce a batch for the WTP. So we've tried, we've recognized the issues that we had with mobilizing large layers of sludge in DSTs [Double Shell Tanks]. We've identified that issue. We've addressed it in our waste feed delivery strategy, such, that we're only now planning on having batches of 70 inches in those five staging tanks for the WTP.

So your dilution question is one of, we believe when we have created the batch, we will be at the feed concentrations that's necessary to meet the WAC for the WTP.

To answer your line-plugging issue, currently, we don't have any issues with that going on in the tank farm, either in our retrieval systems, or in our transfer systems. Previous issues with plugging at the Hanford site primarily dealt with phosphate, phosphates being, gels being formed in transfers due to not controlling the chemistry of the waste appropriately.

Our waste compatibility program now controls that, where we stay away from those areas where you may have those line-plugging regimes with phosphate, and we do not believe that we'll have any trouble in transporting the waste to the tank farm. We have no evidence today, that we have any line-plugging in the transfers that we're doing today. We don't believe that we'll have significant settling in our lines.

Our design criteria for our waste transfer system is six feet per second for a linear velocity in our pipes, so we are a little bit above the velocity that's in the WTP in our transfer system, because we will probably be transferring around more concentrated sludges than you would see in the WTP.

So our linear velocity that we require in our pipes is higher. So we don't believe we'll have plugging in the lines in the tank farm.

CHAIRMAN WINOKUR: I'm going to ask the Board members to try to keep their questions in the range of ten minutes as we go through this, so that we can, you know, finish up with this and then get to the public comment period. Okay.

MEMBER MANSFIELD: At what stages do you have to sample the waste and test the waste to determine physical properties, and what physical properties do you have to--will you have to measure to meet a WAC, a waste acceptance criterion?

MR. RUTLAND: We will sample, that we will do the prequalification sample of the batch. Each one of those 70 inches of sludge, as I've just described in the file staging tanks, will have to be sampled for that prequalification sample. Once that sample's pulled, that tank has to remain quiescent, and what I mean by "quiescent" is no additional weights can be added to that tank during that six month period, while we go do the analyses of the sample that we pulled, to make sure that it meets all of the requirements for the WTP waste acceptance criteria.

MEMBER MANSFIELD: And how do you ensure that that sample is--how do you ensure it's homogenous and that your sample is appropriate?

MR. RUTLAND: Currently, right now, we have a waste mixing and sampling program that is ongoing in the tank farm. Our plan, and strategy today is to do the waste sampling and mixing in the million gallons tanks.

Just so that everybody's very clear, the mixing and sampling issue for Hanford waste is not a new issue. It was identified in 2002 and has been incorporated in the ORP Risk Register since that time.

So we've known for a while, that this risk was out there. In 2008, when we took over the contract, EM [Environmental Management] and ORP accelerated our mixing and sampling program by the application of ARRA [American Recovery and Reinvestment Act] funds, such that we accelerated the mixing and sampling program by two years, because we felt like we needed to have those answers earlier, so that we could support the WTP.

MEMBER MANSFIELD: Okay. I'm going to read a list of some potential waste properties that are important for understanding various aspects of the pre-treatment facility operation, and I'd like you to tell me whether or not you measure those, and kind of precision, or rather, confidence level do you have in your measurements.

For instance, density. What would that--shall I read the whole list, or would you like me to do one at a time?

MR. RUTLAND: I guess first of all, I'd like to say that the requirements for the sample are really being determined, and the--and we'll call it the quality of the sample, are being determined by the ongoing DQO [Data Quality Objectives] effort that we have with the WTP today. So I may not be able to answer all of your questions in that--

MEMBER MANSFIELD: So you don't have

any current goals for that.

You will measure solid content, though?

MR. RUTLAND: Yes.

MEMBER MANSFIELD: Okay. And activity of course.

MR. RUTLAND: Yes.

MEMBER MANSFIELD: And gas generation?

MR. RUTLAND: I believe that's a part of one of the things that we have asked for; yes.

MEMBER MANSFIELD: Okay. Including not just H_2 but O_2, N_2, N_20?

MR. RUTLAND: I believe that's a part of the program where we have identified that we need some analytical technique development and need to do that.

MEMBER MANSFIELD: Okay. Do you have heat generation?

MR. RUTLAND: Yes.

MEMBER MANSFIELD: Viscosity?

MR. RUTLAND: Yes.

MEMBER MANSFIELD: Yield stress?

MR. RUTLAND: Yes.

MEMBER MANSFIELD: Okay.

MR. RUTLAND: Those are currently required by the ICD-19, so we know that we have to measure those.

MEMBER MANSFIELD: Yes, and we expect them to show up in the WAC; correct?

MR. RUTLAND: Yes.

MEMBER MANSFIELD: Okay. Are there any others?

MR. RUTLAND: I believe we will be asked to determine fissile material content, which is already a part of ICD-19.

MS. CHARBONEAU: And critical velocity, which refers to the previous question about the density.

MEMBER MANSFIELD: I'm sorry. Say that again.

MS. CHARBONEAU: Critical velocity.

MEMBER MANSFIELD: The critical

velocity; right. Okay. But you don't know yet what accuracy is going to be required? What confidence level, I should say.

MR. RUTLAND: Currently, we don't know the accuracy that's going to be required. That's a part of the DQO process that is ongoing with the WTP now, and the results of that will feed in to our mixing and sampling program such, that we modify our program to meet the requirements of that DQO.

MEMBER MANSFIELD: Okay. The Environmental Management Tank Waste Subcommittee reported 28 issues closed, including the prequalification capability for waste batches. "Closed" doesn't mean that you've got all the answers; right. It means that you don't believe at this time, that anything that will prohibit you from continuing, completing the engineering procurement or construction efforts; is that correct?

MS. CHARBONEAU: That's correct.

MEMBER MANSFIELD: Okay. Right now, that's all that that means; correct?

MS. CHARBONEAU: That's correct.

MEMBER MANSFIELD: So what's closed is not closed, and you've got a lot of work to do, and you can't answer questions today about whether or not you're going to be able to meet any particular waste acceptance criterion until you know what it is and--

MS. CHARBONEAU: So as the EFRT issues were closed, and those technical issues were addressed, any changes necessary to the interface control document were looked at and visited. There were some specific changes with regard to the solids waste percent, that will be dealt with within the WTP facility as one of those technical issue closures.

Right now, the tank farm believes that we can meet the waste acceptance criteria as--

MEMBER MANSFIELD: Any waste acceptance criteria that's--

MS. CHARBONEAU: As outlined in the interface control document today.

MEMBER MANSFIELD: Okay. In ICD-19; right?

MS. CHARBONEAU: Right.

MEMBER MANSFIELD: Okay.

MS. CHARBONEAU: And so as we go through the DQO process and understand, like you said, what's the confidence level, to what degree do we need to sample, what is the size and quantity of those samples, not the kinds of things that we'll need to determine through the DQO process.

MEMBER MANSFIELD: Okay. My list of properties before--let me add to it. Would you have to test for gels and for precipitates that might clog the ion exchange columns, things like that, and things like that as well? Would that be part of a criterion, do you think?

MS. CHARBONEAU: I think what we'll need to do is have a good understanding as we-

-and I'll just call them "problematic tanks." And Ines referred earlier today about good process history we have with regard to the constituents, and the characteristics of the waste in the tanks today. I think we have a good understanding of the problem tanks that we knew, and we will address those problem tanks through the transfer and blending discussions that Paul had talked about earlier, so as we're putting that feed batch together--right now, I can't answer the question on to what degree will we characterize those samples specific to things like phosphates.

MEMBER MANSFIELD: Is there going to be--it the waste acceptance criteria going to define a particle that's too big for you to transfer to the PTF?

MR. RUTLAND: Currently, we don't believe that it will. The waste acceptance criteria, as written today, is based on the linear velocity. If we can pump it through the pipe and meet that linear velocity, we'll be okay.

MEMBER MANSFIELD: Okay. What if they have problems processing material with large particles, say, in the 100 micron stage? What will you do about that?

MR. RUTLAND: We will have to prepare batches that will meet the waste acceptance criteria--

MEMBER MANSFIELD: How will you do that? You can't blend large particles away. They're large, no matter how much you dilute them.

MR. RUTLAND: Currently, we don't have a means or mechanism in the tank farm to separate out large particles like 70 microns--

MEMBER MANSFIELD: No. I know you don't.

MR. RUTLAND: We will have to develop a strategy that would include--

MEMBER MANSFIELD: All right. Okay.

MR. RUTLAND: --grinding, or

something else, that would put the particle size into the particle distribution, that would be able to be accepted by the waste acceptance criteria.

MEMBER MANSFIELD: And my last question, Mr. Chairman. Are you going to have enough lab space to be able to do all this?

MS. CHARBONEAU: For what we know today, the answer's yes.

CHAIRMAN WINOKUR: Mr. Bader.

MEMBER BADER: Thank you.

Ms. Charboneau, looking at the criticality safety recommendations from the Criticality Safety Support Group, there is a statement that tank farms have been in static storage mode. Activity will increase for tank-to-tank sludge transfers, reconfiguration of kilogram quantities of plutonium in the near future.

Are you going to revise the criticality safety evaluation report, to recognize the fact you're going into a dynamic from a static mode?

MS. CHARBONEAU: I am not aware if any plans to go back and reevaluate our criticality safety report today. Today, the evaluation has been done, and in fact we had a criticality safety review performed across the tank farms, again, about 12 to 18 months ago, and in the farms today, we find criticality to be incredible. And that's primarily based upon the geometries of our tank, and where we know the Pu oxide is, and some of the other--you know, we understand the distribution of some of the wastes as they are today, and knowing that process and knowing where we do have a couple of direct Pu oxide discharges to those tanks, how we address that, operationally, keeps us in appropriate DSA [Documented Safety Analysis] space.

I don't know, Paul, if you had anything to add.

MR. RUTLAND: Well, there's a couple

things that we really want to make sure that we are cognizant of. The first one is, we know where the plutonium is. It's not like the plutonium's going to surprise us, that we're going to find plutonium that we don't know about.

We feel we have a very good understanding and characterization of where the waste is in the tank farm. The characterization of what's in the waste, the overall composition of the tanks, we feel we have a very good "handle on."

As you know, in the late '90s, DNFSB [Defense Nuclear Facilities Safety Board] issued Finding 95-3, that dealt with the characterization of the Hanford tank farm. In the closure of that Board finding, the tank farm and its contractors developed the Hanford-defined waste model, and also did some additional sampling in the tank farm.

The Hanford Defined waste model was based on the process knowledge from the

Hanford site, from the very beginning of the Hanford operation. Each transfer that was made in the tank farm, and from any of the operating facilities in the tank farm, were tracked in that model.

In addition to that, the Origin 2 code was used to predict the composition of the waste streams, of what was processed into the canyon facilities, PUREX processes and those things. The Origin 2 code was updated in 1965. It was updated, once again, in 2001. The reason it was updated in those two timeframes was it was overpredicting the amount of plutonium that was being accounted for.

And the Origin 2 code is not just a code that applies to Hanford. I'm sure you know it's an industrywide code.

MEMBER BADER: Mr. Rutland, let me read--I read from a March 2010 Office of River Protection Report, which summarizes what was discussed. The last sentence is:

"Team suggests that contractor not wait until a CSER Change is needed to start working on the next revision."

The report goes on to criticize the basis on which the existing CSER is done. It specifies a number of weaknesses. It makes the statement that for a static system, i.e., not moving sludge around in large quantities, that there is sufficient margin, the benefit of having large amounts of conservatism, such that as long as it stays static--and I'm summarizing a number of statements in here--there's not an issue.

It says that when you start moving the sludge around, you really need to redo the CSER.

MR. RUTLAND: And I was about to get to our control strategy for that. For every transfer that we make in the tank farm, we have a waste compatibility program. One of the things that has to be analyzed for each transfer is criticality. It's also phosphate generation, gel generation, all of those things.

So for each transfer, Dr. Bader, I believe we do do an analysis of the criticality associated with that transfer.

So I don't know if we've done--if there are plans to redo the CSER, but I know for each transfer, each retrieval that we have to do in the tank farm, we do have to do a criticality analysis for that transfer.

MEMBER BADER: Dr. Triay, do you have any comments on this situation?

DR. TRIAY: As you know, Dr. Bader, we have an extremely experienced contractor in the tank farms. They have a substantial amount of experience at the Savannah River site, and they retrieve waste and process waste for treatment at the Savannah River site routinely. So with respect to the analysis that has been discussed, the Department of Energy, at the local level, as well as the contractor, will get together like they always do. I mean, Mr. Rutland is not a part of the safety authorization basis of the cadre of experts in the tank farm contract, and as you know, we take, of course, the safety of the tank farms extremely seriously, and our authorization bases are indeed what allows us to move forward.

So Ms. Busche and Mr. Sain will probably like to make a comment on this matter.

MR. SAIN: Sure. I would. As you know, all that work is controlled under a DSA, for the safety bases, and certainly, any criticality safety evaluation--all of that has to be looked at, just like Paul was saying, as part of preparing and planning a transfer.

So I can assure you that we're using the same process at TOC that you're familiar with at Savannah River, and that process is very rigorous, to include the safety bases and the criticality safety evaluation part of the planning process.

MEMBER BADER: A number of your people were a part of writing this report. Mr. Brockman, do you have any comments?

MR. BROCKMAN: I do. I'm not familiar with the report. Could you give me the title of that report. You said it was Office of River Protection?

MEMBER BADER: It's Criticality Safety Recommendations from the Criticality Safety Support Group, and the lead sentence is: "The U.S. Department of Energy, CSSG [Criticality Safety Support Group], conducted a review of the tank operations contract, criticality safety technical bases, in December 2009."

MR. BROCKMAN: I haven't--I'm not familiar with if I read that, but if that report was written, I would assume that the findings have been documented and have been transmitted to the contractor, and we'll follow up with it and make it a matter of record, what the status of that is.

MEMBER BADER: The other--

MS. CHARBONEAU: I guess I would just comment, I am familiar with that review. That's the review that I was referring to earlier.

MEMBER BADER: That was what I--and I saw you were down on distribution.

MS. CHARBONEAU: Right. But you know, as my response was earlier, I am not aware of any current plans, right now, to revise a CSER. We do address those issues through our waste compatibility and our transfer plans. So I'll have to defer and get back to you, if there's a specific date that we have identified based upon our increased retrievals and DST to DST transfers, we would deem that it's appropriate to readdress the CSER.

But today, we deal with waste compatibility and ensuring we stay within the DSA controls.

MEMBER BADER: The only other

question I have is, to me, the discovery of the plutonium dioxide particles, plural, in a sample, is a potential game-changer.

Would you comment on how prevalent you think they are and what characteristics you've seen from the PoO2 samples that have been examined, in terms of size, in particular.

MR. RUTLAND: The samples that we have today, the largest particle that's been seen is the one that's referenced in the report on the WTP, the 40 micron particle, that if you do the spherical equivalent becomes a 10 micron particle. As far as a surprise, I would not say that finding Pu oxide was a surprise. We actually do know that Pu oxide does exist in the tank farm. It also exists in some other tanks in the tank farm. TX farm, for example, that we have samples from, we do know we have Pu oxide in those tanks.

As I said, you know, our HDW

[Hanford Defined Waste] model did predict where those materials would be. Our sample program, every time that we've done a sample, it actually documents and confirms what the HDW model has predicted, as far as waste type is concerned being found in the tank. So the presence of Pu oxide was not a surprise. We knew that Pu oxide was in the tank farm and we have controls to deal with it.

MEMBER BADER: Do you plan to do further sampling of those two tanks, SY-102 and TX-18--I think it's 118, in order to further characterize those because of the discovery--and I'll say, there was statements made that PoO2 was not expected, earlier on.

MR. RUTLAND: I don't know who made that statement. I would not agree with it. We do plan on actually re-sampling SY-102. It was in the plan, actually for this year, to resample SY-102. However, the project--we are in the process of replacing our core drilling machine, and it was deferred until next year.

So SY-102 will be sampled next year.

Currently, there's not a plan--I mean, I don't--it's not in the next year. We have sat down with the Department of Energy and developed an integrated sampling schedule. I don't believe that the 118 sample is scheduled in the next year. It may be in the year after that but I'm not--I don't have that at my hands, right now.

MEMBER BADER: Thank you. I have no further questions.

CHAIRMAN WINOKUR: Mr. Sain, in the last year or so, we've reduced the MAR [Material At Risk] coming into the facility, or we've reduced the waste acceptance criteria by reducing the MAR, and there have been other changes, and I think you've heard the discussions today about the potential uncertainties.

What do you see as the challenges that the tank farm is going to have to face? Do you think this is the toughest job that a tank farm is going to have to prepare this waste, to control and characterize it, and feed it to this facility.

MR. SAIN: Well, I think, certainly, it's going to be a challenge to prepare the waste. But as I stated earlier, I think we have experience at doing this, at Savannah River, and I think we have brought expertise to TOC from Savannah River. We're capable of supplementing that. I think as the project goes along, we're going to do what we need to in the tank farm, to support, you know, the start-up and the operation of WTP.

CHAIRMAN WINOKUR: Are you going to be doing that in a proactive role, because we had a discussion, a very nice discussion with Paul Beck in Washington, and we were talking about particle size, and we asked him if he could control it, and we've had a little bit of a discussion here about that, and he said something like, well, we haven't received notification yet.

And I kind of thought, well, you know, the tank farm is going to run this show in the end, and it would be, it seems to me important, and I encourage you to make sure that you're looking in front of the headlights as much as anybody, to make sure that you can see in advance, and way in advance, if you can, what you're going to have to do to prepare that waste.

MR. SAIN: I can't agree more, I agree totally with that, and I think we've, since that time when we had that discussion, you know, we've really focused a lot on integration between WTP and the tank farm, and certainly we have realigned, organizationally, to provide an integrated approach, and, you know, Paul, I'd like for you to address--one of the things that we also discussed at that time was, you know, to do additional sampling, to improve, you know, the characterization of the waste in the tank farms.

DR. TRIAY: As Paul gets ready to

address that, I would like to point out that part of the assessment report that Mr. Knutson talked about in his opening remarks, called for an integration position at the Department of Energy level, and that position, we have moved out with that position at the Senior Executive Services level, and we're filling that function because we also recognize that integration is extremely important, not only at the contractor level or at the DOE level.

One of the specific tasks of the contract, that the tank operator contractor has with the Department of Energy, is integration, and looking ahead for the operability of the Waste Treatment Plant, and how we're going to be feeding the waste to the plant. Go ahead.

MR. RUTLAND: One other I would like to point out is we did develop a waste planning DQO, so that we would obtain more information in order to do better planning of the batches going to the WTP. So we completed that effort this past summer and we have included samples in the sample program for that very specific purpose, to allow us to do better planning for the batches that are going to the WTP. So we are trying to get out in front of the headlights, so to speak.

My experience at the Savannah River site is that's very important, and one of those that Leo talks about being sent up here. We understand the issues that occurred, early on, in the DWPF operation with Sludge Batch 2A, where they had to come back and blend some additional waste in it, so that they could actually pour glass in the melter.

So we're very familiar with the problems and the issues that we're facing, and we believe we have the right people. In addition, to make sure that you know that we're communicating significantly with the DWPF on the Savannah River site, we actually had a Waste Feed Workshop at the Savannah River site about two months ago, where we spent three or four days with the DWPF people, discussing, walking through their waste acceptance criteria, how they mix and sample waste and how we could apply what they've learned at the Savannah River site to how we're going to do it at the Hanford site.

CHAIRMAN WINOKUR: At this time, have you received any basis of design changes that are telling you to limit the size of plutonium particles, or particles, in general?

MR. RUTLAND: We have not received any BOD [Basis of Design] changes to this, to date, that limits the particle size, or particle size of plutonium. The document that you were referring to, when I was in Washington two, I guess it's almost three weeks ago now, we met with the WTP on that. It was a draft document, and what you'll see in the next version is that it will say that the linear velocity measurement of 4 feet per second will meet the requirement, as outlined in that document, and although the document was not written well and did not say that specifically, it should have said that, and we've talked with the WTP, and we've met and are working together to make sure that that type of issue doesn't occur again.

CHAIRMAN WINOKUR: Our last question. Stacy, you needed a new DSA for the tank farms; right? And when do you--

MS. CHARBONEAU: That's correct.

CHAIRMAN WINOKUR: What are the plans for that?

MS. CHARBONEAU: We actually just revised the DSA this last year, and so we rolled that out at the beginning of calendar year 2010. We find that that's -- we relooked at a number of control strategies within the tank farms as a part of that new DSA, as I know you're aware of, and specifically as we look at passive controls and specific administrative controls, we've reanalyzed, based upon some of the material-at-risk discussions, and some of the other, looking forward and how we'll operate the tank farms specific to increase operations in transfers and retrievals, and we believe that the DSA today reduced a great deal of cumbersomeness. I will say in the previous DSA, it's more streamlined and allowed for improved work planning, which we rolled out a new work planning control strategy this year, as well.

CHAIRMAN WINOKUR: All right. Thank you. Mr. Brown.

MEMBER BROWN: Yes. Thank you, Mr. Chairman. I just have a few questions here. As I--and I guess the first one is for Mr. Knutson. As I prepared for this hearing, I went back and read the testimony of the former Waste Treatment Plant federal project director, that was given to this Board in March 2007 public meeting on safety and design.

And in his discussion of technology readiness assessments, he said that after the decision was made not to proceed with two fully prototypical pilot plants, the omission of extensive prototypical testing has been an expensive error for DOE to correct, one that has prolonged the safe disposal of Hanford tank waste.

Now in Mr. Kasdorf's opening statement, he talked about the need for a credible strategy for dealing with uncertainties, and suggested four actions, and I'm curious, what your reaction is to those four suggestions that he made on how to deal with, or how to put together a credible strategy.

So do you see a need, a necessity for accelerating the characterization of the worst tanks, the waste types, that is, SY-102, TX-118, in the tank farms?

MR. KNUTSON: Well, I can tell you that in the evaluation we've just completed, there are two types of risks that are the driving risks for our ability to actively implement our commissioning and start up an operational approach.

One is the ability to identify a simulant that actually is representative and for which we have reached consensus. The second is the realtime characterization of feedstreams, as well as the realtime characterize of material in the Waste Treatment Plant, or at least as close to that as we can get to maintain assurance that what we expect to be there is what we actually have there.

Hopefully, those are elements of the technology development program. They are both elements that have been at least conceptualized in terms of methodologies that are available to help us deal with those issues, and to the extent that the recommendations that Mr. Kasdorf made in his opening comments actually help us to deal with those risks and deal with the ongoing issues that we'll learn from the large-scale vessel test, they would all be considered.

MEMBER BROWN: So you're satisfied with the progress of characterization of the wastes in the tank farms? I mean, that's meeting your needs, or you need them to accelerate their characterization?

MR. KNUTSON: I believe that the characterization of the tank farms, as described by Mr. Rutland, meets the needs of what we would require for an input feedstream. But from an operational point of view, and the ability to understand anything that would be off spec, or something that would happen on a realtime basis, a finer level of detail may very well be required. We'll understand that more as we go through the processes of large-scale testing as well.

MEMBER BROWN: Okay. The second thing Mr. Kasdorf recommended was accelerating large-scale testing, which we've already talked about. The third thing he suggested was designing a waste retrieval facility with mixing and sampling capability engineered to protect mixing requirements established by large-scale testing. Is there a necessity for that, or is that more in Ms. Charboneau's ball park?

MR. KNUTSON: I believe that should be deferred to Ms. Charboneau or to Paul.

MEMBER BROWN: Okay.

MS. CHARBONEAU: We've talked about a purpose-built facility and we've talked about the waste receiver facilities in previous discussions with the Board. The tank farm's baseline, as it exists today, includes construction of two waste receiver facilities. The primary function of those waste receiver facilities are basically pumping stations and staging stations as we need to motivate the single-shell tank waste from those far-reaching tanks, from a geographic perspective, looking out at the T farms and the B farms that are far away from our double-shell tank farms, as we retrieve those wastes.

We're approaching the need for those

waste receiver facilities from a number of angles with regard to potential improvements in how we move the waste from the single-shell tanks and consolidate those wastes and stage them, and again move those to the WTP.

As we look at the requirements and needs for mixing and blending to meet the waste acceptance criteria of the WTP, we've framed the mixing and sampling studies that are ongoing, right now, in that regard.

We expect to know by the end of this calendar year, I should say calendar year 2011, whether or not we will need to enhance some of the capabilities in the east area waste receiver facility.

And so that's what we've discussed. We have it in some of our integrated waste feed plans as a potential opportunity, but we don't know today, if we will need some additional blending and mixing capabilities that we cannot fulfill within a million gallon tank today, until the end of 2011.

But what we've talked about is enhanced capabilities within the existing waste receiver facility for 200 East.

MEMBER BROWN: So you say the two, there are two waste retrieval facilities in the baseline?

MS. CHARBONEAU: Yes.

MEMBER BROWN: And when do you expect the design of those to be complete?

MS. CHARBONEAU: The design for the 200 East waste receiver facility, as it's in the baseline today, those design activities start in 2015. So we will want to have an answer on, is it necessarily to add capability and enhance that waste receiver facility before 2015? But that's where it is today.

The second waste receiver facility is out in past-2020 timeframe.

MEMBER BROWN: Okay. Thank you. And the last thing that he recommended was designing a hot pilot plant capability to verify the acceptance of feed batches to WTP, and I think a hot pilot plant is more in the range of WTP's realm. Do you agree with that?

MR. KNUTSON: I don't know that a hot pilot plant actually adds anything more to the information that would be needed to support input feedstreams to the Waste Treatment Plant. I do agree that the idea of using the large-scale vessel testing to ensure that we understand what the characteristics are of a batch ,or what the characteristics are of a feedstream process, of even what the training and qualification criteria would be for individuals who have to interact with that type of a batch, is a critically important element.

Whether you take that all the way to establishing another contaminated facility for the purposes of dealing with hot pilot capabilities, that's a question that I haven't considered yet.

MEMBER BROWN: Mr. Rutland, how many flow sheets do you expect to come out of this, the tank farms? I've heard a number up in the near 500 different recipes for wastes that are going to be developed as you try and--as you--not try--but as you actually empty these tanks.

MR. RUTLAND: I'm not sure exactly how to answer your question. I can tell you that we have 49 different sludge types in the tank farm. Those will be blended together to produce a batch of material.

Right now, on the HLW side, I believe we have 300 batches over the life cycle of the mission. Now it's been a long time. I can get the exact numbers and put them in the--

MS. CHARBONEAU: It's three hundred--

MEMBER BROWN: But we're in the hundreds?

MR. RUTLAND: We're in the hundreds of batches--

MS. CHARBONEAU: 376.

MR. RUTLAND: --that we will prepare, very similar to what's being done at Savannah River site. They have several, lots of batches that they have to produce too. On the LAW [Low-Activity Waste] side, we have a fewer number because the LAW waste is able to be stored in million gallon tanks, and it's not nearly as complex to be able to move that waste around.

So right now, I would say we have 300 and something batches of high-level waste. We have 49 different waste types in the tank farm. I want to be careful, cause that sounds like a lot, because there are--most of those waste types are very, very similar to one another. There's just slight nuances associated with them.

For example, AZ-101 is a waste type, and we have a AZ-102 waste type, because they're just very slightly different and what was predicted by the model was actually found in the tank.

So although they're both PUREX waste, very, very similar waste, we have two different waste types to describe them. So to say we have 49 waste types is a little bit misleading because it's not nearly as many as that.

So does that answer your question? I apologize--

MEMBER BROWN: What I understand the hot pilot plant to be is to take these recipes and run them through until they're glass, to make sure that you don't experience a problem in the big plant, and with several hundred of these to do, it seems like it might be nice to know that it's going to work, before you fill up the vessels in the Waste Treatment Plant.

MR. RUTLAND: And we agree with you, Dr. Brown. It is planned during the prequalification--

MEMBER BROWN: Mr. Brown.

MR. RUTLAND: Mr. Brown. I apologize. Mr. Brown, we do, in the prequalification of the sample, do intend to take the sample that we pull from the waste tank. When we lock it down, we tell you about the six months. The reason it's six months is so that we can take that sample and run it through in the laboratory, each step in the WTP process. So we will--if we're going to leach that sample, we'll reproduce the leaching in the laboratory to make sure that we understand what's going to happen in the WTP from a leaching perspective.

So we will do that on a bench laboratory scale. I'm not--and that was very similar to how we actually started up the DWPF, where we would pull the samples and take it to the lab, and run it through the mini molter, and determine whether or not we could--it would pour, or what the viscosity of the glass was, all of those properties that were critical, at that time, at the Savannah River site. So we have a similar process here. Although it's not a pilot plan, it is a laboratory plan to take the sample through the various operating, unit operations in the WTP in a laboratory setting.

MEMBER BROWN: Okay. Thank you.

MR. SAIN: That actually validates, Larry, what you were asking, how are you going to validate before you put it in the plant. But you heard what Paul said.

MEMBER BROWN: I've heard a number of people suggest that, and when I went back and read the previous technical director's statement, I said, "gee, that's come up again." So I think it's something you might think about. I just want to ask one more question. I know we're trying to move on, so we make sure that the audience, anyone who wants to make a statement, and I know, Mr. Chairman, you have several other comments.

Dr. Triay, if I could ask you just a couple questions here.

According to the current Hanford cleanup project system plan, which I think is

Revision 4, but whatever the baseline is, when will the waste treatment mission be completed, here, in Hanford?

DR. TRIAY: I believe that it's 2047, in the last systems plan. But please correct me if--

MS. CHARBONEAU: The TPA [Tri-Party Agreement] milestone is 2047 but the system plan actually has us completing the mission in 2045.

MEMBER BROWN: So you've given yourself two years of margin in that.

MS. CHARBONEAU: Plenty of cushion.

DR. TRIAY: But let me make sure that we understand the regulatory framework. The regulatory framework of the triparty agreement necessitates that the Department of Energy look into improvements to those dates, the date of 2047, that we proactively look at ways to accelerate the tank waste cleanup, here, at the Hanford site.

And we have, at the direction of the

secretary, made a significant investment, on the order of $50 to $60 million per year, depending on the year, to technology development associated with a tank waste cleanup, at both the Hanford site and Savannah River site.

And we invested, from the Recovery Act, about $300 million associated with accelerating the infrastructure that we are going to need at the tank farms in order to support the Waste Treatment Plant coming online. Some of those infrastructure improvements were, indeed, associated with the laboratory that Mr. Rutland was just talking about.

MEMBER BROWN: So the current baseline to meet that date, 2045, or to meet the commitments to the state, that includes a second LAW; is that correct?

MS. CHARBONEAU: That is correct.

DR. TRIAY: The baseline does, the regulatory framework calls for a decision on supplemental low activity waste capability.

MEMBER BROWN: That's actually where I'm trying to get to, the problems that the farms have to address. Do you need--in your assessment today, I know that's not a decision today, but do you feel a need to have supplementary pretreatment in the tank farms to meet the commitment?

DR. TRIAY: In order to meet the commitment, what we definitely need is supplemental capability for low activity waste. As we have delineated and is clear in our regulatory framework, the Waste Treatment Plant will provide capability for about 50 percent of the low activity waste capability that we need for the entire tank waste cleanup.

So we definitely need supplemental capability for low activity waste as part of the technology development efforts that we are conducting. The Secretary of Energy feels strongly, that the environmental management program needs to invest in technology development, applied research and development, that would allow us to perform our mission more effectively, and accelerate the mission in this particular case of the tank waste cleanup, and as part of those efforts, you know, to accelerate that mission, we are considering in tank, at tank precipitation, including a number of options for adding supplemental low activity waste capability to the tank waste cleanup at Hanford.

MEMBER BROWN: And that's including a number of other novel technologies like steam reforming, or any of those?

DR. TRIAY: That is part of what we are looking at. As you know, the regulatory framework does call for a waste form that is as good as glass. So we have asked the National Academy of Science to perform a study on waste forms. I mean, they have published the interim report. They have spoken about the criteria of as good as glass, but, yes, the reforming would be one of those options, there would be other options, and the at tank, or in tank treatment would involve innovative technologies such as rotoring microfiltration or a small ion column exchange. It is essential that we perform the tank waste cleanup in earnest, and that is the objective of our investments in applied research and development.

MEMBER BROWN: Thank you very much. I think I've gotten the hook. So Mr. Chairman.

CHAIRMAN WINOKUR: Thank you. And Ms. Roberson.

MS. ROBERSON: Okay. Actually, I'm just going to ask two questions. Mr. Chairman, I'll be very, very quick.

In reading the responses to the Board questions, it struck me that ICD-19 must be undergoing an update. Is that right, Mr. Rutland? No?

MR. RUTLAND: Let me respond. ICD-

19 is in revision. Yes, it is. We are working with the WTP. There are several areas that we're still trying to close on ICD-19, and as the results of the DQO assessment come out, and as the results of our mixing and sampling program come, we will again meet together to make sure that ICD-19 still meets all of our requirements.

So ICD-19, I would describe it as a living document for the next short period of time, until we close these issues, and then we can finalize the ICD-19. So it is being revised. We have actually just made a minor revision to it in the last two months, so--

MS. ROBERSON: Okay. And then my last question, and it actually crosses over another session, so I'll just keep it brief because we're kind of creating a sense that we have finality, but, in essence, because you haven't created your operating envelope for WTP--is that right, Ms. Busche?

MS. BUSCHE: Correct.

MS. ROBERSON: Okay. Who, WTP, tank farm, will be developing the procedures, once you have that operating envelope, for standards and verification that the waste meets that acceptance criteria that will be enveloped in the safety basis for WTP? Who? Which--who will do that?

MR. KNUTSON: The Waste Treatment Plant project includes the scope of work for developing those procedures and for training and qualifying the staff that are responsible for implementing those procedures.

MS. ROBERSON: So WTP will have a certification group, or whatever you want to call it, a group that is responsible for certifying that the waste, and the process utilized at the tank farm, is acceptable in qualifying waste?

MR. KNUTSON: I think that we introduced this concept of the integration function between the tank farms and the WTP. That role is a Senior Executive Service role.

Part of that role includes the definition of what I would call "expected conditions," expected conditions both from the tank farm feedstream and expected conditions from the Waste Treatment Plant, in terms of its readiness to receive that feedstream. That function is now being defined.

MS. CHARBONEAU: Can I stake a stab at this one. The ICD, as its written today, requires a WTP contractor to do the waste farm qualification during commissioning, and so as Dale had talked to, they are responsible for writing the operating procedures, et cetera. But as we've talked about earlier today, clearly, the eventual operating contractor needs to be a part of the commissioning efforts and the readiness efforts of operating the WTP.

We are using ARRA funds today to upgrade the 222-S facility that we anticipate to be used for waste farm qualification in the future, and so while those procedure and processes will be a part of the commissioning effort for WTP, that will transition to the operating contractor, most likely at the 222-S facility.

Does that help answer the question?

MS. ROBERSON: Well, it does, and I think we can come back to it later. You're not going to wait until commissioning to figure that out, because if you need additional capabilities, you've got to have them in place, so--

MS. CHARBONEAU: No; you're absolutely right. That's actually almost a different question than I was answering. So Paul can help answer that too. But we understand there are some additional analytical methods that will need to be developed for waste farm qualification, not necessarily for commissioning, but as we understand the waste acceptance criteria, and the characterization of the waste we have in some of those more problematic tanks today, and so we have a good idea of what additional analytical methods will be need to be developed, and that is a part of the tank operations baseline today.

MR. RUTLAND: We have already actually asked the 222-S lab to start developing some of those analytical techniques. We've identified some of them, and we've already asked them to start working on developing those techniques.

MS. ROBERSON: And I guess the only thing I want to confirm is, even though ICD-19 is a living document, you are assuming, based on at least what we got in response--we saw a lot of responses that said, "And if this will be a restriction on the waste acceptance criteria." You're assuming, though, so that you're prepared; is that right?

MR. RUTLAND: Yes; absolutely.

CHAIRMAN WINOKUR: Well, let me thank our panelists, some of whom have been with us for five hours, and probably will get a Board medal. We haven't designed it yet. We'll be sending it out. Thank you, Dr. Triay, Mr. Knutson, Mr. Brockman, Mr. Rutland, Ms. Charboneau, and Mr. Sain and Ms. Busche. And that concludes the testimony from our staff and the department, and we're now going to move on to call members of the public who have signed up to speak.

As I indicated earlier, I'll ask each speaker to limit remarks to about five minutes. If times permits, I'll extend the time for additional comments.

And I believe there are microphones in the audience that you can use. And the first person on our list is Ms. Suzanne Dahl.

MS. DAHL: Well, thank you. Thanks to the Board for offering this opportunity for public comment. I'm Suzanne Dahl of the Washington State Department of Ecology. I'm the tank waste treatment section manager. The Department of Ecology regulates the cleanup of Hanford through the Hanford Facility Agreement and Consent Order, and most recently through a consent decree filed in court, and through our authority in various permits, we regulate the design, construction and operation of equipment that touches the hazardous waste, to protect the environment, the workers, and the people of this region.

I would like to say that the State of Washington welcomes and depends on the nuclear waste safety review that the DNFSB provides, both today and for many years before this. As regulators, we appreciate your detailed approach on these safety issues.

I would like to highlight, that the tremendous risk that exists from the 53 million gallons of high-level radioactive mixed waste. It poses a significant risk to the underlying aquifers, to the Columbia River and to the region as a whole, and it is essential that this waste be retrieved and immobilized into glass, to prevent future catastrophic impacts.

I can also say that Washington State Governor Gregoire, and the ecology director, consider it essential that the Waste Treatment Plant is completed in a timely manner, essentially the end of this decade, and that the Waste Treatment Plant proceed to emptying the tanks and immobilizing the waste to protect this region.

However, it is Washington State's expectation that the Waste Treatment Plant be constructed in a manner that will allow it to operate safely and efficiently.

We recognize the complexity of this facility and strongly support the detailed, comprehensive and timely review, and resolution of both technical and safety issues.

And to just talk about two of those issues, briefly. ORP has spent a significant amount of time with the Department of Ecology explaining the changes that they propose at the material-at-risk, and their approach seemed reasonable, and the goal of reducing the complexity of active controls made sense to us, as regulators.

The resolution of the mixing issues, and the need to be able to move the waste, the heel waste, so to speak, downstream, so it can be treated, is essential, because obviously, all this waste needs to eventually end up in glass. And the Department of Ecology is anticipating, and plan to be very involved in the resultant changes of the vessels that will need to occur.

And so again, I'd like to thank the Board for its commitment to this project and commitment to this region.

CHAIRMAN WINOKUR: Thank you, Ms. Dahl. Next is Mr. Carl Adrian.

MR. ADRIAN: I'll make it easy on the sound people and stay at one microphone this afternoon. I'm president and CEO of the Tri-City Development Council, locally referred to as TRIDEC. TRIDEC is the lead economic development organization that serves Benton and Franklin counties. The organization was formed in 1963, and among other designations, we have the designation from the Department of Energy as the community reuse organization, or the CRO for the metropolitan area.

TRIDEC has approximately 375 member firms as well as contracts with all, or most, of the local governments in the community. Our primary mission is to facilitate job creation and capital investment in the region. But as part of those broader economic development programs, TRIDEC has had a long history and interest, and involvement with DOE, the Hanford site, and the contractors.

Now let me talk about some of the details from a community standpoint. First, Hanford. As you well know, for 67 years, our community, along with other weapons complex communities, has supported national missions. First, World War II, next the Cold War, and finally, the cleanup mission that's underway currently.

The good news is Hanford is getting cleaned up, and I think we're all pleased about that, particularly from a community standpoint. In just four short years, by 2015, the 586 square mile site will be reduced down to approximately 75 square miles, and I know it sounds like a big area but it's only 75 square miles compared to that 586.

And as you know, that's where the location of the WTP is. Between 2015 and 2019, the Waste Treatment Plant construction will be completed, systems will be turned over and the plant becomes operational. We've had two members of TRIDEC's staff monitoring design, construction, working with DOE, and others, in this process for the last ten years.

We at TRIDEC, with support from the Department of Energy, have hosted more than 85 congressional staff at the site during that same time period. We have consistently felt that it's important for congressional staff to personally visit the waste treatment facility and witness firsthand the size and complexity of the plant.

Also, we feel strongly that it's important for the congressional staff, and the members, to know that this community is directly involved, interested, and concerned with making certain the plant works, and making certain the plant works safely.

And safety both in terms of the workers that are at the plant, but, frankly, also for us that live nearby the plant, in the community.

Confidence in the Waste Treatment Plant is imperative, I think, from a community standpoint. The fact that the single-shell tanks are aging makes the need to complete the design, construction, and make the plant operational extremely important. You heard that from the Department of Ecology a few minutes ago.

We ask the Board to make the necessary decisions to complete design as quickly as possible. We certainly don't want to sacrifice safety, but again, I think the message from the community is "we need to get on with it and get the cleanup completed."

Successful operation of the WTP is the largest and final steps to Hanford cleanup. The other nations, such as France and Japan, have reprocessing programs, classification programs, they're working, and we support this plan and want to see it go operational. We have confidence in your ability to do the necessary reviews to make this plant a safe plant and get it online.

We also have the utmost confidence in Bechtel and the DOE's Department--or Office of River Protection--to make sure that the plant goes operational in a timely fashion. Again, the message from the community is we want to get on with it, we want to finish cleanup, and get on with whatever that post-

Hanford economy looks like.

So again, thank you very much for the opportunity to speak. I'd be happy to answer any questions in the future. Thank you.

CHAIRMAN WINOKUR: Thank you, Mr. Adrian.

Mr. Tom Carpenter.

MR. CARPENTER: So I realize I'm your last, maybe your last person standing between you and lunch, so I'll try to be efficient. So again, I'd like to repeat, thanks for you holding this hearing today, and to afford an issue for the public to weigh in on these various important issues. My name is Tom Carpenter, and I'm the executive director of an organization called Hanford Challenge.

It's a regional public, nonprofit organization, that seeks to have a positive influence on the environmental remediation mission at the Hanford site.

Hanford Challenge fully recognizes

the urgency for a robust and effective treatment strategy for dealing with Hanford's high-level waste. So, of course we support the Waste Treatment Plant strategy for vitrifying high-level waste with disposal in deep geological repository.

Of course any such facility, as has already been said, and is recognized by you folks, must operate safely and efficiently. Therefore none of my comments should be interpreted to mean that we are in any way opposed to the Waste Treatment Plant but we do care about a facility that works, and works in a manner that does protect workers and the public.

I've had a role at Hanford since 1987, assisting numerous employees who have raised concerns about environmental safety, health, and management issues. Many of the employees I've helped suffered reprisal as a result of their attempts to raise these issues. Some where unjustly and illegally fired from their jobs. Others were harassed and discriminated against in various ways.

It is vital to Hanford's environmental remediation mission, that a safety culture is established and nurtured, so that employees can bring concerns forward without fear of reprisal. A culture of suppressed concerns leaves us guessing whether there might be hidden defects that could result in a failure of equipment or processes that could impact workers, the public, or the effectiveness of the mission.

Since 2002, we have worked with insiders from the Waste Treatment Plant, including experts who have raised issues about the design and construction of the facility. Most of these employees have been fearful about stepping forward because of the impact on their careers.

Our major concerns with the Waste Treatment Plant are simply stated. The quality and reliability of the Waste Treatment

Plant is suspect when employee concerns are effectively suppressed through the design and construction phase of the facility. Additionally, the recent decision to quickly close out unresolved design concerns for resolution at a later date perpetuates what we see as a "delay and deny" strategy that continues to set the WTP up for failure. While this decision may have met a TPA milestone and earned the contractor millions of dollars in fee, it does not inspire confidence in the motivations of the contractor and the government agency tasked with building facilities capable of vitrifying high-level nuclear waste.

Bechtel has a history of suppressing employees raising safety concerns. The Department of Energy itself has confirmed the existence of a hostile work environment at the Waste Treatment Plant in the 2005 report. The team from DOE interviewed 117 employees, and found that greater than 50 percent of the workers interviewed believed that their job would be in jeopardy due to their participation in that inquiry.

Most of the interviewees, the report says, mentioned other workers had issues but felt they could not risk their employment by coming forward. Roughly 20 percent voiced the belief that when individuals raise safety concerns, those individuals are targeted for future layoff lists.

Roughly 15 percent of the interviewees claimed that there were fear of layoffs of workers who reported issues to the Employee Concerns Program.

In 2008, the DOE also imposed a civil penalty for nuclear safety violations against Bechtel National, Incorporated, based upon the findings of a DOE hearing officer that a Bechtel engineer had been terminated after having raised nuclear safety concerns.

And more recently, on July 2nd, 2010, Dr. Walter Tamosaitis, the manager for research and technology for the Waste Treatment Plant, was removed from his position following his submittal of approximately 50 safety and technical issues. His abrupt removal sent a shock wave through the facility and led to that engineer's letter to this body.

CHAIRMAN WINOKUR: Mr. Carpenter, could you summarize fairly soon.

MR. CARPENTER: Sure.

CHAIRMAN WINOKUR: Thank you.

MR. CARPENTER: His concerns are identical to many of the issues being discussed at this meeting. Yesterday, in an apparent rush to publish a report in honor of this very hearing, the DOE's Health Safety and Security Office released a report on the Waste Treatment Plant safety culture, and in that report concluded:

"A number of individuals have lost confidence in management's support for safety, believe there is a chilled environment that discourages reporting of safety concerns, and are concerned about retaliation for reporting safety concerns."

So we have a number of questions to raise to you. In the interest of time, I'm just going to skip through to the last couple of questions, and submit material for the record.

One of our major concerns is why has the Department of Energy assigned the design agent and the design authority role to Bechtel, when Bechtel clearly has a potential conflict of interest in authorizing its own work? Our question is shouldn't these roles be separated and the design authority operate independently of the contractor responsible for building this plant?

And we would suggest that perhaps this body, the DNFSB, or the Nuclear Regulatory Commission, could fulfill that role.

At this stage in the game, we wonder

if Bechtel is the right contractor to build this facility, or continue building the facility, given the history of failures, reprisals, and missteps. We question whether or not DOE is providing the necessary oversight for a rigorous, robust and conservative design. Again, we appreciate the Board and its role here.

We note that for the first six years of design and construction, Bechtel lacked a vendor quality assurance process, and how can we assure that the quality of procured equipment and instruments is adequate without the necessary pedigree? Which leads us to ask the question, would this facility be considered for licensing by the Nuclear Regulatory Commission or would that license be denied due to its quality, indeterminate state?

And does the public deserve a plan that meets the safety standards of an NRC [Nuclear Regulatory Commission] licensed facility?

So to wrap up, after spending, from our perspective, spending ten years and $6 billion so far, designing and building the Waste Treatment Plant, it appears that nobody can really guarantee that this plant will operate safely or effectively.

The strategy of closing out unresolved safety concerns and waiting until operations begin, or at a later date, instead of resolving those issues before start-up, guarantees far greater cost increases and schedule delays in the long run. When the atmosphere has been poisoned by a history of reprisals against employees who raise concerns, the quality and safety of the plant will always remain indeterminate.

So again, I will submit the rest of my comments in writing, and thank you very much for your attention.

CHAIRMAN WINOKUR: Thank you. We'll be happy to accept it into the record, and thank you for your comments, Mr. Carpenter.

Now just as a matter of formality, there are a few names down here that I need to assure don't want to speak at this time. The indication is they may not. One is Mr. Jennifer Gregory. Liz Matson. John Williams. And Walt Tamosaitis.

Seeing nobody approaching the microphone, I'd like to say that this concludes the public comment portion of the session and I'll therefore close this session.

Anyone who wishes to submit written testimony should do so at this time, by giving a copy to the Board's general counsel, Richard Azzaro. Thank you all for coming.

We're recessing the hearing and we'll reconvene at 5:00 p.m. this evening.

(Whereupon at 2:03 pm., the above-entitled matter went off the record.)

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