UNITED STATES

NUCLEAR WASTE TECHNICAL REVIEW BOARD

FALL BOARD MEETING

September 19, 2007

Atrium Suites Hotel
4255 Paradise Road
Las Vegas, Nevada 89109

NWTRB BOARD MEMBERS PRESENT

Dr. Mark Abkowitz
Dr. William Howard Arnold
Thure Cerling
Dr. David Duquette
Dr. B. John Garrick, Chair, NWTRB
Dr. George Hornberger
Dr. Andrew Kadak
Dr. Ali Mosleh
Dr. Henry Petroski

SENIOR PROFESSIONAL STAFF

Dr. David Diodato
Dr. Daniel Fehringer
Dr. Bruce Kirstein
Dr. Daniel Metlay
Dr. John Pye
Dr. Gene Rowe

NWTRB STAFF

Dr. William Barnard, Executive Director
Karyn Severson, Director External Affairs
Joyce Dory, Director of Administration
Linda Coultry, Program Support Specialist
Davonya Barnes, Staff Assistant

I N D E X

P R O C E E D I N G S

8:00 a.m.

GARRICK: Good morning. I'd like to welcome all of you. This is our third full Board meeting of 2007.

Our meetings begin with introductions, and I'll start with my own. My name is John Garrick. I'm Chairman of the Technical Review Board, and my professional activities are in the risk assessment field and nuclear engineering, nuclear science. I want to introduce the Board. And, as I introduce the members, I ask them to raise their hands.

First, is Mark Abkowitz. Mark is Professor of Civil Engineering and Management Technology at Vanderbilt University, and Director of the Vanderbilt Center for Environmental Management Services. Mark Chairs the Board's Panel on System Integration, and is the Board's technical lead on transportation.

Howard Arnold. Howard is a consultant to the nuclear industry, having previously served in a number of senior management positions, including vice-president of the Westinghouse Hanford Company, and president of Louisiana Energy Services. Howard chairs the Board's Panel on Preclosure Operations.

Thure Cerling. Thure is a Distinguished Professor of Geology and Biology at the University of Utah. He is a geochemist, with expertise in applying geochemistry to a wide

range of geological, climatological, and anthropological studies. Thure is our technical lead on the Natural System.

David Duquette. David is Department Head and Professor of Materials Engineering at Rensselaer Polytechnic Institute in Troy, New York. His areas of expertise include physical, chemical, and mechanical properties of metals and alloys, with special emphasis on environmental interactions. David is the Board's lead on Corrosion.

George Hornberger. George is the Ernest H. Ern Professor of Environmental Sciences, University of Virginia. His research interests include catchment hydrology, hydrochemistry, and transportation of colloids in geological units and media. George co-chairs the Board's Panel on Postclosure Repository Performance.

Andy Kadak. Andy is Professor of the Practice in the Nuclear Engineering Department of the MIT. His research interests include the development of advanced reactors, space nuclear power systems, and improved licensing standards for advanced reactors. Andy is the Board's technical lead on Thermal Management and where the water goes.

Ron Latanision is absent. He is preparing for some hearings on Davis Besse, but I'd like to introduce him anyhow. Ron is an Emeritus Professor at MIT and a Corporate Vice President and Practice Director of Exponent's Mechanical Engineering and Materials/Metallurgy practice. His areas of

expertise include materials processing and corrosion of metals and other materials in different aqueous environments. Ron co-chairs the Board's Panel on Postclosure Repository Performance.

Ali Mosleh. Ali is the Nicole J. Kim Professor of Engineering and Director of the Center for Risk and Reliability at the University of Maryland. He has had a major role in many risk and safety assessments, reliability analyses, and decision analyses for the nuclear, chemical and aerospace industries. Ali is the Board's technical lead on Performance Assessment.

William Murphy. Bill is a Professor in the Department of Geological and Environmental Sciences at California State University-Chico. His areas of expertise are geology, hydrogeology, and geochemistry. Congratulations, Bill, on your recent appointment as full Professor. Bill is the Board's technical lead on the Source Term.

Henry Petroski. Henry is the Aleksandar S. Vesic Professor of Civil Engineering and Professor of History at Duke University. His current interests are in the areas of failure analysis and design theory. Henry is the Board's technical lead on the design of Surface Facilities.

Now, before we introduce the topics for today's meeting, I'd like to highlight some of the technical areas of

current interest to the Board. During the preclosure period, transportation and design of a surface facility stands out as current areas of interest and activity. This year, the Board has received several updates on related topics at its meetings in January and May. Today, we are going to focus on the transportation, aging and disposal canister, known as TAD, preclosure safety, surface facilities design and concepts of integration. And, I have asked Board member Mark Abkowitz to lead the discussion on the TAD's concept, and Board members Howard Arnold and Henry Petroski to lead the discussion on surface facilities design and concepts of operation.

Collectively, this Board meeting, and future Board meetings, will focus on DOE's effort to make transparent the integration and operation of the total waste management system, by which we mean from waste acceptance at the generator site to emplacement and preclosure operations of the repository, to performance demonstration and confirmation and, finally, closure of the repository.

The utility of the transportation, aging, and disposal canisters needs very careful review. Specifically, there is a need to establish the risk-benefit of the concept in the context of appropriate timelines and operations. The extent to which the TAD reduces the worker dose (a driver for the concept) as a result of less handling of the fuel is

dependent on such factors as the startup date of the repository and decisions on such fuel handling operations as on-reactor-site dry storage, dual purpose casks handling, spent fuel aging on pads at the repository, and possible need for interim storage.

The design of the surface facilities at the repository has not advanced to the point of demonstrating the optimization of the handling of spent fuel and radioactive waste in terms of facility complexity, operations efficiency, the costs associated with each, and radiation exposure. The issue is the need to address and make visible the impact of design on such performance measures as safety, efficiency, throughput and complexity.

Although the topic of thermal management is not on today's agenda, we do hope to have it on our agenda for the Board's winter meeting. It is among the more important issues when demonstrating an integrated waste management system. A technically based thermal management strategy has the potential to greatly simplify operations, particularly with respect to the need for waste aging pads and the frequency and duration of handling waste.

Other Yucca Mountain performance issues being closely followed by the Board include degradation assessments of the waste packages, radionuclide source term analyses, water infiltration rates, and long-term, that is, greater

than 10,000 years, long-term radiation dose assessments at the accessible boundary of the repository.

Finally on the matter of integration of the total waste management systems, our concerns are not only with the integration of activities within the Project, but also the integration of the project itself with other industrial entities. An example of activity integration is the linking of data and lessons learned from the site characterization program and exploratory tunnel operations to the design of both surface and subsurface facilities. The presentations today are intended to support the Board's desire to have transparency of all of the activities and the operations that affect the overall waste management system.

Now, let me briefly review today's agenda. As is customary, we will begin with an overview, both of the overall Office of Civilian Radioactive Waste Management program and, more specifically, the Yucca Mountain project. That overview will be followed by an update on the final performance specifications for the TAD by DOE. After a short break, we will hear presentations from industry representatives on the development of the TAD design. And, following these updates on TAD development, we will hear a two-part presentation of surface facilities design and operations.

Following lunch, we will have a presentation on the

status of the Preclosure Safety Analysis. The Board is interested in the general framework of the analysis, how the different scenarios are aggregated, the approach to importance ranking of safety issues and the development of the nuclear design basis for safety.

As usual, following the presentations, we have scheduled time for public comment, an aspect of our meetings that is very important to the Board. If you would like to make a comment at that time, please enter your name on the sigh-up sheet at the table near the entrance of the room. And, of course, written comments are accepted and can be submitted, and they will be made part of the record.

Some of you have asked about questioning during the course of the presentations. Our preference is for you to write down your questions, and submit them to either Davonya Barnes or Linda Coultry. They're in the back of the room. We will cover as many of these questions as time will permit.

As we get into the presentations and discussion part of our meeting, it's important to know about how the Board tends to operate. Board meetings are spontaneous by design. We express ourselves freely, and we want to be able to continue to do that. So, when Board members speak extemporaneously, it is important to realize that we are speaking on our own behalf, and not on behalf of the Board. And, we'll try to distinguish between Board member positions

and positions taken by the Board.

As a final note, I am going to ask all of you to turn your cell phones and pagers to their silent mode to minimize any interruptions.

And, now we are very pleased to have Ward Sproat with us today to give us the overview of the program and the project.

Ward?

SPROAT: Thank you, John. Good morning, everybody, and welcome. And, thank you for the invitation to come and speak to the Board again this morning.

It's been just about exactly a year since my first appearance in front of the Board as the director of the program. And, at that time, I laid out to you the four strategic objectives that I've laid out for the program during my tenure in this office, and I laid out the best achievable schedule, which is consistent with a number of major milestones and deliverables that DOE needs to deliver to move the program forward.

In my time in this program, it seems like every time I get a chance to talk in public, I am continuously reminded by somebody about how people have heard DOE say we're going to do "X", we're going to deliver "Y", and it never happens. And, people always love to bring that up. Well, I'm here today to tell you and give you a report on

where we stand in providing the deliverables that I said we would provide a year ago, and where we are on the schedule to do that, and to let you ask me whatever questions you want about where we're going and what we're going to deliver from the program.

May I have the first slide, please? We're entering what I'm calling the period of delivery. And, what I'm going to talk about on this first slide is a fairly substantial list of major deliverables that this program needs to deliver to get to submittal of a license application to the NRC, including the license application itself. And, I want to run you through all the things you're going to be seeing coming out from the program over the next nine months, or shorter, because it's a substantial amount of work, all of which are absolutely necessary to support moving this program forward. And, I'm here to report to you that they are all either on or ahead of schedule with the requisite quality that we need to defend them in the public arena.

So, the first one is the Licensing Support Network. And, I think the Board is very aware of the Licensing Support Network, a rather large and extremely expensive tool to support discovery and litigation of the license application for Yucca. All the parties are required to certify their systems and their submittals to the Licensing Support Network and their processes for putting documents and keeping the LSN

updated.

DOE attempted to certify the LSN several years back, and failed miserably for a number of reasons. We are in the neighborhood of between four and six weeks away from certifying the LSN. The regulations require the LSN to be certified six months prior to license application submittal. The date I gave you last year at this time is we'd certify by December 21st. I'm going to tell you we will certify sometime in October, and it could be early October.

Right now, on the LSN, we've submitted about 3.5 million documents. So, despite what you might hear from other people about, you know, DOE is hiding things and they're not putting things in the LSN, 3.5 million documents is a lot of documents.

We have approximately 8,000 documents that we've identified that are currently going through the update process to be loaded on the LSN. We expect that set of documents to be completed in the next two or three weeks, at which time I will do a final check of all of our internal certifications, our internal check lists, in terms of making sure we've done all the internal reviews, documentation that we need to have to be able to certify the LSN. And, I expect to be able to do that, as I said, sometime in the month of October. That will be the first major step forward towards the license application.

I told you last year that we were going to need to revise the Environmental Impact Statement for the repository, as well as for Nevada Rail, and that our target date for doing that was going to be approximately nine months prior to LA submittal. The Supplemental Environmental Impact Statement, the Draft Supplemental Environmental Impact Statement for the repository is at the printer. It's been signed out. It will be released to the public as soon as it comes out of printing, sometime probably the first week in October. And, then, the notice of public availability will go out as soon as that distribution is sent out to the various parties.

We will be holding hearings during the last quarter of the year here in Nevada and California and in Washington. We're going to provide a 90 day public comment period per the request of the counties and some of the intervenors. And, it's a high quality product, and Dr. Jane Sommerson (phonetic), who led that effort, with her team, did an outstanding job. So, the Supplemental Environmental Impact Statements are on schedule, and they will be out as we said they would. And, they will be there to support the submittal of the license application about nine months from now.

Something that's not directly tied to the license application, but one of the things I told you that I said I would do when I came in, when I talked to you last year at

this time, was three independent assessments. One was on the engineering processes that the program uses. How good are our engineering processes on design configuration, management design control, that type of thing. We brought in a team led by Longenecker and Associates, but they were really an integrator. They brought in a number of senior utility nuclear industry executives with engineering and plan experience. They came in for about three months. Their report is in printing right now. I'm not ready to go through the detailed results of that report, but I can tell you that it had a number of very positive findings. Most of their findings and recommendations are associated with inefficiencies in the way we're doing our engineering, not breakdowns in the processes. And, so, we will be releasing that report to the public probably sometime in early October.

The next report you're likely to see--I'm doing this in kind of a chronological sequence of expectations--the next report you're going to see is our release of the TSLCC, the Total System Life Cycle Cost Analysis. This is something that was last done and updated and released in around 2001. And, this is an estimate that says based on the current design, on the amount of fuel that we're going to have to dispose of, what's the estimated total cost of the system. This is going to be in constant 2000 dollars over 100-some year period, and that is currently in final draft form.

We're still making some editorial comments on the final draft, so I don't have an exact release date for that yet, but I expect it to be in October, November time frame.

It is going to show an increase over what the 2001 TSLCC was, not unsurprisingly, but we will be very clear on what the key drivers are. And, two of the key drivers are, number one, there's a lot more fuel to get rid of. The assumptions back in the 2001 study, that was based on the current fleet of operating plants and the expiration of their current operating licenses. Well, since then, as you know, many plants have gotten life extensions. And, so, our projection of the amount of spent nuclear fuel that needs to be disposed of is up substantially, and that's one of the major cost drivers in terms of increase in the cost of the total system.

Obviously, inflation is another driver, and some revised estimates in terms of material costs, staffing costs for running the repository, that type of thing, are also secondary drivers. And, we will explain all that when it comes out. But, that's a major study that you should expect to see sometime in October, or so, and it will show that the total cost of the repository over its life will be higher than what was estimated in 2001.

Yes?

KADAK: 2000 dollars?

SPROAT: Constant 2000 dollars.

KADAK: Why not 2007?

SPROAT: Because the previous report was in constant 2000 dollars, and we want to make it easy for people to compare the old report with the new report. And, you will see the factors in there. If you want to do the math to escalate it up to 2007 dollars, you can do that. We're trying to make this so that people reading the old report and the new report can see the differences in what's driving it.

One of the other independent assessments I talked to you about last year was an independent assessment of Quality Assurance, both the programs in terms of how the programs are designed on paper, and how the programs are being implemented in the major organizations, DOE, BSC, SNL. That assessment is well underway. We're probably about a month or so from having that report finalized. We will release that report to the public also, and probably about that time, the Board may want to have a report on that, and we will be glad to do that. So, I'm not prepared to tell you yet exactly what that report says, because the assessment is still in progress, but you can expect to see that report sometime late this fall.

The next report that you're likely to see, and the timing on this is somewhat variable, not because--let me just say the timing on the report is variable--is the Fee Adequacy

Assessment. The Nuclear Waste Policy Act requires the Secretary to evaluate whether or not the 1 mil per kilowatt hour fee imposed on the nuclear generators to pay for the repository is adequate. And, this Fee Adequacy Assessment was last released to the public in 2001, and we intend to release the updated version of this either late this year or early next year. It depends on exactly how long it takes us to finalize the report, and the recommendations in it.

It will obviously be based on the updated TSLCC that I just talked about. I can't tell you yet what that report is going to say, but it will be an honest assessment of whether or not the 1 mil per kilowatt hour fee is adequate to build the repository as the current funding mechanism for the repository is structured. It will not be necessarily just based on the current and projected balance of the nuclear waste fund, which by the way, the current balance of the nuclear waste fund is about $20.5 billion, and it's generating a return of about 5.3 percent a year, which I'm not using or seeing right now.

So, I can't tell you exactly what the Fee Adequacy Determination report is going to say. I can't tell you exactly when I'm going to release it, but you will see it, and it will be released sometime probably in the next six months, or so.

Another report that you're going to see probably in

spring time, we have not set a firm date on this yet, is the Second Repository Report. The Nuclear Waste Act requires that the Secretary report to Congress on the need for a second repository prior to January 1, 2010. Well, we're going to report to Congress in 2008. This is kind of one of those reports like where you already know the answer. It's a matter of how you're going to present it. Everything stays exactly the way it is right now, 70,000 metric ton limit on Yucca, current operating fleet. That 70,000 metric tons will be fully allocated sometime when the spring of 2010 refueling outages are over. With that set of reactor core discharges in early 2010, Yucca is full.

So, we already know kind of like the final answer on what that report is going to say. Exactly how we say it, the options, how we present the options to a second repository, that we still need to work on. But, obviously, the report will have a lot of math behind it, and how we project the discharges and the capacity of the mountain, and all that kind of thing, but, we are going to issue that report next year, and we already know the primary answer. How we present it and what the options are going to be to that answer is still not clear.

Then, the Final Environmental Impact Statement for the repository and the rail line, Nevada Rail Line alignments will be issued probably in June.

And, then, finally, the license application. What I'll say about the license application is I've been very clear, very public about putting out front that we're going to get that license application into the NRC by Monday, June 30, 2008. And, I'm telling you we are ahead of schedule in doing that. How ahead of schedule we'll be come March or April remains to be seen, but we are ahead of schedule to meet that date, and we will meet that date.

So, those are the reports and the deliverables that you are going to see coming out of OCRWM over the next nine months. And, I think you can see why I'm calling it the Delivery Season. These are going to be clearly scrutinized heavily. I'm sure there will be a lot of public posturing by various people when they come out, but rest assured that we are not producing these with the idea of we've got a schedule and we've got to get out whatever we have. We are putting a lot of time and a lot of effort to make sure we have very high quality documents that meet the needs of both the regulator and the stakeholders in defining this whole program. And, so, I am very optimistic, well, I'm more than optimistic, I'm certain we will make this happen on this schedule.

So, if we can go to the next slide? Let me give you an update on key issues that I'm paying attention to, and the Board probably would be very interested in also.

The first is fiscal year ’08, which starts in two weeks, and the appropriations and budget situation for that, which obviously is important because to complete the Environmental Impact Statements, complete the engineering that’s supporting the license application, support the science, work product completion that’s supporting the license application, and the writing of the license application itself, all that is going to be paid for out of the fiscal year ’08 budget.

The President asked for $494.5 million for Yucca for fiscal year ’08. The House of Representatives voted down an appropriations bill that gave us all of that money. I would like to point out, in case you missed it, that while the Energy Appropriations Bill was on the floor of the House, there was an amendment to the bill offered by Congressman Porter here in Nevada to basically strip out Yucca Mountain funding. That amendment was defeated by 351 to 80. Now, people have various opinions about the political support and the level, it is there bipartisan support in Congress for Yucca, and I am a political neophyte, but I’m smart enough to help you get 351 votes in the House of Representatives on anything, that’s pretty good bipartisan support. So, very good support in the House.

In the Senate, the Energy Appropriations Committee voted out $50 million less, reported out $50 million less

than we asked for at $444.5. They added in another $1.5 million for Inyo County in California for their drilling program. So, they reported out $446.1. The Senate has not brought their Energy Appropriations Bill to the floor yet. It's not clear when that will happen. It is highly unlikely that it's going to happen before the end of the fiscal year, so we're expecting a continuing resolution for some period of time into '08.

And, that continuing resolution would be at this year's funding number, which is $444.5, $50 million less than what we asked for, about the same as what the Senate voted out. What I'll tell you is is that we have planned our '08 spend plans and work plans for that number, the $444.5. And, so, based on that, I do have a confidence level that we can get this license application in as we said we would. We'll have to see what happens with the continuing resolution. We'll have to see what happens with the Energy Appropriations Bills. No way for me to predict that, and I'm not going to try, but overall, that's where we stand for funding for '08, and we have our spend plans and our business plans set at $444.5, and that's what we're going to start executing as of October 1st.

The license application. All I'd like to say about that is it is on schedule, and actually a little ahead of schedule, and that we are incorporating the results. We have

completed the Independent Assessment that I said we would do on that. We received a several hundred page report from our Independent Assessment team that had in excess of 20-some people on it, who looked at the previous draft license application from the 2004-2005 time frame, and generated several hundred comments/questions based on that. All of those comments and questions have been given to the LA writing team, so they have gone through all of them. And, they are dispositioning all of them as they are writing the license application.

So, we have a very high confidence level that that was a very worthwhile effort that is informing our content and style on the license application, based on this independent review by a number of very experienced people looking at the previous revisions.

Around the organizational issues, as you know, one of my second strategic objectives is about getting the DOE organization set up for long-term success. And, let me just talk about quality for a minute. Anybody who's been involved with this program knows that the program has had a set of issues with quality assurance in the past. And, I would invite you, if you haven't, to go to the GAO website and go under the Department of Energy GAO reports, and look at their recently released report on Yucca Mountain, which was posted on the website about four weeks ago.

And, this report was a followup to their previous report that was done, I think, in 2005, 2004 or 2005, on quality assurance and management of the program. And, I would invite you to read that. That study was done. The GAO team was in for almost three months. They were in Washington, they were out here, and if you are an experienced Washingtonian, knows that GAO does not like to write generally favorable reports when they look at other agencies. I would invite you to take a look at that report, and see the conclusions GAO has drawn regarding the turnaround the program has made in terms of management, in terms of quality, in terms of a number of things that GAO found problems with when they looked at the program two and a half or three years ago.

Their primary issue for the program is that, two things, one was it's too early to tell whether or not the license application is going to be a high quality license application. And, that's true. You know, we're in the writing stage. And, they had interviews with NRC and they asked NRC if they thought we were going to give them a high quality license application, and, of course, the NRC said don't know, haven't seen it. So, the GAO was a little frustrated. They couldn't draw any conclusions about the perceived quality of the license application that's going to come out.

And, the other thing they were just questioning was given this turnaround in the program, and the progress that's being made, can it be sustained after the Director leaves, which is a valid question. But, I made it very clear to them, you'll see my letter to them in the back of the report where I addressed that issue straight on, and said that I'm spending 50 percent of my time on the selection, the development, and the training of my senior leadership team, the senior FED leadership team. So, when I leave, that team is going to be taking this program forward without me being there, and they will do just fine. So, I'm very confident that when I leave the program, it will not have what I'd call reversion to the mean, from where it was before.

In terms of personnel, we have made some personnel changes. Paul Goen is my principal deputy, has moved out west to California to take the Director position in charge of the Stanford Linear Accelerator program out in Palo Alto. His family is from back there, and his wife's family is from back there, so they decided to make a move.

Cris Kouts is going to be up here in a minute and talk to you, who has had a very long history in the program, is my acting principal deputy director, and Chris knows more about this program than I certainly ever will, and I'm very comfortable with him in this role as the acting principal deputy director. I am conducting a search, and we will do a

set of structured interviews of a number of senior FED folks, both from inside the program and outside the program. My intent is to select my permanent principal deputy by the end of the year, but I'm not in any rush because Chris is pretty darned good, and he is a candidate clearly for that position. So, you need to be aware of that change and that potential change in that key leadership spot that's going to be heading up this program after I leave.

Paul Harrington, who you've met, was selected as the Director of Engineering for the program. So, very, very happy with that selection, with his background. Somebody who you have not met, but I'm sure you will, in the past, I have just hired in a very recently retired Navy Captain, Jim Hollrith, who ran the Navy Civil Engineering Corps, built bases in Europe and a number of other facilities. Very strong construction project management leadership background, and he is a very valued addition to my senior management team, and right now, he's moving into the position that's in charge of actually building the place, building the repository, and he's got the background and the leadership skills to pull that off.

So, my message here is that I am paying attention to the organization. I am paying attention to the people who are going to be here after I leave, and I've got very high standards in who I put in there. So, I don't have the same

concerns as GAO does about what happens after I leave, and I've got a lot of work still to do before I do leave to make sure that management team is cemented in place.

The last thing I want to talk about just briefly, and I've already talked about to some extent, is the Nuclear Waste Fund and the Fee. This issue of what I call Yucca Finance 101 is something that has taken me a full year to really start to comprehend and understand. If you have a bank account, like I have with the Nuclear Waste Fund, of $20.5 billion, and you do the Total System Life Cycle Cost analysis and the Fee Adequacy Assessment, and you run all sorts of scenarios, and you take a look at how that money will last and, you know, in terms of the cash flow needs versus how much is in there, and the interest it's bringing in, and the fees bring in, it looks pretty good. It really does.

The problem is is that the program doesn't have access to that fund, and when Congress set up the Nuclear Waste Fund and set up the fee, it was very clear that their intent was, was that this program not be saddled with the annual appropriations process and not be saddled with the competing against all other governmental needs and Department of Energy needs for Energy Appropriations on an annual basis. They recognized that they're going to build a repository that has required cash flow between $1 ½ to $2 billion a year, you

needed to have a certainty of a revenue stream to get that program built, executed and build that repository on a schedule that made sense.

Unfortunately, when the Gramm-Rudman-Hollings Act got passed in the mid Nineties, the Nuclear Waste Fund fee was classified as mandatory receipts. The program itself was classified as a discretionary program. And, the law does not allow mandatory receipts to be used to pay for discretionary programs. Therefore, now, we have a disconnect between how the program gets funded and how the program, where the money comes from, how the money gets appropriated to fund the program.

As a result, each year, the fee comes in. That amount of the fee that doesn't get appropriated that year goes into the Waste Fund, and the Waste Fund continues to accumulate, build interest. Unfortunately, the interest and the unappropriated Waste Fund fee shows up in the Department of Energy's appropriations bill from the House and the Senate as an offset, which means essentially that money is being used in a current year offset in the year that the interest accumulates, and the year the revenue comes in. So, essentially, in order for me to tap, or for the government to tap the Nuclear Waste Fund to build the repository, whatever amount of money comes out of there has to be scored. In other words, it's deficit spending, which certainly was not

the intent when the Nuclear Waste Fund was set up, and the use of the fee was certainly not set up to be used that way.

Well, suffice it to say in my testimony in front of both the House and Senate Appropriations Committees, I have--there is a small group of people in D.C. who are very familiar with the budget process, who understand this, but most people don't. And, I have made it one of my key objectives in my remaining time here to go after this issue of funding the repository with the revenue stream that exists and was set up by Congress specifically to do this. Because right now, just to give you an idea, the appropriations for Yucca have been in the neighborhood of between $350 to $500 million a year, and the budget targets that are set for the out years remain in that same range.

When we re-baselined the program, over the last six months, when we took a look at the new design, the new schedule, the staffing levels, and we re-baselined the entire program with the new milestones, what that shows is that the required cash flows on an annual basis are between $1 ½ to $2 billion a year through 2023, starting in '09. And, clearly, the continuation of the way things have always been will never get us there. It just won't happen. So, I'm very pleased so far, that as I have talked about this with the Secretary and the Deputy Secretary, I've got very strong alignment and support in the Department of Energy to go get

this fixed from our CFO, our general counsel. I've had discussions up on the Hill with people who are very interested in trying to get this fixed, and we actually are going to have a hearing in the House Budget Committee in early October on the Nuclear Fund Liability issue. So, there is interest up there to go and make this issue visible, and to see what we can do to actually get it fixed.

I am not as confident that I'm going to be able to get this fixed in the next 14 months as I am that I'm going to get the license application in, but I'm going to give it a damn good try.

So, that's kind of my quick overview, if you will, of where the program is, what we've got coming up, what I'm paying attention to, and we're serious about making this work. So, with that, I'm going to open it up to questions from the Board.

GARRICK: All right, questions from the Board? Andy?

KADAK: Thank you. A couple of questions. You didn't mention EPA rule. Could you give us an update on where that stands and how that affects your license application?

SPROAT: The question is regarding the EPA rule, and I think most people who have followed the program know that by the Nuclear Waste Policy Act, the Environmental Protection Agency has the responsibility to generate the requirements for the long-term exposure limits for the repository, and

that NRC has to adopt those standards into their regulations. And, EPA issued their regulations several years back. They were challenged in federal court. There's an aspect of part of those regulations associated with long-term exposure and peak dose that were overturned.

EPA has redrafted the standard, has sent it out for comments. The comments have been incorporated. It's in final draft. It is in interagency review, and I believe it's down to one--there are discussions going on between the Department of Justice, EPA, OMB, I believe DOE is in those discussions. I am not in those discussions, so I don't know exactly all the details. But, we do expect that to be issued shortly. Of course, I expected that to be issued shortly last December, but it's out of our hands. So, I don't know exactly when it's going to get issued.

What I can tell you is it does not have an impact on our license application, because we know whatever the final number is that EPA puts out, and the NRC adopts, there is greater than a 50 percent chance it will get litigated again, and the end result of that litigation is at least three years off in the future, if by then. So, what we've done is when you see the Environmental Impact Statements come out, and when you see the license application come out, you're going to see the TSPA runs that show long-term postclosure performance out to a million years plus. You'll

see where the area of peak dose is, and you will be able to take that chart and you will be able to see when a final number gets finalized, where is that final number relative to the chart. And, the NRC will need to do that before they actually issue the construction authorization. But, I don't need it to get the license application in.

GARRICK: Mark?

ABKOWITZ: Abkowitz, Board.

Ward, I wanted to explore with you a little bit what happens after June of 2008, what your plans are. My understanding is there's no requirement that the NRC make a docketing decision within a specified period of time. And, given the rapid pace at which you're still trying to resolve issues, for example, around surface facility design and preclosure safety analysis, I can envision a scenario where your application might be considered incomplete, in some respects, in terms of how the NRC is prepared to review an application. And, so, consequently, it's certainly realistic that there may be a period of time here where the need to prepare and submit additional information will be essentially recommended from NRC to DOE, and there will be a need to respond in some timely fashion.

SPROAT: Sure.

ABKOWITZ: Could you go into some detail as to what happens with your leadership and your activities planning

following June of 1008?

SPROAT: Sure. Good question. First of all, in terms of where we stand right now, we're having a series of what we call technical exchange meetings, which are public meetings, with the NRC staff on a number of very specific technical issues. Had one just last Friday that I attended on license application content around specific issues, including PCSA. So, we are, we believe we have a very good understanding of what their expectations are. We're trying to give them, as best we can, a good picture of what our approach is in terms of level of detail in the license application.

I fully expect, contrary to some public statements I've read that other people have made, this is going to be a complete application. I think, as the Board knows, when I first got here, there was talk at that time that there would be multiple parts of the application. Now, an application just covers certain early--certain surface facilities, and something else comes later, I said no, we're not doing it that way. This is one, full, complete application. And, as we are writing this license application, we are being very judicious in terms of reviewing acceptance criteria that the NRC has in NUREG 1804 about the level of completeness they expect to see. So, I have a very high confidence level that this LA will be complete to meet their needs for docketing.

One of the ways I intend to make sure we have

enough time while I'm here to get this docketed is get it in before June 30th. And, that's why we are working the internal schedules sooner than that date, and that's why I'm able to tell you right now we're ahead of schedule compared to a June 30th date. But, I'm not ready to tell you yet exactly when it's going to happen. It's still too far out in the future.

The discussions we had with the NRC in our technical exchange just last Friday, the question of the acceptance review period, which is that period, once we put it in, they have to decide whether they're going to accept it for docketing, we talked quite a bit about that period in terms of what the NRC staff would do and the kind of detail they would expect to see. And, they told us, you know, they expected that that review could last up to six months. They said it could be shorter than that, but because of, obviously, first of a kind regulation, first of a kind facility, wide range of technical issues, and, just from a resource constraint standpoint that they have in terms of people they would have to read the license application and the Environmental Impact Studies, that it very well could take up to six months. And, so, we recognize that and we are prepared to support their acceptance review to get them information they need to do that. But, part of my strategy is get it in before June 30th. I'm not sure if that fully

answered your question or not, but that's about the best I can do right now.

GARRICK: Ali?

MOSLEH: The Total System Life Cycle Assessment, how much of that depends on the level of detail that you have in the design? I assume that that's an important valuable.

SPROAT: It is. What we did is the new baseline for the program that we issued in, I guess, March or April is based on the current design. And, we got down to the point where we had, we've estimated, quantities of structural steel, concrete, rebar, and for the buildings themselves, the shells of the buildings, the thickness of the walls, those type of things, we've been able to estimate those fairly well. So, the TSLCC, when it comes out, will be reflective of the current design.

Now, obviously, what we did is the original estimates were developed by BSC, our contractor who has designed the buildings, we brought in Burns and Rowe, who has nuclear construction experience, to do an independent review. And, they reviewed things like, you know, for a building size of this footprint, nuclear seismic structure, are our estimated quantities for concrete, steel, you know, cable, those type of things, are those appropriate or not, and we actually made some changes based on that review. And, then, plus, we made a decision that we would include contingency

and management reserve at a level that allows us to have an 80 percent confidence level in the results of the estimate. In other words, there's an 80 percent chance that the actual cost will come in at or below the numbers we've estimated.

So, we have a pretty good, like I said, we have an 80 percent confidence level that we've got a pretty darned good defendable cost estimate of the facilities that have been cranked into that TSLCC. That is one of the major cost drivers.

Quite frankly, some of the other major cost drivers are just the number of TADs and casks and transportation overpacks. I mean, those are significant costs, and the waste packages. The more fuel, the more waste packages, the more metal that you're going to stick in the ground. So, those are major revisions from the previous cost estimates that were done back in 2001.

GARRICK: Ward, you were fairly optimistic about the second repository report as to what it was going to say, or what have you. Is there an activity that's ongoing in that regard? Specifically, is there a team working on that report now? And, is there equivalent of a table of contents or a spec on what that report is going to be beyond what has been mandated by Congress?

SPROAT: No, not yet, John. The underlying calculations in terms of what's the current spent fuel inventory, what is

the inventory we're projecting by certain dates from each plant, we have that data and we've had it for a long time. That's part of what Chris Kouts' group does. I mean, they keep track of each plant, what its discharge rates are, how many bundles we expect to come out, and so we have a pretty good forward looking projection of spent fuel inventory, which is kind of the basis of what is going to drive the conclusions in this study and analysis. So, that's there for us to draw on.

But, the actual writing team, in terms of putting together the table of contents, and the selection of options to be discussed, alternative options to be discussed, we haven't done that yet. So, you know, we'll start that--we budgeted that activity in fiscal year '08, so I would expect we would pull that group together and get them started sometime this fall.

GARRICK: Thank you. Andy?

KADAK: Kadak, Board.

The budget for next year is going to be $444 million. That's a lot of money. We've been hearing talk about layoffs at various DOE contractors, and so forth.

SPROAT: Yes.

KADAK: And, we're also kind of interested in the status of the tunnel, and making sure that that's useful during the period of license review. And, I guess the question is what

is it that you're going to be doing in the next couple of years while the NRC is reviewing the application for $444 million?

SPROAT: Well, let me just talk about--there's a couple different pieces to your question. Let me talk about '08, and that funding level and layoffs. I think I told the Board before last time we got together that there would be layoffs on the program, regardless of the funding level for '08, because our appropriations for '07 were at the $444.5 level, but we had $100 million of carry-over. So, we have a burn rate through '07 of 544. And, even if we got the full 495 that the President requested, that's a $50 million reduction. We're not building anything, so, that's strictly salaries. So, there would have been a layoff anyway.

What we are doing now, actually what we did this summer, as we set the spending plan at $444.5, the lower of the House and Senate mark, we put our plans together to be very clear about what our head count needed to be and how it needed to come down going into fiscal year '08, and then after we're in fiscal year '08, with the primary objective being get the license application completed, and its supporting engineering and science work products. That's where the money is going.

And, quite frankly, we have taken money away from upkeep, quote, unquote, of the tunnel. Now, there are still

scientific collection activities going on in there, and we make periodic entries to collect that data, check on the data loggers, and that type of thing. But, it's not a priority for us right now.

Now, as we go forward in '09, and I can't talk yet about what the budget request is that we've sent to OMB for '09, but it's going to depend on so what do we actually get. The program plan that we've laid out that gets us to an opening date somewhere between 2017 and 2019 is that there is a significant ramp-up in spending starting in fiscal year '09. If we don't get that significant ramp-up in spending, the program is going to extend out. We'll be very clear with Congress every year of this is what we asked for, this is what we got, here is the impact on the opening date of the repository.

So, we're going to treat this like we would in the private sector. If you're running a major project and go to the board of directors and you say here's what I need, and they say well, you can't have that much, you can only have this, the next answer is well, here's the impact of that. That's what we're going to be doing, telling Congress each year. So, in terms of what we will be doing in '09, clearly number one is defense of the license application, retention of the scientific expertise, retention of the engineering expertise, and the legal expertise to defend the license

application for the three, four, or five year proceeding that we're going to go through. That's where the primary focus is going to be.

But, in order to maintain critical path on the program on the baseline we laid out, there's a lot of other work that needs to go on, the design and construction of Nevada Rail, the detailed design of the repository and the surface facilities, the procurement of the TADs. There's a lot of other stuff that is in that cash flow that if the funding isn't there, we'll get delayed, and the critical path just gets pushed out.

KADAK: Are you doing a review of--there are going to be layoffs--but, making sure that those critical people who have been working on this project, whose knowledge you really need, don't go away and work for some other industry or company?

SPROAT: As best we can. Absolutely. We put together a license defense targeted team list in both Sandia, BSC, so that we know by names who we want and what we want them for, and to make sure that we retain them as we go through this effort.

GARRICK: David and then Bill.

DUQUETTE: Normally, the Board doesn't get involved with economics, but you seem frustrated at not being able to access the Nuclear Waste Fund. The fact of--the calculation

tells me that the Nuclear Waste Fund is generating about a billion dollars a year in interest, or in return investment right at the moment. You're spending about half of that, which means that you're re-investing half, which seems like a nice economic model since you can't build anything until your license has been approved. So, it seems to me that the-- until the license is approved, you can't do major construction projects anyway. And, assuming that Congress will release some of the Nuclear Waste Fund for actual construction, it doesn't seem like it's that bad of an economic model. Now, it would be very interesting to see what your cost analysis looks like for the total project. But, I do think that as a citizen, rather than a Board member, that the economic model doesn't look that far off base.

SPROAT: You're right. If the economic model worked the way it was intended, but it doesn't. That $20.5 billion, the only way that would get spent and allocated to this project is if it was appropriated and scored as deficit spending. Congress has shown no interest in doing that, and the current basis through the appropriations process doesn't allow it.

The other supposition that we can't do any construction prior to a construction authorization is not clear, and I disagree with, particularly around Nevada Rail. Nevada Rail is on the critical path of opening the

repository, because we need the rail line to support construction. It is not under any kind of NRC licensing regime, and it's part of the construction and infrastructure that we need to get this thing done.

If you were doing this project in the most efficient way, which is somewhat of an anathema of the government, I understand that, but that's my job, is to get this done the most efficient way, you don't wait until you get your construction authorization and turn around and say okay, now, what do I need to do. Maybe you ought to put a road into the site, or maybe I ought to go bring transmission lines and have electric power at the site. You don't wait until then. You do it now. And, that's how we've built the critical path baseline of the program. So, we need money now to get that going, and that's what we intend to go after.

DUQUETTE: That's assuming the license application will be approved eventually.

SPROAT: I'm not going to wait until the license application is approved to get the infrastructure going that we need to build this on the shortest potential critical path.

GARRICK: Bill?

MURPHY: Bill Murphy, Board.

Last September when you spoke to us, you were relatively new to the program at the time, and one of the

points that you made was that you were interested to identify, according to my notes, key risk driving uncertainties. And, I'm particularly interested in those uncertainties in scientific problems that pose risks for the repository. And, I wonder if in the interim, and at this stage, you have identified scientific problems that are key risk driving uncertainties.

SPROAT: Let me answer the question in two parts. First of all, I'm not the right person to answer the question to the level that I think you want, because I'm certainly not expert or well versed in all of the uncertainties and uncertainty bands around key drivers in the TSPA. Other people are much better prepared to do that.

What I was speaking about then is that one of the issues I had a concern about was within the TSPA framework, from what reading I had done, was were our models consistent in the application of uncertainty and the characterization of uncertainty in the various parts of the model. And, so, one of the things I did is turn to Sandia, which is our lead lab and has responsibility for that analysis, and said I need you guys to take a look at how the various models in the TSPA are handling uncertainty, and do we have a defendable consistent approach to that across the set of models, the suite of models. And, they've done that and the answer is yes, and they've developed a very--I know they have developed

specific, I won't use the term procedures, but program guidance that's applied across the AMRs for doing that. And, that's the best answer I can give you because I'm not prepared to go any deeper than that. So, Sandia has answered my concern about that from the level I'm concerned about, which is consistency of approach.

MURPHY: Thank you.

GARRICK: Any other questions? Andy?

KADAK: I've got three semi-technical ones. Could you tell me what the program is doing relative to acceptance of MPCs or DPCs without repackaging? That's number one. What the program is doing--

SPROAT: You're assuming I can remember all three of these?

KADAK: Well, I'll remind you. What the program is doing on burnup credit, which is somewhat related, and what the program is doing relative, which is a cost driver, on seismic design, which from what we've read is enormous relative to surface facilities? So, it's acceptance of existing waste storage and transport canisters, burnup credit, and seismic design.

SPROAT: I'm not going to answer the third because whatever I say will probably be wrong. But, we have other people here who will be able to answer that. Claudia, we have somebody you think can answer that in a way that's--not

right now, but--okay, I'll probably want to do that on the record.

The issue of the burnup credit, there is--we think we have a path forward. There have been a number of exchanges, technical exchanges between the NRC and us on criticality analysis and burnup credit. I am not versed well enough in the details of that that I'd want to engage the Board on that myself. I'd want to have somebody else do that, and we'll see if we can do that later today or this afternoon.

On the MPCs, we have drafted a proposed amendment to the standard contract that basically says that for those who are willing to sign that amendment, we'd be willing to take their MPCs, you know, and put them in transportation overpacks and take them to Yucca, and open them up and then put the fuel in the TADs through our wet handling facility, if they're willing to use TADs. So, we are in negotiations with contract holders right now on incorporation of that amendment. So, we have told them we would be willing to take their MPCs.

KADAK: The one reason that we were concerned about the original plan of handling bare fuel was the number of fuel handlings taking place. So, what I was really trying to get at is trying to avoid the reopening of the canisters.

SPROAT: Right.

KADAK: So, no effort on that front?

SPROAT: It can't be ruled out. But, what I'd say is that given the number of those situations, that it's not in our baseline design that we'll describe in the license application. We have a wet handling facility to open them up, repackage them in the waste packages, and send them underground. So, that's the base design. Once we get through the licensing process and we see how that plays out, and we know what we can do and what we can't do, what potential limits we might have, if that makes economic and risk sense, there is no reason why we shouldn't be able to do that. But, we need to do more, some more homework before we're ready to do that, and I'm not willing to put that into the license application as the base design at this stage of the game, given the cost benefit of doing that at this stage of the game. We have not ruled it out. It's just not in the base design as we're going to describe it in the license application.

KADAK: As long as you have someone looking at it, I think that's a good thing. But, I'm not hearing a lot of words about even people studying the option.

SPROAT: We're not putting a lot of money into it now because it's not going into the license application. I've got to put that money somewhere else where I get a bigger bang for the buck. It's strictly a project management issue.

KADAK: Do you have a feel for the number of canisters that will be in storage casks at reactor sites by the time Yucca Mountain opens?

SPROAT: Very good question. Ask Chris Kouts that question when he comes up.

KADAK: He knows. I just wondered if you did. It's a big number.

SPROAT: I'm sure it is. I try not to remember big numbers like that. I remember big numbers like $20.5 billion in the Waste Fund that's not spent.

GARRICK: Okay. Any other questions? Any questions from the Staff? One question. Go ahead, Dan.

METLAY: Dan Metlay, Board Staff.

In August, you folks issued a draft national transportation plan, which was subsequently withdrawn. Do you have a sense as to when that would be re-issued?

SPROAT: It's news to me that that was withdrawn. That was sent out for comment, for public comment, and I think the public comment period is either open or just about done, and the intent is then take those comments and revise it and re-issue it. And, the intent is it's a living document that will continue to grow and expand as we get further down the transportation planning process. But, it's news to me that it was withdrawn.

METLAY: Okay.

GARRICK: All right. Well, thank you very much, Ward. That was a very interesting and comprehensive overview, and we know how tight your schedule is, and we very much appreciate your being here.

SPROAT: I appreciate the Board's interest. Thank you.

GARRICK: Thank you. All right, we'll now go into the next phase, which I'm turning over to Mark Abkowitz, and I'll point out to Mark that we're right on schedule, and he's obligated to sustain that high level of performance.

ABKOWITZ: Yes, sir. Thank you, John.

As Dr. Garrick indicated, we have a series of presentations here that will be looking at the TAD program, and an update on its development. The Board has been following the TAD initiative quite closely over the past couple of years, and has been particularly interested in the timeliness of the availability of a TAD canister, as well as its ability to handle the vast majority of commercial spent fuel.

The way we have the sessions organized today is we'll be hearing from two different entities. The first will be an update from Chris Kouts from the Department of Energy, following which we will take a short break, and then we will hear an industry update after we resume from break.

Chris Kouts really doesn't need an introduction because he's spoken many times before in front of the Board,

and I think Ward Sproat did an ample job of describing how important Chris is to the OCRWM program. But, let me just point out that in addition to his current capacity as Acting Principal Deputy Director of OCRWM, he has been with the OCRWM program for 22 years, which also makes him the curator of the institutional memory of the program.

So, with that as background, Chris, you have the floor.

KOUTS: Thank you, Dr. Abkowitz. Do we have a clicker or--it's going to be hard for you to do it, but--

While we're dancing around here, first of all, it's good to be back in front of the Board. I'm going to try to give you an update on where we are with the TAD canister development effort. As Ward indicated, I wear two hats. One is Acting Principal Deputy, but I also wear my other hat, which is the Director of the Waste Management Office, which is responsible for the development of the TAD concept.

We announced going to a primarily canister based approach for the acceptance of commercial spent fuel in October of 2005. And, there are a variety of good reasons why we did that. As the viewgraph indicates, it certainly supports the standardization of the handling of these materials at utility sites, through the transportation system and at the repository. It certainly simplifies our facilities at the repository, reduces our low-level waste,

and makes it a lot easier on us.

On the other hand, it does create some challenges for the utilities, and we're working to minimize those challenges as we implement the program.

Next slide, please. To go into the way back machine, we issued a preliminary specification for TADs and our vision of what TADs had to be in order for it to operate effectively at the repository, and also at utility sites and through the transportation system back in November of 2006, and we initiated a proof of concept design at that time.

We identified four qualified vendors, who are named on the screen here, who developed proof of concept reports. We essentially received those proof of concept designs back, and completed our review in March of this year.

Subsequent to that, we initiated a procurement after we had the proof of concept designs, we initiated a procurement effectively that allowed us to go forward to the final design effort. And, prior to initiation of that procurement, we issued a final specification. You might remember, we issued a preliminary one back in November. We issued a final in June. Actually, it was serendipitous with my attendance and presentation at an ACNW meeting at the NRC. We issued a press release, and at that point in time, indicated what the final specification would be.

Then, we issued a solicitation in July of this

year. I believe it was July, if you're interested in specific dates, July 11th. The specification went out on our internet site on the 19th, I believe, of June. We have received proposals. The solicitation closed on August 24th, and right now, we're in the process of evaluating those proposals.

And, if you're going to ask me questions about them, it's procurement sensitive, so I won't be able to answer them. If you're going to ask me how many proposals we received, I'll say I can't tell you. If you're going to ask me when you're going to make an award, all I can say is as soon as we can. So, that process is underway. It's procurement sensitive, and I really won't be able to discuss it, so I try to get those questions out of the way to save you the trouble of asking them.

Let's talk a little bit about the final TAD performance specification that we issued in July. It, as the preliminary one did, essentially delineates all the requirements that we feel we need for the repository itself to deal with our postclosure needs and our preclosure needs, and, also, there are a variety of aspects to that that make it a little easier to handle at the repository, and makes our surface facilities more efficient.

We didn't change the capacity going from the preliminary to the final. We're still at 21 PWRs and 44

BWRs, and if you're going to ask the question well, why can't we go to larger ones, as Dr. Kadak would say, when you look at the existing DPCs, they are substantially larger in terms of capacity than what we're looking at at the TAD. And, the issue that we have is that we feel that if a TAD is designed, manufactured, loaded and sealed in accordance with our requirements, that is disposable at Yucca Mountain. And, that is the subject of our analyses.

If we wanted to go to some other construct, we would have to go through that analysis and see whether or not we can make that case to the Nuclear Regulatory Commission. But, from our perspective, we feel the TAD works, and will work in our license application, and will be sustained in our review. To look at, you know, different situations, different concepts of canisters, and so forth, that would have to be a different evaluation.

Again, a lot of the issues that drove the TAD specification had to do with postclosure needs, what our long-term criticality materials are, and how they are arranged in the basket, and so forth. So, in order to make a change to that, you're going to have to go back and do a variety of iterations with our TSPA to see whether or not we can make the case for that. And, again, as Ward indicated, we are not essentially investing in that at this time.

KADAK: Could you answer the question for Ward in terms

of how many canisters or MPCs will be in storage at reactor sites by 2017 when the first canister is shipped?

KOUTS: Okay, let me try to answer it this way. Right now as of this year, there are about 9,300 tons in storage. But, I will say that probably less than half of those are transportable. A lot of them are in storage only overpack. So, the storage only overpacks are kind of off the table because you can't get them to Yucca Mountain. As we proceed into the future, obviously, that number is going to rise, and we do have projections for 2017 and 2020. I can't pull them out of my brain at this time. But, we do have those estimates available. It's a lot of fuel, and I believe in the 2017 time frame, we're looking at, ballpark, something like 17,000 metric tons that potentially will be in dry storage.

What our intent here is that if we can get TADs out in the marketplace, and effectively in the 2011, probably 2012 time frame, we can hope to encroach upon that amount that is being deployed at reactor sites. And, as Ward indicated, we are trying to provide incentives to the industry in order to utilize TADs. We've gotten some fairly positive feedback from those who we've talked to, and we're hopeful that we'll be able to penetrate that market, and hopefully reduce the burden as we go into the future, because, again, the TADs as we envision them are disposable.

They don't have to be repackaged, and we would certainly want as many of those deployed as possible prior to the time that we started waste acceptance.

KADAK: Thank you.

KOUTS: One of the big changes from the preliminary to the final spec had to do with the length of the canister. The original specification, the preliminary one that went out, basically was a one size fits all at 212 inches. We've allowed that to float downward to no less than 186. That allows a substantial greater amount of utilities to be able to be serviced by a TAD canister. So, that was one of the big changes from the preliminary to the final spec. The diameter stayed the same, roughly about 66 ½ inches. Next one, weight, was the same. Maximum average dose, this is all fed into our preclosure safety analysis calculations. This is with a shield plug at the top of the cask at 800 mr per hour, and there's also in the specification, it's allowed to go up to, I believe, 1 rem in certain areas of the cask. But, the average, of the top of the TAD, but the average has to be no greater than 800 mr per hour.

Borated stainless steel is the required neutron absorber for disposal. They need to be seal welded. They are handled in a vertical orientation at the repository. Also, we'll have a common lifting fixture for ease of handling. And, of course, organic, pyrophoric, and RCRA

materials are prohibited, which again are the requirements for our site.

What you're seeing now, a picture sometimes says a thousand words, moving pictures sometime say more, this is essentially how a TAD would be loaded, either at a utility site or at our wet handling facility. You just saw the canister go into the transfer cask. It's going into the pool. You'll see it will be about 20 minutes before you get 44 assemblies in here. We only do about two of these to demonstrate it. But, you'll see the assemblies being pulled out and into the canister, into position, and we would expect these same operations, and effectively, we want these designed to be essentially handled the same way that utilities handle dry storage in canisters on their site today.

So, with the second one, basically, what's going to happen is the transferred cask is going to be picked up out of the pool. It's put on first, and basically that's what happens at the pool. What we have here is, what you're going to see, is the welding fixture, first of all, it will have to be drained somewhat, drained and dried, and then welded, if you will.

Okay, that's the first vision I wanted to show you. The second one has to do with just the transfer of that to a dry storage in a vertical configuration. Basically, it's

being lifted on top of the aging overpack. The canister is being transferred in. We'll put a lid on. Actually, these are lifting features that will go in first, then the lid--no, the lid goes first, and the lifting features next. And, then, it goes out to the storage field, and, hopefully, not at this velocity, and placed into the storage field.

Okay, the next is how this can also be handled in a--that was a vertical configuration--I think we go to a horizontal configuration next, which is essentially the same process. You transfer the canister and transfer cask into the aging overpack. The lid is put on, and then it's put on trunions and let downward and taken out. You're probably familiar with that configuration. It's used at the various sites around the industry.

And, the last one is just transfer into a transportation cask. This would be at a utility site. It would be loading essentially to put it directly into a cask to take it to Yucca Mountain. These are the trunions for lifting features, and we have the inflatable impact limiters, and it goes off. We don't use inflatable impact limiters, but they look inflatable at this point. Our graphic artist had some fun with that.

So, those are essentially just to give you a sense of how these would be handled, both at utility sites and at the repository.

To summarize my presentation, the final spec can be found on our website at that address. The procurement, as I mentioned earlier, the solicitation was issued, proposals have been received, and they are currently under evaluation. And, I'll be happy to answer any questions that you may have.

Yes, Henry?

PETROSKI: Petroski, Board.

These computer schematics are interesting, but what about physical prototyping and physical testing of these operations, do you have any plans for that?

KOUTS: Actually, we don't feel that we need to go to a prototype phase. We think that this can go directly for use at reactor sites without going through a prototype. What we heard at the proof of concepts phase was that the vendors basically were doing analyses based on the current canisters that they had, and they're very comfortable with what's being done today. So, I don't think we need to go that extra step in order to go to a prototype. So, I think we're going to go directly from the design phase to licensing, and then deployment.

Now, one of the things I'll also say is that part of the requirements of the solicitation would be that the vendors need to couple with an industry entity in order to get these deployed as quickly as possible. And, we're aware that those contacts have been made, and we're going to make

sure that these--we're just not designing them with no place to go. We want this procurement to be such that in the various phases of it, that once it's designed and certified, that there is a path forward and there is going to be a site that these are going to be deployed at.

So, the bottom line is no, we're not planning on a prototype phase. We think it can go directly to be deployed at utility sites.

PETROSKI: Is there any new equipment or any of this transportation, or transfer equipment that's new to this? This is all existing technology?

KOUTS: It's all existing technology. It might be slightly modified for the sizes involved, but all this is being done all the time at reactors, and we made a special point in my presentations with the NRC, we're not doing anything new here. We expect to have the same types of operations at utility sites, use the same technology. We don't anticipate that there's going to be anything really new about this.

KADAK: It's Kadak again. It's a small MPC?

KOUTS: Right.

DUQUETTE: Chris, thank you for the presentation. I had a question on the proposals that went out and what the vendors can come back with. Is it to design, build specification, or just to build specification? And, I

wondered if things like the manufacturing process, the sealing process, materials of construction, and so on and so forth, are in the specification, or can the vendors come back and make some recommendations for better efficiency, better design, and so on and so forth?

KOUTS: Well, the specifications are the specifications, and they're not negotiable in terms of what we need at the repository site. For instance, if they came back and said, well, you know, what if we use something other than borated stainless? The answer is no, we need borated stainless in there, and that's driven from postclosure.

What we really are relying on is the vendors to design it, to license it, to have it fabricated with an industry partner, if you will, and have it deployed. So, at every step along the way, we're going to have to make sure that whatever they do is consistent with our specification. But, to the extent that they're consistent with it, the design is left up to them, the actual licensing would be left up to them, and the fabrication, and so forth. Now, we would have to confirm that if there are any tweaks associated, for instance, in the fabrication process, if anything that looks like it's somewhat out of spec, they have to come back to us to get a "mother, may I" and we would have to approve it.

So, to the extent that there are any changes, they have to be approved by the Department before basically they

can proceed. And, that would be the same case in the licensing arena. If, indeed, through REIs, the NRC asked questions and they want to change their design, for whatever reason, they basically have to come back to us to make sure that we're okay with whatever changes that might occur in the design during the licensing process. So, the Department is going to be intimately involved from the review standpoint to make sure that we're totally consistent with the specification. And, that's what our fixation will be, is it consistent with the specification. If it is consistent with the specification, then it will meet our needs. If it doesn't, then we're going to have to talk about that.

DUQUETTE: Duquette, Board.

Obviously, I understand what you're saying. The specifications can be very tight. They can be relatively loose. And, I wondered if the competition you will have among the vendors and fabricators, and so on and so forth, will involve a consideration of, again, manufacturing processes, sealing processes, and so on and so forth, or if it's just going to be who can build it the cheapest?

KOUTS: I'll answer your question this way. I think it's to the government's advantage to have as wide a competition that we can have for these. In addition to that, many of these vendors work with segments of the industry. We want to get as much coverage of the industry as we can. So,

we would like competition, and I think the Department would like to see that. Again, we'll have to see how the proposals turn out and see what happens at the end of our evaluation. But, going into it, I think we want to encourage as much competition as we can.

ABKOWITZ: Andy?

KADAK: Kadak, Board.

Utilities have pretty much decided what technologies they want for on-site storage. And, some go NUHOMS, others go NAC, vertical, whatever. I'm trying to understand the implementation of this relative to TAD. For example, if I've got, and I'm very comfortable with NUHOMS horizontal storage systems, will the DOE say well, we are now going to ask you to store this vertically because that's the way we need to handle it for transport? Or are you going to maybe issue awards to every generic type to then conform to the utilities fuel handling operations?

KOUTS: Let me answer your question this way. There is nothing that would--our requirement is that the canisters have to be handled in a vertical orientation at Yucca Mountain, basically, it has to go into a vertical overpack. There is nothing to preclude it from also being able to go into a horizontal overpack. So, to the extent that a utility wants to put this in a horizontal overpack at their site, that's certainly up to them.

KADAK: So, what you're actually--I'm trying to figure out what it is that you're actually asking the utility to do. Are you asking the utility to do the packaging of the TADs at their reactor sites and then be responsible for somehow storing the canisters in whatever method they choose, until you decide to come and pick it up; is that right?

KOUTS: Let me answer your question this way. Let's assume the repository is open. We pull up to the site. We would pull up to a site with a transportation cask and with a TAD for them to load from their pool. Okay? If prior to the time that we begin operations, if a utility, on their own nickel, wants to use TADs at their site, then that's fine. In other words, for dry storage purposes, if indeed a utility, based on the incentives that we're going to be providing them, wants to put, from the date the TADs are available, wants to put their spent fuel in TADs, we could also take it from their field. But, at the time of operations, our expectation is that most utilities will want us essentially to take fuel from their pool, because if we take it from their field that has a TAD in it, then, they're going to have to load another TAD and put it in the field.

So, the bottom line here is that there are two pathways. One is prior to the time that we begin operations, and while utilities are doing dry storage, with the incentives that we provide, we would hope that the utilities

will use TADs instead of other storage devices. And, there are also parts of that amendment that also incentivize them to do that, to deal with some of the costs involved with that.

KADAK: Now, have you modeled the proposal that you have in terms of tying up a TAD and perhaps shipment device you have, and trying to figure out the logistics and the numbers that you'll need to be able to handle the TAD shipments from reactors?

KOUTS: Yes, we have. And, part of the--certainly our total system model analyses make the assumption that not only transportation overpacks, but also TADs, go to reactor sites for the purposes of loading.

KADAK: And, you expect a two week turnaround time, something like that?

KOUTS: What we're going to do is we're going to--we have a perspective of what turnaround times are, and what we need to do is get input from industry as to how long this is going to take. It's not going to be quite the same, obviously, as loading a bare fuel cask, because a bare fuel cask, you don't have to worry about the canister, you don't have to worry about welding, and so forth. So, it's going to take more time, and we're going to have to deal with that. So, in terms of the lead times and the amount of transportation casks that we're going to need, and the lead

time that they're going to need on the canisters, that's something that we're going to have to work out as we move forward in the future. But, we are sensitive to that and we do understand the issue.

ABKOWITZ: Ali?

MOSLEH: Mosleh, Board.

This is somewhat related to Dr. Duquette's question. Do your specs include reliability and quality requirements?

KOUTS: Let me answer your question this way. For the purposes of our preclosure safety analysis, yes, we have to address those issues. But, that's built into the specification itself. And, to try to understand that, you really would have to see the whole picture of our preclosure safety analysis and what our rationale is for that in order to understand what reliability we're building into it. But, yes, we have addressed that issue in terms of what's in the specification.

MOSLEH: So, based in part on the results or insights from the safety?

KOUTS: Yes.

MOSLEH: I see.

KOUTS: For instance, one of the requirements which is received somewhat of an interesting response from the industry has been the fact that in a 3G earthquake at Yucca

Mountain, hypothetically, that these aging overpacks cannot tip over. And, there's a reason for that. In our preclosure safety analysis, essentially we provide the rationale as to why we need them to be vertical and not falling over in a 3G earthquake that potentially would happen at the site, although the potential of that happening is very, very, very low probability event, nonetheless, we're going to ask the designers to design an aging overpack at Yucca Mountain such that when the canister is in there, that it would not tip over. So, that's the simple way I can answer your question. You really have to understand our rationale for the preclosure safety analysis in order to understand what reliability has been built into the specification.

ABKOWITZ: Andy, yet again?

KADAK: Two quickies. Could you describe some of these incentives for the utility to buy its own TAD, store it, and then have it available when you're ready to take it? What kind of incentive would--

KOUTS: It has to do, and I don't want to get into the details, but it has to do with avoided costs to the government. In other words, at the time that we would accept it, what avoided costs the government would incur at that point in time. And, then, there would be basically a credit given to the utility for the utilization of that device. In other words, the Department didn't have to buy that TAD, the

utility bought it, so we'd basically have to look at avoided cost to the government.

KADAK: So, you'd pay the utility, or defer some fee payments, or something.

KOUTS: Something like that.

KADAK: The 3G thing came up again. 3Gs, now, as I understand it, it's vertical and horizontal; is that correct?

KOUTS: That's correct.

KADAK: Now, what happens with 3Gs to a cask vertically?

KOUTS: We're talking about an aging overpack.

KADAK: Aging overpack. What happens?

KOUTS: It's probably not going to go sideways. It will probably go up and down.

KADAK: It will fly? 1G is good, 2G is up, 3G is flying?

KOUTS: No, I understand that. But, the question is how high it goes, and when it comes down, what happens. The bottom line is it's a conservative approach. I won't argue that.

KADAK: Where did that number come from?

KOUTS: Again, to fully understand the rationale for it, you'd have to see our preclosure safety analysis, and that will come out later on.

KADAK: That gets back to my seismic question, I guess. The standard for normal reactor storage systems is what

typically in terms of equivalent G levels, even at Diablo Canyon?

KOUTS: They're much lower. But, again, we look at--I think you have to go through and understand the rationale for our preclosure safety analysis, what our Category 1 or Category 2 events are, what we can postulate on site. And, all I can tell you, Dr. Kadak, is that we've taken a conservative approach to this, and we built that into the specification. And, again, we can't get into the details until the preclosure safety analysis is made public, which will be about the time that we submit the license application.

KADAK: The reason I'm asking this kind of question is you're going to be doing this total cost estimate again, and all these things drive costs really, really high, and I'm just wondering if anybody is trying to balance the need for having very, very conservative standards versus the safety and the cost. And, it doesn't sound like people are doing that at DOE.

KOUTS: Well, we're trying to get something that works, and what we feel we can demonstrate in a licensing environment will be successful. I always leave open the opportunity in the future as we learn more, that perhaps we can go to a more efficient TAD. There will be a different generation, and I've said this many times, going to a higher

capacity would certainly be a substantial reduction in overall system cost, because essentially, you know, the reactors are going to have to do roughly 50 percent more loadings because we've got a reduced capacity. So, it's to our advantage to look at those issues. I think where the program is right now is we're trying to get something that works. Yes, it may be very conservative. And, if we can take away some of those conservatisms in the future and go to a more efficient system, we will do that. But, the first thing we need to do is to get the facility licensed, to get the system operational. At that point in time, we can look at how to make it more efficient and to optimize it more.

ABKOWITZ: Let me wrap up with a couple of questions.

I want to get a little more clarity on this issue of the motivation for utilities to use TADs before our repository would be operational. My understanding is that there is a fairly large difference in the capacity of a storage container in terms of a TAD design versus some of the DPCs that are available today. So, from an economic standpoint, the utility would be much better suited to put more into a single container. So, is that part of the incentivizing that you're discussing with the industry in terms of what DOE would do to make it a break even argument so that the utilities would, you know, elect to use TADs as opposed to some other storage device?

KOUTS: Okay. Well, there's one other factor that we haven't talked about, and that's that absent a contract modification, the Department is under no obligation to accept any of the devices that currently exist out there. So, the incentive, I think, that if those devices that do exist out there that are transportable, if the Department is to accept them, then what the Department wants in return is okay, we'll accept those, but we also want an agreement that you will use TADs from the day that they're available until we begin operations. So, I think there's a powerful incentive there, because again, absent that contract modification, the Department is under no obligation whatsoever to accept them.

ABKOWITZ: So, you're basically using the legal argument over the economic argument for that position?

KOUTS: No, I think we're using both. I think that we're also sensitive to the fact of the potential increased cost of these to the utilities, and we want to look at avoided cost to the government and make sure that that's addressed appropriately with the utilities.

So, I think one incentive is we'll take your other cans. The other one is we'll provide also an avoided cost, and I think that's a very reasonable approach. And, I will say it's not just a legal argument, it's--well, it is a legal argument. I testified in court on this issue, and the courts have sustained the Department. At the time that the standard

contract was written, these devices did not exist. Therefore, according to one judge's opinion, therefore they could not have been covered by the contract, therefore, they're not covered by the contract. So, the Department is under no obligation to accept them at this time, absent a contract modification.

ABKOWITZ: Okay, let me move on to my last question. I have asked you in the past and you had indicated to me that the TAD, success of a TAD initiative rests on having rail available to Yucca Mountain. And, I've always thought that was kind of the Achilles heel in this whole business. Can you comment on any additional thought that's gone into what will happen to this whole plan if rail is either significantly delayed in its availability to bring TADs to Yucca Mountain, or the possibility that it's never constructed at all?

KOUTS: Well, there are facilities out there that will be unable to utilize TADs. They simply don't have the ability at their sites in order to load them and seal them, et cetera. They don't have the crane capacity. They don't have the pool size. And, we are going to have a facility at the repository, the wet handling facility, that will be able to take truck casks, if you will. I mean, our baseline plan is that we will have rail availability. And, we're not designing a TAD to be basically hauled. It's a rail

dominated system, and there's just no way around that.

If, indeed, it never happens, then we'll have to go back and think about that. But, we will have a facility on site that will be able to take truck casks. There will certainly be a lot more truck casks than rail shipments. But, ultimately, I do think we'll have rail. The question of its availability, you know, that's something that the future will divine for us.

ABKOWITZ: Will your license application and your preclosure safety analysis look at the contingency planning required if rail is not available or not available in a timely fashion? Because it would seem to me that would have tremendous implications on handling and the risks associated with that.

KOUTS: My sense is our EIS will look at that option, if you will. But, the license application that we're making to the NRC will be based on a, you know, primarily based rail system.

ABKOWITZ: Okay, thank you.

At this point, we are on schedule, Mr. Chairman, and we will take a 15 minute break, and we'll reconvene at 10 o'clock. Thank you, Chris.

(Whereupon, a brief recess was taken.)

GARRICK: There's an item of business I want to take up that we missed this morning because we didn't get the

question in time. A question was raised by Judy Treichel having to do with record of decision, and I want to pass that question on to Ward Sproat, because it was as a result of his presentation that the question came up.

So, Ward, would you deal with it?

SPROAT: The question, as I understand it, was for the Supplemental Environmental Impact Statements that I talked about, will there be a formal DOE record of decision.

On the SEIS for the repository itself, there will not be a DOE record of decision. All we do is we finalize that Environmental Impact Statement, and give it to the NRC, and they do their review of it, and they make their decision whether to adopt it or not for the repository licensing. So, there will not be a DOE record of decision on the repository SEIS.

For the SEIS on the Nevada Rail, we already have record of decision of saying that the primary route of transportation is rail. There will be a record of decision as a result of this SEIS on the final rail alignment for Nevada Rail. So, there will be a DOE record of decision for that SEIS, but not for the repository.

GARRICK: All right, thank you.

Okay, Mark, let’s proceed with the discussion.

ABKOWITZ: Okay, thank you, John.

We’re going to go to Part 2 of the TAD update, and

at this time, we're going to be hearing the industry perspective. We'll actually be hearing from two different individuals, Rod McCullum, who is the Director of the Yucca Mountain Project with the Nuclear Energy Institute, and then he will be followed by David Blee, who is the Executive Director of the U.S. Transport Council. And, what I'd like to do is--well, let me ask you, Rod, would you prefer that we have questions in between each presentation, or wait until the end of both of them?

MC CULLUM: Actually, it's one presentation. We're going to do a tag team. I'm going to start out here, David is going to come up and then we're going to be together for questions at the close.

ABKOWITZ: Okay, very good. Thank you.

MC CULLUM: Thank you, and I want to thank the Board for giving me the opportunity, and David the opportunity, to share industry perspectives on this important initiative. It's been 16 months since David and I last came and spoke to you about the TADs. At that time, I think we, as well as DOE, were talking about a rather ambitious set of things that had to happen in front of us. And, as I think Chris Kouts spoke earlier, many of those things have happened, and they have happened on a very positive schedule.

I also appreciate what Dr. Garrick said at the beginning of the meeting today about the desire of the Board

to look into the integration of the project with other industrial entities. From our perspective, I think summing up industry's perspective in a nutshell, the value of the TAD is in the integration of the overall waste management system.

We expected it to be, and have seen through what has happened so far to be a very effective integration tool in terms of integrating the overall used fuel management system. So, if we can go to the first slide?

It's always important when you get an industry perspective that we have at least a couple words about why we're doing this. Nuclear energy is very important to this country's prosperity, to this country's future. We have 104 commercial nuclear plants. The last time I spoke to you it was 103. The restart of Brown's Ferry, so that is a growing number, and I also know there are plans to begin resuming construction of Watts Bar 2. So, that would go to 105, and, of course, there's a number of new plant projects in the early stages of the licensing process is there.

The existing plants, most of them are getting life extensions, so they're going to be around a while. We have maintained our 20 percent share of U.S. electricity generation, even as electricity demand has been growing. We're certainly cost competitive on existing generation, and we think the numbers are still yet to come in on the new plants. We think we'll be cost competitive on new plant

generation, particularly if you figure in the real costs of such things as carbon sequestration technologies that would be necessary for some other energy sources.

And, of course, one of the key advantages, we are the clean air energy, we produce a lot of electricity with a very small amount of material when you look at what you get out of a single uranium pellet that I could hold in my hand here versus the amount of natural gas, coal or oil. And, as we're here in a city where the lights burn brighter than anywhere else in the world, where the air conditioners work as hard, if not harder, than anywhere else in the world, the opportunity to get a lot of electricity out of a small amount of material without polluting the air certainly should be a topic of great interest.

So, going to the next slide, that small amount of material, and actually, this slide answers your question, Andy. These are the numbers. We have approximately 56,000 metric tons of spent nuclear fuel out there currently. This is pretty close to the number Chris gave, 9,600 metric tons in 877 casks at 39 sites. By 2017, the earliest date the repository might open, we anticipate having 22,000 of the 76,000 metric ton total in dry casks. Now, hopefully, some of those will already be TADs at that point as they're deployed.

I want to focus on this number for just a little

bit, and I think it's important to note here the difference between those two numbers, 22,000 and 76,000, about 54,000 metric tons, remember, right now the repository is authorized, as Ward Sproat said earlier, would be committed, fully committee for the 70,000 tons in 2010. They have allotted in at least their initial EIS, and I don't know that this would change in the updated EIS, 63,000 metric tons for commercial used nuclear fuel.

And, if you look at, you know, what DOE has said publicly about wanting to get 90 percent of the fuel in TADs, well, that's about 56,000 metric tons of the 63, and you see 54,000 metric tons there that hasn't already been committed to dry casks, and, again, some of those dry casks by that time may already, or should already, be TADs. So, there clearly will be plenty of fuel available to put into TADs to meet DOE's initial design assumptions.

Changing those assumptions, going to the second repository report we heard about this morning, you would have to visit the Yucca capacity as one of the options. Certainly, we believe Yucca can hold a lot more than 70,000 metric tons, there's the EIS number. We have the EPRI work that I believe you've been briefed on in the past, which indicates that Yucca Mountain could hold upwards of 500,000 metric tons. So, certainly there's plenty of opportunity to successfully deploy the TADs to help manage this inventory

more effectively, which is really what it's all about. And, that brings me to the next slide.

The industry has actively engaged with DOE because we support this initiative. I told you 16 months ago we supported the initiative. That has not changed. And, I think our actions speak as loud as any words I told you then, or could tell you now, the work that has gone, the commitment industry has put into this. The reasons are the same things that Chris talked about. You know, we certainly see an advantage in simplifying the repository, both in terms of its cost and its licensability. It reduces disposal and waste acceptance uncertainty. I mean, you're not talking about loading a cask that DOE says, in court anyway, that it won't accept a cask of uncertain destination. You're loading a cask that says right on the side of it, you know, ship to Yucca Mountain. All postage paid, care of Chris Kouts, you know, and that has--that's the same joke I told 16 months ago. I'm glad to see it's still funny to some. But, it is true. There is absolutely a value to that, to reducing disposal uncertainty.

Now, how that plays into the economics, that's up for each utility to decide. But, the stakeholders, we believe, will see that. If you are looking at building an essvicy (phonetic) and talking to your communities, if you are looking at an interim storage site somewhere and talking

to those communities, the notion that that Yucca Mountain stamp was on the side of the canister as opposed to this uncertainty out there we think is important to be able to tell those communities that these things do have a more certain destination.

And, as I said, it really is, the TAD program and the exercise we've gone through over the last 16 months has been a tremendous learning experience and a tremendous integration exercise. We've brought industry and DOE together. We've taken disposal parameters, we've taken storage parameters, we've taken transportation parameters, we've brought these things together and we've talked about, and substantively done things to make the system work together, and it hadn't been considered before. And, that has been tremendously valuable.

The next slide, getting into what we mean about integrated used fuel management. These are the various elements that if you're doing all of these things, you truly would have an integrated system. Obviously, we store them in the pools now, and we store them in dry storage facilities. The TADs will do that. TADs will be transportable.

Now, I alluded to centralized off-site storage, that might be something--that's certainly something industry is interested in, that might be something that's in the cards as we work towards Yucca Mountain and the recycling

facilities that might also be proposed. The TAD has value there. Again, for the stakeholders at those places, for the DOE acceptance certainty, and for the licensor, you know, you've got a standardized canister now. And, that canister will make the design of whatever interim storage facility a lot more straightforward. You're not looking at a hodge podge of systems out there that were designed for criteria that made sense at individual sites. You're looking at a standardized system, standardized for the repository, and it's also standardized for interim storage.

And, while I'm not going to try to tell you that we're hoping that we would ship TADs to recycling facilities just to cut them open, there certainly is benefit towards if we do start sending some used fuel to recycling facilities, to the lessons and to the standardization and the process of integration, the process benefits of what we've gone through to get to the TADs. The process infrastructure that's now in place, and if a recycling facility were a research facility and it was uncertain how that research was going to progress, if fuel arrived in a TAD, if it went into a reprocessing stream or a research project, great. If it didn't, it could go on to Yucca Mountain. That also would provide some additional assurance there, and, of course, final disposal.

So, we see the TAD as having a role, granted, variable amounts of value in each instance, but having a role

in all elements of integrating the used fuel management system.

Going to the next slide, what we have accomplished? And, I really do believe that the accomplishments have been substantial here. We resolved a number of technical issues. I think Chris Kouts had his Slide Number 6 where he listed some of the basic parameters and the lengths and the materials and the various things of the TAD. Those weren't the things we started with when we had our first meeting. We had to go through an iterative process. Industry raised these issues. DOE raised its reasons why it needed certain things for disposal, and we got to the end of that process and have an integrated container.

The TAD specification was completed. And, for those of you who might be skeptics about what Ward said this morning about this era of delivery that we are in, DOE has indeed been delivering on the TADs pretty consistently. I mean, the schedule that was set out for the TADs, it's been within weeks of the schedule that the TADs followed, and it's been a quality product. The TAD specification has been acceptable enough to industry that vendors are able to submit the proof of concept designs, and that the procurement process is now moving forward based upon that specification.

So, it is certainly, for those who have doubted the program in the past, certainly tangible evidence that the

project can produce quality results on schedule.

Another often overlooked thing that has occurred, and I do consider it a significant accomplishment in this process, is that the NRC review of the TAD specification has been completed. NRC commented on the TAD specification. DOE responded to those comments. The response to those comments from DOE as well as from the vendor communities echoing this is that those are issues that will be addressed in the respective license applications. But, there's a tremendous amount of value to getting those issues on the table ahead of those applications so that we can address them.

A lot of folks, there's this kind of conventional wisdom out there that the Yucca Mountain licensing process is going to take a long, long time. It's first of a kind. It's contentious. However, it has something else that's unprecedented in its nature, too, that goes to its advantage. It has a more extensive body of prelicensing work between DOE and NRC and now industry that didn't exist at any other licensing process. And, so, we would hope in this case, as well as other cases, that the project would be able to build on what's been done in the prelicensing phase to have a successful licensing process.

Going on to the next slide, this is basically Chris's slides 1 through 5 condensed down to one slide. I think the value of having them, so I won't read through all

the things that have been accomplished. But, I think it is important. I think that the value of seeing it all together is you do see that a lot of work was done in the last 16 months.

I will point out that we had our first significant meeting on January 31, 2006, which was the eighth anniversary of the date DOE was supposed to be, just by coincidence, the eighth anniversary of the date DOE was supposed to begin picking up our fuel. So, I will point out and remind Chris that we've got our tenth coming up soon. So, I hope we can do something really special for that one.

Also, a couple other milestones here that are on the plate. The vendors are expected in the procurement that Chris spoke about to have licenses by 2010, and to complete a demonstration of the first of the TADs in accordance with those licenses by 2012. In order for that to happen, the ball is in DOE's court. I mean, within weeks to next month, one of the things we need to see delivery on is DOE to move forward on these procurements that it is, as Chris said, is evaluating. But, we hope that the record of progress will continue so that the vendors will have--those are tight timelines--so that we will have time to meet that schedule. And, if you're starting to deploy TADs in 2012, you can go back to the earlier slide and look at what we've got in 2017, all the fuel still in pools. It really meshes well with

DOE's design assumptions.

And, I think a key point is that industry, DOE and NRC all agree on the licensing path forward. We've got cross-cutting issues between Part 71 and Part 72, Part 50 and Part 63. We've got to continue to manage those, but we all agree that those processes have to proceed in parallel. There's some licensing risks there, but we all have agreed on our path forward that gets us out of what could have been a chicken and egg situation, where you've got to be licensed in 63 before you can go to 72. You've got to be licensed in 72 before you can go to 63. So, we're all in agreement that those processes will proceed in parallel.

Of course, as I mentioned, if you could go to the next slide, a substantial amount of work needs to be done. I can't stress quickly enough that DOE does need to move quickly with the balls that are in its court right now. We haven't had this problem yet, and we don't want to have the problem where the clock gets eaten up by what needs to happen on the federal side. The vendors need to be able to do the high quality work and have the time to do that, and, you know, they have a lot of things that they do, a lot of existing contracts they're working on.

Financial incentives have to be out there to address the TAD and the marketplace priorities. That's something we've heard the Board question. That's one of

those balls that's in DOE's court. It was encouraging I think to hear Ward talk about the type of things being negotiated. That needs to be closed out in a way that makes economic sense for the utilities. Therefore, they can commit to buying TADs. The applications need to move forward, the loading and deployment.

Further system integration needs to occur. The first generation of TADs, the next generation of TADs may be a different kind of standardized container for a recycling facility. Who knows? But, the TAD designs do need to continue to evolve.

So, if we can go to the next slide? This is what I alluded towards, the parallel licensing processes. You see the DOE process, the wild card and the EPA standard of course down there. And, although we certainly agree that the project should proceed forward as that standard is being issued. You know, our EPRI science would again tell us that there should be plenty of margin beneath what the existing proposed standard is, however it comes out, that they should be able to do that.

You notice a lot of dotted lines here? Every time I show this graph, I was always asked to add more of those that need to coordinate, so that when a TAD is loaded under NRC regulations, it can be transported under NRC regulations, and it can be disposed of under NRC regulations. If you have

any mis-matches throughout this process, there's a problem with the regulation. There's a problem with the regulatory structure if something gets loaded under Part 50 and stored under Part 71, 72, transported, it can't be disposed of. So, we need to continue to communicate to make sure that once under NRC regulations, always under NRC regulations.

You will also notice that there's an annoyingly large amount of stars in there for the applications for TADs. The reason for that is, and this came up when Chris was being questioned, it is vitally important to industry that we have a competitive marketplace for TADs. When you look at the 877 casks we have loaded, we've done that successfully, we've done that safely, we've done that cost effectively. That's a pretty perfect--it is a perfect record over a lot of operations, a lot of fuel handling, a lot of loading operations, and I think a lot of basis for why we have such a good, at least that part of the system that's in place, is because we have a competitive marketplace where utilities can choose from amongst multiple vendors to meet their needs. They can find the vendors that best meet their individual needs. So, that's been one of the great successes of the TADs. DOE has kept that alive throughout the process, and it is vitally important that we continue to have choices of TAD vendors throughout.

Going on to the next slide, who will do what? You

see again, as I mentioned, there's a lot of balls in DOE's court. I don't think there's anything on there that we haven't spoken of already, and DOE has demonstrated to us that they're making good on their commitment so far. A couple big ones remain.

Vendors have, you know, it looks like a few things there, but those are biggies. The utilities, of course, have to buy the TADs and load them and store them on site.

NRC has the important role of regulating consistently all the way through the process. So, that, you know, a lot of integration has gone into that. We all know what we're doing on this, and I think that's a good thing.

Moving to the next slide, I'm going to talk about some of the specific utility perspectives, and then David Blee is going to come up here and talk about some of the vendor perspectives. Then, we'll get together at the conclusion. We have a lot of overlap between our membership, a lot of NEI members are USTC members, and vice versa. But, I tend to speak more from the utility side, and David will speak more from the vendor side.

TADs must be compatible with existing systems. I think with the specification, we don't have any problems there yet. TADs will require more storage space. There's going to be more of them. So, the pads have to be bigger. That is a problem at some sites. A few sites may be real

estate limited. Of course, it's less of a problem if DOE starts picking up fuel in the near term. So, the sooner you show up, the less we're concerned about that. But, that could get to become a problem as we deploy TADs somewhere.

Must recognize that procurement decisions are made five years in advance. And, some of the strategic planning windows are longer than that. I think with especially the utility entities, as they're defined in procurement space, participating in the procurement now, I think obviously the long-range business planning discussions have at least begun and some of the negotiations in place. So, some of that is encouraging. But, you know, you can't just switch over to TADs like that. There needs to be advanced planning, because what you're talking about here is assuring that you have sufficient space in your pool for four TADs and continuing to support your refueling outages, and you need to know well in advance that you have that so the TADs need to be there in advance. There needs to be certainty.

Proven design and manufacturing capabilities. Again, keeping all the vendors in the business there is key to making sure we have sufficient capability. Radiation exposures must be maintained ALARA. We have a very good track record there. We intend to maintain that record, and that's even more important with TADs, because we'll be loading more of them. And, we had a lot of discussions in

that regard when we were agreeing on the final spec.

Cost to utilities must be comparable with existing systems, must make a good business decision. There was some discussion about whether it was a legal thing or an economic thing. Certainly, there is economic value to having DOE agreement for acceptance. And, I will not get in between utilities in their negotiations with DOE. Everybody is different. There's some agreements in place. There's some frameworks. People know what they're getting on their agreements. What would they get with TADs? However you play those cards, the fuels manager at the utility site needs to go to his boss and be able to explain the business case, as to why the TAD is a sound business decision. And, it can't be just because you feel good about loading one, as much as I feel good about them being loaded. But, there does need to be a business case for these. And, again, the TAD designs need to evolve.

So, with that, David will share some of the specific vendor perspectives, and then I'll have one point to make at the end.

BLEE: Thank you, Rod.

As Rod noted, we have been working together for the past 16 months, our two organizations, since the DOE announced it was moving forward with the TAD. I think that has been very productive, and we're pleased that you are

continuing to focus on this important initiative. We welcome the transparency in the process. We believe that progress is being made, and I think it's worth looking at why we have been making progress collectively with respect to the various parties that are involved, the DOE and the utilities and the so-called technology companies, as well as the NRC.

I think what it comes down to is, one, this program is predicated on maximum reliance on the private sector. These aren't my viewgraphs, by the way. These are just a few thoughts here. Maximum reliance on the private sector. DOE is not attempting to be a market maker, as it was with the ill-fated MPC program about ten years ago.

Transparency. This has been a transparent program from the beginning in terms of the conceptual design, specifications, and as the iterative processes have gone forward.

Three is it is encourage customer focus. And, I think that's very important. It's the first time we really have been able to integrate utilities into the process. There have been on the surface some utility interaction, but this has forced it because really, this is the intersection of a lot of things, the intersection of fuel acceptance, transportation, public confidence, the standard contract, disposition, the surface facility. This is a key integrator and a very, very important initiative.

And, I think fourth is a sense of urgency. We've really seen a sense of urgency from the DOE. I think that speaks well to Ward and Chris and their organizations, and I think that we have seen--and, it is tied, of course, to the license application, too, so that all lends itself to urgency. But, I think it's been a good catalyst, a good example of how we can work together in other areas in terms of the basic tenets of transparency, customer focus, sense of urgency and transparency throughout the process.

In any event, with respect to specific so-called vendor TAD perspectives, the USTC represents companies that, what I call technology companies, but most people call vendors, who actually design and license the casks, and manufacturers that actually will fabricate the casks under contract to the utilities. And, we believe that, as I said, this is headed in the right direction.

Going to the first point here, DOE has been responsive to suggested changes. The initial conceptual design had nickel gadolinium, uncoated carbon steel, and had a length that just--had key components there that would not have been feasible, didn't turn out to be feasible, and the DOE adapted to the suggestions, and I think we've got a good product to show for it.

There's a large amount of work that must be done in a short period of time. In particular, as we go forward,

there needs to be a focus on NRC resources. The NRC at the same time as they're considering the TAD will be also considering dry storage applications, the other things they do in the spent fuel storage office.

I think Bill Brock of the NRC has both the proven experience and a long track record in this area, but he isn't the master of his budget and the resources he has, and I think we need to make sure, certainly on the Part 63 side of things, and they've moved to integrate those, but we need to make sure that the NRC has resources to consider these designs if we are going to make the 2012 deadline.

With respect to--you do have a new player in this as opposed to what has been done in the private sector before, in the sense that DOE is the contractor, the customer, and there will be a dual focus. In terms of the licensing, development of this project, DOE obviously will be, at least at the beginning of this process, their turnaround times will be something--they will have to have very expeditious turnaround times in terms of their review of the license applications and preliminary milestones as we go forward.

Lead times must be recognized. I think we told Chris initially that we thought this would take five years from beginning of the design process to licensing and actual deployment. And, I think in this case, they followed suit in

the sense that they're moving forward and 2012 is the first delivery, so I think that's reasonable and we've got to keep our eye on that one.

With respect to material suppliers, there is concern just generally through the market in terms of some of the materials, and this isn't just necessarily specific to the TAD in terms of stainless steel and other materials, in terms of neutron absorber material that will--large quantities of this will be needed. They will be needed in any event for the dry storage. So, that's a growing concern, not necessarily restricted just to the TAD.

Lessons learned have been valuable. Again, we're pleased that there is a focus on a demonstration. Chris didn't actually--you had talked earlier about a prototype. It's not really a prototype. But, what is called for in the RP is delivery of four TAD systems--well, if they pick four contractors, each contractor is required to deliver one TAD system to a utility partner that they're working with. And, we think while this is not a prototype, it effectively is a demonstration project that's something we think is very, very important and it is date specific. That doesn't mean that it will be limited to one, but certainly that is what is called for in the RP, and we think a demonstration process is important, and we're delighted that DOE adopted that in their RFP.

Additional seismic requirements. Dr. Kadak mentioned the seismic criteria, the 3Gs. That is a new wrinkle that wasn't in the proof of concept that came out in the final spec. That is an issue that we're assessing, and I don't have an answer for you today, Andy, on that, but that is something that will be a challenge certainly, and that is something that's being assessed and we will stay in touch with you on that.

KADAK: You might talk about other constraints relative to the seismic, like tie downs not permitted, all that other stuff.

BLEE: Let's see, that's beyond my portfolio. But, again, in terms of--it was just this third requirement. There are several requirements in there. But, it's the third requirement that was put in there in terms of this 3G, and the first two actually we were anticipating. It's the third one came up at the very end. It was included in the final spec, and we're going to live with it. It is a challenge, and I think it can be addressed and we're working to see how we're going to address that.

So, the bottom line is we believe the TAD design is achievable. We are hoping that DOE will meet its schedule. In the RFP, it said that the decision--awards will be made within 30 to 45 days after receipt of the RFPs. The RFPs were submitted on August 24th. That would be roughly

September 24th for the--or October 8, sometime between September 24th and October 8th in terms of the award, and any slippage in that schedule would obviously, for a day's slippage, potentially, in meeting the very aggressive schedule called for in terms of getting these designs into the NRC and docketed within a year.

In terms of the TAD overall, from the vendor perspective, this is simply another iteration of a design that is--some of these vendors have done two dozen iterations of their dry storage design. In this case, it has certain requirements which make it disposable, but it is using some tangible components that have been used before in other systems. So, it's an aggressive schedule. What we don't want to see is on the front part of it, any slippage. We don't have any indication that there will be slippage in that award, but I notice that Chris didn't say anything affirmatively about that, but maybe because it's procurement sensitive, but we do hope that 30 to 45 day projection will be met.

Next slide? Again, with respect to the transportability, we think the physical dimensions are very similar to existing dual purpose canister dimensions. The transportation cask designs will be similar. Minimal burnup credit will be necessary for transportation due to reduced capacity.

With respect to--we don't think this will result in increased shipments. We think DOE had a very modest case in terms of the number of casks in their rail car load. We think that simply by increasing the cask shipments by one or two, that you can maintain the same amount of shipments, total shipments to the program.

You did have a question on the truck transport. There is no truckable TAD design. That is something that is consistent with the mostly rail scenario. I don't think this would preclude the development of a truck TAD design if it was deemed feasible. But, it's something like that will have to be addressed later on.

In closing, I would say the TAD is an important initiative. We welcome your focus on this, and that it has potential to contribute to simplifying integrating the fuel cycle management, increasing stakeholder confidence, and I think tangible progress has been made. I believe that we're on track towards a 2012 delivery if these initial steps in the next few months can be made and taken by the DOE.

And, Rod, you're going to cover the last graph?

MC CULLUM: Yes, if you can just move to the last slide? I'd like to leave everyone with this image, just to get us back to the subject of the real value of the TADs is in the systems integration. Those of us who live and work in the Washington, D.C. metropolitan area know it's a city that's

very dependent on its bridges, and we quite often get in our cars and park on the beltway and wait patiently for opportunities to cross these bridges sometimes. But, you know, there are many bridges that make the city work, and we're, in fact, replacing one of the key bridges, the Wilson Bridge, with a new bridge these days.

The important thing to note here is I really do believe that TADs are important. They're the pillars of the first bridge that will be built to cross this gap that now exists, the status quo where we are pretty much simply storing material to the true world of integrate used fuel management, where we're doing all those things that I talked about in that one earlier graph. So, this is the first bridge. It's probably a little two-lane crossing. Then, you know, perhaps it leads to more substantial freeway bridges, and then futuristic modes of transport.

But, it is very important that we make that first crossing of that gap and get to the world of integrated used fuel management, and we have made in the last 16 months, more progress in that direction than has ever been made before. And, I'm looking to DOE hitting those balls that are still in their court out of the park so we can continue to do that.

Thank you.

ABKOWITZ: Thank you, Rod and David. I'm going to ask the first question. If we could go back to Slide 11, I want

to pick up on a question that I asked Chris. The next to the last bullet here, the cost to utilities must be comparable with existing systems, I sense this disconnect right now where the utilities are basically saying, you know, we've run this as a sound business, if it's going to cost us a lot more to use TADs for on-site storage when we could have put the waste in DPCs, then the business case suggests that we need to be economically incentivized to use TADs rather than what we would use in its place.

From what I hear from DOE, that doesn't seem to be an active discussion or negotiation item right now because of the feeling that there's a legal basis for utilities basically accepting that they should be using TADs, because otherwise, there is really no place for dealing with taking title of the waste that's currently in DPCs. Do you want to comment on whether I understand the situation properly, and what is happening to try to resolve those differences?

MC CULLUM: Yes, I'm glad you asked that question. I certainly appreciate Chris's position. I certainly understand that DOE is not going to public on the record compromise its negotiating position. But, I think I would offer you a one pretty substantial piece of evidence that these negotiations are real and that they are ongoing. I mean, Ward Sproat talked about them being ongoing. We know that DOE has received bids in response from the vendor teams

on his procurement. These bids, by definition, had to include interest by utility entities, so we know that the utilities have engaged DOE in these discussions. DOE has already paid out, I think last time I heard Ward speak, over $250 million in settlements and lawsuits.

There are two major utilities that have settlement agreements with DOE, Duke and Exelon, where they get certain reimbursed costs, not just from the past, but going forward for activities that they spend on their site due to DOE's non-performance. So, I think what has to happen is the utilities have to weigh the value of what's being offered in the TADs against what they are likely to get in a settlement absent the TADs. And again, the only thing I can do, I cannot speak for the individual members' negotiating positions, nor would I want to say anything to compromise those positions, as Chris will not compromise his negotiating position, but just if you look where the procurement is, it is very strong evidence that those negotiations are real and they're ongoing.

ABKOWITZ: Thank you. John?

GARRICK: Speaking of integration, organizational integration in particular, one of the continuing concerns that this Board has had is the desire to move in a direction of realism as much as possible in the design of this facility, and to arrive at practical solutions, not

necessarily solutions that are adopted just because it makes the regulatory compliance easier. And, we are particularly concerned about the industry resource as a part of this process, and the mechanisms that have been employed to get enhanced interaction between industry and DOE on this project.

You have talked a number--addressed a number of points about how this has been improving and working, and what have you. I guess I'd like you to pick one or two things that you think have been most important in providing the public with assurance that the industry perspective and the industry experience is part of the foundation of the design basis for this project.

MC CULLUM: Well, I think you kind of have to deconstruct the record a little bit there. But, if you look at the final specification, you look at what DOE is calling for, and you look at what is not in there, such as nickel gadolinium, carbon steel, you look at the way that our experience in loading is reflected in terms of the radiation protection requirements and the shielding, and I think you're raising a second point here, which I'll just simply have to take back, which is how you make that transparent to the public.

But, you have a specification that is not, and by deconstructing the record, you can go back to things that

were in previous DOE repository designs, nickel gadolinium is certainly a matter of record, and you can see a difference between, you know, the design DOE was talking about for its waste packages more than 16 months ago, and what is in that specification. And, the difference is entirely due to the fact that industry experience has been brought into that. Every one of the vendors, and a number of utilities and other players have come to the table. They, on their own time and their own dime, have come to meetings, multiple meetings with DOE to get these issues resolved.

But, how do I package that up and wrap it up so the public sees it all? That's interesting. I think this meeting is an important part of that. I mean, I think we are putting on the record this discussion that we have in fact done that. But, if you look at where DOE was 16 months ago, and you look at the specification there, I think that speaks to--that's the best thing I have right now to speak to that.

GARRICK: Well, can you just comment briefly on the role of such organizations as NEI and USTC in making this happen?

MC CULLUM: Oh, I'd love to brag, yes. We facilitated the discussions. We hosted a number of the meetings. You know, between David's offices and NEI's offices, you have a very comprehensive coverage of the industry. I mean, when I say there's a lot of overlap, the majority of the members of, you know, the major vendors, for example, are in both

organizations, a lot of the transportation integrators, but David plays a more focused role with some of those. We play a broader role. Utilities are our biggest dues payers, and we were able to facilitate this. I think we were able to drive on DOE. You may have heard some of that today. I mean, we are continuing to push for DOE to swing at those balls that are in their court, and to hit them soundly. And, I think that's an important part of our role.

Yes, David?

BLEE: This has been refreshing, it's been groundbreaking, but the fact of the matter is there is no mechanism for this being repeated in other programs. As you know, you all are beating the drum on the surface facility. But, there was very little interaction at all with industry on the surface facility, which was just critical, in which they had considerable expertise to bring to bear there.

When you go to other countries, I just returned from Sweden and Finland, and a number of you had a trip there, it's being done by the private sector, so, there is a mechanism for the private sector, but the transparency of their programs is remarkable. And, that enhances public safety.

So, in terms of industry input into other elements of the program, in this case, DOE recognized that, well, consistent with the Nuclear Waste Policy Act in the

transportation sector, maximum reliance on the private sector to achieve transportation oriented projects. That is the law of the land. But, too, they welcomed that, they did not try to become a market maker. But, it has been isolated really to this, and, of course, there have been ad hoc, I think that, you know, you have a director of the program who comes from the private sector, who has recognized us and brought people in.

But, in many respects, you know, I'll give you credit for forcing the focus on this. That certainly has, and welcoming the private sector up here to even give our views on this, I think that has been very helpful, and we hope you'll do that in other areas, because I think that's where you can serve as a bridge to the private sector as far as some kind of standing organization. This has been very much ad hoc between organizations in terms of we were--DOE was not resistant to the idea of our getting involved in sort of a working group together. But, again, it's one of a kind so far, and once they get into the RFP process, or the contractual work going forward, there is not necessarily a standing entity that will survive this process. But, I think you can be a catalyst there and you can be a bridge to a lot of this.

GARRICK: Thank you.

MC CULLUM: Yes, I'd just like to add, I mean, we talked

about building the first bridge here. I think what you're saying is maybe there needs to be more, and we'd agree, and both of our organizations would be happy to facilitate other interactions.

ABKOWITZ: Okay. I've got Andy, then David, and then Ali, and then Thure.

KADAK: Yes, I'd like to ask about this integration question. One of the criteria that was not mentioned here was thermal loading. You are able to load apparently packages of greater than 18 or 20, or however many kilowatts in the package, provided all you need to do is meet the transportation requirements?

MC CULLUM: That's correct. That's why the middle name of the TAD is aging, because as long as we meet the transportation requirements, we can load what we can load, and then they will sit out in that earthquake proof aging pad until they're ready to go in the mountain.

KADAK: And, relative to the integration, have you had a chance to look at the TSM assumptions about what you will be doing when you get these storage canisters, these TADs, in terms of do you need to build your own on-site storage facility, or do you wait for the truck to come, or the train to come? Have you looked at that?

MC CULLUM: Well, yes, and I think Chris addressed this in his presentation. Right now, we don't see any substantive

change, except for the fact that we would be loading more containers. I mean, if a utility has not reached the point in their pool where they need dry storage, they probably would wait on buying a TAD, unless DOE was saying we're coming to the gate, you know, I'm sure they'd jump at that. But, once a utility has already built an SVC (phonetic), or is planning to build their first SVC if the TAD works into that planning window, it would simply be loading a different canister into systems that are fully compatible with the existing systems we use.

KADAK: So, the answer is yes, you have reviewed their planning assumptions on the TSM?

MC CULLUM: Yes. Well, no, not specifically the TSM. This comes from our interactions that led to the spec and through the procurement. We do not see in what is being called for in that specification anything that would substantially change the way we do business in terms of loading dry storage.

KADAK: That's a TAD spec, not a use spec?

MC CULLUM: A what spec?

KADAK: A TAD spec, but not a use spec in terms of implementation. What I'm trying to get at is have you guys looked at what DOE has assumed relative to how these TADs will be managed at your sites so it can be effectively integrated into their delivery system, and the thermal

loading is an important characteristic of that.

MC CULLUM: Well, again, without going specifically to the TSM, the answer is no, we haven't looked at that.

KADAK: Okay. Now, the last question, I'm sorry, just one more, from an economic standpoint, is it realistic to think that the TADs will be comparably priced to a much larger canister?

MC CULLUM: No. We don't expect that, and that's the subject of negotiations in terms of what incentives DOE is offering so that the fuels manager can go to his boss and explain why it's a sound business decision to use a TAD. There's no illusion that a TAD will be priced at the same, you know, on a per assembly basis, the same as an existing system.

KADAK: Thank you.

ABKOWITZ: David?

DUQUETTE: Duquette, Board.

First of all, I'd like to commend your negotiations, and so on and so forth. As you probably know, many members of this Board have been very much in favor of a dialogue between industry and DOE.

MC CULLUM: Thank you.

DUQUETTE: And, secondly, many of us on this Board have been in favor of the TAD concept from the very beginning that it was introduced.

I have a very naïve question, and I know the number changes all the time with acquisitions, but how many utilities currently are--what percentage of the utilities that have nuclear plants have more or less signed on to this?

MC CULLUM: Well, that would be getting in between the negotiations. I mean, nobody is going to publicly--and, I hate to give this answer, I really do.

DUQUETTE: But, is it 50 percent, 80 percent, 90 percent?

MC CULLUM: I can only tell you that when we had the interactions with DOE, we had probably anywhere between 50 and 80 percent of the reactors represented at the table all the way through the process in terms of the utility participation in the interactions. As to what utilities have partnered--or entitied with what vendors, inside the procurement, I can’t speak to that.

DUQUETTE: I don’t want specific names.

MC CULLUM: I can also say that NEI is the policy-making body for the nuclear industry, and what you’re seeing there on integrated used fuel management is the official policy of the industry. It’s been endorsed by the CNOs of--chief nuclear officers of all the major utilities, 104 nuclear plants. So, the TAD initiative is within our overall industry policy, and the industry participation in the TAD development had so far been, you know, definitely majority,

and I don't see, again, as long as DOE makes good on its end of the bargain, I don't see any reason why that would change.

DUQUETTE: And, a pseudo-technical question. You mentioned that the amount of waste that still is to be generated could pretty much all be handled in new TADs. Do you see a situation where you will unload the current DPCs at the utility sites into TADs for shipping?

MC CULLUM: I don't see any such situation. I think DOE is designing into their facility the capability to unload them there, and given that when the TADs show up, we'll have fuel to put in them, I think the system--the system actually will work very well the way it's being designed, and I don't see any reason to bring the DPCs back into the utility pools.

ABKOWITZ: Ali?

MOSLEH: Mosleh, Board.

Mine are related to the design of the TADs in terms of requirements. I assume that the truckable version is a minor variant of the rail ones; is that the case?

BREE: Yeah, it would be a--right now, the only truck casks in existent in terms of--is one assembly, and that's just a simple legal weight truck. This would be a scaled down version, in terms of no one has actually come out with a concept, but in terms of designs that I've seen, it would be a multi-element scaled down version, and you'd have to look at the cost benefit of that, and the feasibility of that just

in terms of fitting with the overall program. But, essentially, it would be down-scaled to fit--be carried on a truck.

MOSLEH: Yes. And, then, another one is on one of the slides, I think it's Slide 12, said additional seismic requirements would be a challenge. What do you use as a reference for additional? I know 3G, and then what would be the level that would not be a challenge?

MC CULLUM: Well, I guess this is best illustrated, I have two versions, I have the draft spec on my shelf, and I have the final spec, and the draft spec was about a half inch thick and the final spec is about three inches thick. The difference is entirely due to the appendices that were added on soils and things like that due to the seismic requirements.

The vendors have, in making proposals, committed to address these, and it's important to point out here these only really come into play with the aging overpack design, primarily come into play with the aging overpack design. So, all the challenge is meetable. You know, it's a tremendous additional amount of work, as reflected by that difference. And, when we say TADs must continue to evolve, this is what we mean. I would think that TAD number one and TAD number 172 might be--TAD number 172 might be improved, and I would hope we could--that DOE, in future licensing iterations,

would become more realistic on its seismic analysis.

ABKOWITZ: Thure?

CERLING: Cerling, Board.

A number of times you've alluded to the fact that on a number of issues, the ball is in DOE's court. And, so, I'm just kind of wondering from a whole process perspective, sort of what are the rate limiting steps from your viewpoint, and again, both from your side and DOE's side, that have to be done to make this a real place where you can actually cross the bridge? What are the things that have to be--

MC CULLUM: There's really two things. The first thing is in terms of completing the procurement on schedule, and that also includes some negotiating on the incentives. So, there's the economic legal piece of this. If DOE continues to, in its season of delivery here, if it continues to make good on promises, that's doable.

The second thing is obviously as the vendors are going forward with NRC and seeking Part 71 and 72 licenses, DOE needs to be plugged in enough to continue to be giving us the assurance that everything is okay in Part 63 space. And, that implies the continued openness and interactions on the part of the Department, and certainly inquisitiveness on the part of this Board doesn't hurt there.

So, really, in terms of all those dotting lines I showed on the regulatory graphic, keeping information moving

up and down those dotted lines, that's the second thing. And, the first thing is the financial incentive procurement piece.

BLEE: I would just add a couple thoughts also. You will need funding. Dr. Sproat talked about his funding issues. But, you will need funding through 2012 to make this happen. And, clearly, you're going to have to have customers. Right now, what we know is if you have the funding to make this happen through 2012, there's going to be four TADs delivered in the United States somewhere, maybe three or four, depending on how things evolve in terms of there are fees. But, you need the utility customer ultimately, is what Rob was referring to.

And, I think once the--the vendors need to deliver. Once they, assuming that the RFPs go forward in the next 10 to 15 days, or the awards go forward, the vendors have a very aggressive schedule to meet. And, then really, the focus right now is moving into the NRC's court, so to speak, and I think if you had the NRC in here sometime for one of your meetings, I think you'd find that very instructive. I think they are ready for this--they are resource limited, to some extent, but I believe they've identified the resources certainly for the next fiscal year to move forward with this.

ABKOWITZ: At the risk of turning the baton back to Dr. Garrick late, I'm going to allow Andy Kadak to once again--

GARRICK: I stole five minutes of your time. So, you have a little.

KADAK: I'd like to ask about, you mentioned interim storage and NEI's position on that, in the context of this discussion. Clearly, the effort to site an interim storage facility will take money, will take distractions from the Department of Energy, and I'm just wondering where NEI is relative to priorities about moving this process forward compared to getting an interim storage facility moving?

MC CULLUM: We see the two moving together hand in hand. Interim storage is a very high priority for our industry. There's no question we want DOE to begin moving fuel away from the reactor sites as soon as possible. Interim storage is best done, though, against the backdrop of a successful Yucca Mountain project, and that's trying the imagery on the bridges and the integrated used fuel management I'm trying to leave here, is--the government cannot say okay, we're going to do interim storage now, it's an alternative to Yucca Mountain. That's not acceptable to anybody. So, yeah, that goes to funding, that goes to freeing up the waste fund, that goes to all kinds of things, some of which might not be in place right now, but we don't see those as being separable. We want to see interim storage and we understand that to sustain that, you need a successful Yucca Mountain project continuing to knock down milestones. So, that's the answer.

KADAK: Relative to the resources and the effort of DOE, recognizing, as you both know, the successful MRS program we had a few years ago, the successful private fuel storage we have already licensed, do you really think the DOE should be spending its time doing that instead of, because I think it will have to be kind of an instead of, because they don't have the money, they don't have the time, they don't have the resources?

MC CULLUM: Well, I think the point of disagreement here, and I think we'll just have to agree to disagree, is on the term instead of. I mean, there's $20 billion in the nuclear waste fund. If that money is available to make good on the DOE federal obligation, there doesn't need to be an instead of.

ABKOWITZ: Okay. Again, Rod and David, thank you for your participation, and we very much appreciate the effort that industry is making on behalf of this project.

John?

GARRICK: Thank you. And, I'm just going to turn right around and turn it over to Howard Arnold for the next couple of presentations.

ARNOLD: All right.

The surface facilities we're about to hear about are not those I saw when I was new to this Board three years ago. Thank goodness. Good riddance to dry handling and a

million lifts.

Aside from criteria issues like seismic, which will not be addressed fully today, the main issues on my radar screen are those of providing enough flexibility, especially in sizing of wet handling, to cover the wide range of future scenarios, delay of rail lines, timing of TAD availability, and some of the things we've already been talking about, and, particularly the percentage of spent fuel that won't be in TADs at the time of reloading.

Another issue on my radar screen is a degree of detail in design and safety analysis, which are so far available. My most recent experience was with a one-step license for our centrifuge enrichment plant, and perhaps that spoiled me. And, that's also the path being used for new reactor plants. Essentially a final design would be required at the time of the license application. But, Yucca Mountain is not being licensed under that set of regulations. It's going forward under the class two-step process. This license application is my understanding the equivalent of an old PSAR, preliminary safety analysis report. Maybe I'm wrong about that, but that's the way I see it.

In any event, our Board is not the judge of the sufficiency of detail at any particular point in the licensing step. That's between the NRC and DOE. Our job is to review what we see, and comment where we see gaps or

issues, and that's what I intend to do.

We will hear first from Bob Slovic, who prior to joining DOE in early '04, had 24 years of experience with Bechtel on commercial nuclear plants, and I think that's a great way to start this.

SLOVIC: Okay, thank you very much.

First slide, please. We unfortunately, or fortunately for us and unfortunately for everybody else, we talk in a lot of shorthands. So, this particular slide is a number of the acronyms that we use. I apologize, but they're there. It's one slide of that. So, you'll see there dual-purpose canister, geological repository operations area, preclosure safety analysis, which is a product and also the group that does the product. So, my friend, Dr. Frank, is here and he'll talk to you later about that. And, you see TAD. So, these are, if you hear shorthand, if you hear me using shorthand in it, you'll go to it.

The next slide, please? The design of the product is actually being done in a full-sized three dimensional model, and this is a picture of the model of the site plan as it existed, oh, about a week or so ago. It changes daily. You'll see things like here, this is a utility facility, and it looks like a bunch of sticks, and stuff, because they haven't finished modeling yet. But, the day that this picture was taken out of the model, that's what it looked

like.

The dark brown is essentially earth work, doesn't necessarily have all the buildings on it. This again is looking--this is west. This is not a very good representation, but that's the north portal. That's where the waste forms would be transferred to the repository, to the subsurface repository. The building here is the initial handling facility. This is a maintenance facility for the transport and emplacement vehicle. These are some more administrative buildings. This is the wet handling facility. This is canister receipt and closure facility number one, and this is the receipt facility. And, we'll get to what each one of those does.

Further down in the model, but you can't see, it's off the page, there are two more spots. When we got our requirements to change the repository to the mostly canister based system, we got the requirement that 90 percent of the commercial fuel would come to us in TADs. The other 10 percent would come uncanistered, and uncanistered means either in casks or in a dual purpose canister. And, we would repackage that amount.

So, we came up with a system that would meet those requirements. The system has flexibility. It has some additional capacity that's beyond that 90/10 split. Anyway, the site plan.

So, the next slide is a little complicated. Hopefully, if you've got a magnifying glass, you could use it. But, we get various waste forms. I don't know if you're familiar with the old design. We had single facilities that were all things to all waste forms, and now we have multiple facilities, each one with essentially a different purpose.

We get uncanistered commercial fuel. We get dual purpose canisters, which are for our purposes are uncanistered, because as of now, we can't dispose of them. We get DOE canisters of high-level waste, which is vitrified glass, or DOE SNF, which is of various and sundry forms that come to us. We have the Naval canister, which is also DOE SNF, and then we have the TAD canister. And, for the purposes of the design, the TAD canister and the Naval canister, at least the TAD canister in it's initial configuration, was the same size as the Naval long canister. It facilitated our efforts to get started.

Commercial fuel is going to come to us in truck casks. I don't believe there are any licensed truck casks now, but there have been designs in the past, or in dual purpose canisters, or in TADs from down here. The dual purpose canisters and the TADs will come via rail. And, that's a picture of a transportation cask.

We also have the capability to--again, there's no transportation cask for it, but the initial handling facility

has the capability to receive high-level waste canisters in truck casks in that facility. The initial handling facility is the facility that's uniquely designed to handle the Navy transportation cask. The canister didn't change sizes, but the Navy changed the transportation cask size, which necessitated a larger crane and a different crane height in order to make it work.

The canister receipt and closure facility is the work horse facility. Its purpose is, as stated in its name, to receive canisters and to load them into waste packages and to close the waste packages. So, it's the point where waste is transferred from its shipping or storage container into the waste package to go underground.

The wet handling facility is designed specifically for the 10 percent of the fuel that's supposed to come to us as either individual assemblies in transportation cask or in dual purpose canisters.

And, the receipt facility is designed to allow us to uncouple receipt from emplacement. We have a requirement to receive 3,000 metric tons of commercial fuel in a given year once we've got the full repository going. And, we have to receive it in 25 years, but we have a 50 year emplacement period. So, there can be a break. We don't have to emplace everything we receive right away.

We do have aging pads. They have 2,500 spaces for

TADs or dual purpose canisters, with approximate capacity of about 21,000 metric tons of heavy metal. The preferred approach is to load the waste packages and take them directly to the drift. We do have, we're not going to talk about, but we do have thermal limits now as to when we can emplace, which affects the aging pad and other things.

Next slide, please. Again, we've split the waste forms between facilities. High-level waste, while there's a capability to do it in the initial handling facility, essentially all of it will go through the canister receipt and closure facilities. Naval SNF canisters will only go through the initial handling facility. DOE SNF canisters will only go through the canister receipt and closure facilities.

Uncanistered CSNF, and that's either individual fuel assemblies or fuel in dual purpose canisters, will go through the wet handling facility. And, the TADs, commercial fuel in TADs, goes through the canister receipt and closure facility primarily for disposal, but they're actually loaded in the wet handling facility, so we have capabilities to handle TADs there. And, they're also, they process through the receipt facility from transportation casks into aging overpacks or side cask.

So, the principal features that we have, in the initial handling facility, we can load and close waste

packages. It is an ITS seismic structure. It does have--ITS is important to safety, as determined by the preclosure safety analysis. It has important to safety mechanical systems, and it does have a limited amount of dry remediation capability. We're not interested in reconstituting fuel, or anything like that, but if we have to replace the bolts on a transportation cask, or something, to get it to work, that's what we're intending to do.

Canister receipt and closure facility, the other facility with waste package loading and closure, where the IHF will do approximately 400, the other 10,600 will go through one of the three canister receipt and closure facilities. Again, it's an ITS structure, ITS mechanical handling. It has, because of the considerations of a dropped and breached commercial fuel canister, we do have ITS confinement, and we have ITS HEPA exhaust, which is a mitigation thing that we can talk about under preclosure safety. And, it's also powered by ITS emergency power.

So, the difference between IHF and canister receipt is the waste forms. These two particular waste forms, HLW and Naval SNF, do not require mitigation in order to meet the dose requirements of 10 CFR Part 63. We do require them for commercial fuel, and, so, that's why the IHF has these. Because the wet handling facility and the receipt facility both have the same capability to handle commercial fuel in

canisters, either in DPCs or in TADs, they also have the confinement, the HEPA filtered exhaust and the emergency power. But, you notice that neither the wet handling facility or the receipt facility have waste package loading and closure capability. So, that's a breakdown by the waste forms.

I can't show the entire layout of the--this is part of the canister receipt and closure facility. For safeguards and security reasons, I can't show the entire surrounding areas. But, this is taken from the model, and this is the area where we, when we receipt transportation casks, they are received in their 10 CFR Part 71 configuration. And, this is where we take them out of their Part 71 configuration. It's inside. The building is reinforced concrete, approximately four foot thick walls. This particular area has HEPA filtered, important to safety ventilation powered by emergency electrical power. This structure is designed to confine any radioactivity dynamically if we have an event sequence in there.

I need to add that drop of a transportation cask is one of the event sequences that we have considered. It's not a Category 1 event, so it's not expected to occur in the life of the plant. But, we're designing for it because we can't exclude it on a probabilistic basis.

So, in this area, and if this were whatever the

transportation cask is, we bring it in to the building, we shut the building up. All of the safety systems are running. We have an operator in the facility that says okay, everything is ready to go, to start doing your jobs.

So, the first thing that happens is the impact limiters, the inflatable or non-inflatable ones, come off the transportation cask. There's a 200 ton NOG-1, Type 1 single failure-proof crane in this area that will lift the cask. The casks are nominally 125 tons without impact limiters. So, they will be raised up, verticalized, and then put into this device--well, the device is here. This is shown with platforms under it. This is a cask transfer trolley, and its purpose is to maintain the stability, among other things, it moves the cask for unloading, but it also maintains the stability of the cask in seismic events.

So, when the cask is upended, it's put into here. It's prepped. If there are outer lids, the outer lids are removed. If there are bolts that hold on the shield plugs or the shield lids, they are removed. And, when the cask is ready, it's transferred into this area, which is an unloading room. There's only one trolley on each train. There are two trains in the canister receipt and closure facility. There's only one trolley in each train, but the model has depicted it in two locations.

So, if you go to the next slide, please? This is a

little bit smaller, a little harder to see, but this is the area we were just looking at. This is the prep area. And, then, when the cask is prepped, it's moved into here. We do have flexibility to accommodate different size, different length casks for different things, because some of the casks have to be shorter because of the waste forms inside of them. But, we have provisions to basically accept any casks that we would anticipate having.

All these operations out here are shielded by the transportation cask itself, by work platforms, by other things, but all the activities are accessible by operators to do the work.

Once it's moved into this area, the unloading area, there are shield doors that are shut, and there's a shield gate in the top of the room.

Meanwhile, we would have brought in the appropriate waste package empty into the other side, and the unloading process is the reverse of the loading. So, an empty waste package is brought in horizontally. It's put on its emplacement pallet. The emplacement pallet is how it's handled to get it down into the emplacement drift in the subsurface. The trolley upends it, and it moves to the loading position.

Once it's in the loading position, depending on what we're doing, if this was a TAD, it's a one transfer, one

canister out of the transportation cask into the waste package. If it's a co-disposal waste package, which co-disposes both high-level waste and DOE SNF, then it's multiple transfers to load the waste package.

Once the waste package is in place and the cask is in place, the doors are shut, and these then become--I'm sorry--we don't allow personnel access to it during the transfer because if you see, there's not a hard connection between the top of the cask and the underside. So, as we're pulling the canister up into the canister transfer machine, there would be a significant exposure in there, so no personnel access is allowed in there then.

The canister transfer machine is essentially a heavy crane, again, primarily ASME NOG 1, Type 1, with a shielded bell on it. The bell has a gate on it. There are gates in the floor. We align the canister transfer machine over the gate, open the gate in the canister transfer machine, open the gate in the floor. Everything is shielded. And, then, there's a second trolley on the canister transfer machine that has a hoist on it that goes down and engages the canister, pulls it up into the bell. Doors shut, and then moves to the loading position, and the operation is reversed.

So, all the time during that operation, there is, even though it can be operated remotely, we still have access to that area.

We also, because this is the area when we're hoisting a canister out of a cask or lowering it into a waste package, we have--there's an event sequence that could occur involving a drop of that particular canister, failure of equipment, drop of the canister, because of that, these areas, this room and this room, and there's four of them total, both have the confinement capability, plus the ITS HEPA filtered exhaust powered by the ITS electrical.

This is the plan of the transfer room. Here's the prep room that we saw earlier. Here's an unloading port, another unloading port, and here are the two loading ports. We also have some staging capability here, a limited amount. We have the capability to stage two TAD size canisters over there. For some reason, there's never any intention to do that, when we bring a TAD canister in, it's to be emplaced, but there may be some procedural or maintenance requirement that requires us to put us in staging. So, we have that capability. But, we do intend to use the other side. Again, because of the co-disposal packages, how the waste will be shipped to us, we anticipate we'll get a transportation cask of anywhere from seven to nine DOE SNF canisters, and we only load one per waste package, so we will then stage them in this area, again, with shield gates and the canister transfer machine, until we get a series of shipments, transportation casks of high-level waste, and then we can load the co-

disposal waste packages.

ARNOLD: Excuse me, Bob. We had you down for two separate 20 minute presentations. Would you rather collapse them into one?

SLOVIC: Yes, I'll just keep going.

ARNOLD: Just keep going and then we'll have a single question and answer--

SLOVIC: Right. Originally, the second part was going to be delivered by someone else.

ARNOLD: Oh, I see. Okay. We'll let you run right through your two presentations.

SLOVIC: Stop me whenever. I'll go on forever. You know me. Just stop me when you want to.

ARNOLD: You've got another 20 minutes.

SLOVIC: Okay. The next slide, this is the waste package closure area. Again, it's a remote system. It's one of the key activities that we have to demonstrate because the integrity of the outer weld, outer barrier weld, is very important to the TSPA and to the postclosure activities. So, we have two robots. I think some of you anyway have been up to INEL and watched the progress of the welding robots for the closure system. And, when they're progressing to--I'll interject--they're progressing to build the demonstration facility that will be used to demonstrate the waste package closure system. Most of our concerns are not that we're

using new equipment, but that we'll be using it in a different way, in an integrated way. So, that's the difficulty in this.

So, here, the waste package is closed. The inner lid is put on and welded. The waste package cavity is dried--I'm sorry, not dried, is evacuated and backfilled with helium, and then the outer corrosion barrier lid is put on. It's welded to multi-pass weld. Non-destructive examination between each pass. And, then, once the weld is accepted, stress mitigation is performed on the surface. And, at that point, the waste package is closed and ready to go.

Next slide? This is the waste package loadout area. You will hear it called the TEV. It's the transport and emplacement vehicle. It's a shielded vehicle. And, again, backing up one slide, with the combination of the--the waste package transfer trolley is shielded. There's a shield plug on the top of the waste package. So, again, if there's a problem with this piece of equipment, you could go in and manually, unless you're doing transfer, you could go in and maintain the equipment. So, back to the next one.

So, here, after it's closed in this location, the shield doors open, the waste package trolley comes out. It's a rail based trolley. There is a shield plug that's on top of it that protects the--positions the waste package and provides some annular shielding. Then, that tilts down and

there is a cart that engages a drive in the floor. There's a cart inside the waste package trolley on which the emplacement pallet is sitting, on which the waste package is sitting. So, we don't touch the waste package. We pull it out.

Meanwhile, the transport and emplacement vehicle has come in. Its doors are opened. It has a bedplate that's retracted, and then this whole inverted "U" is lowered on screw jacks so that the waste package on its emplacement pallet can be pulled into the waste package trolley.

At this point, this gap here is where we will do a visual inspection of the surface of the waste package. There is a, to be developed, acceptance criteria for how much of a defect we could tolerate on the surface of the waste package. So, that's the production.

The handling of canisters in the initial handling facility is very similar, except there's only a single train in there and a single waste package closure.

Next, we're going to the wet handling facility. This is a picture of essentially the pool room, as we call it, the operating area. It has similar functions to the CRC. Transportation casks come in, either truck cask or rail based cask. We have a 200 ton crane. Again, the 200 ton crane, same operations, reinforced concrete structure, ITS ventilation systems. We shut all the doors, take the impact

limiters off, upend the cask, and depending on what it is, truck casks are prepped over here, rail casks are prepped in this area.

If it's a cask that contains a DPC, we then, behind this wall what you can't see is another of the loading and the unloading stations with another canister transfer machine, so that we have the flexibility, if we wanted to take the canister out of the transportation cask and put it into a shielded transfer cask, which we use in here in this building, we do that.

So, if it's a cask with individual assemblies, it's prepped, and then it's put into the pool, and it's either unloaded directly into a TAD that's in the pool, or we have storage racks in the pool for a limited amount of staging, up to 200 assemblies.

DPCs, if we take them, the capability that we have in the facility, we get the dual purpose canister out of its transportation cask, or out of an aging overpack if it's coming from a receipt facility or the aging pad, and then it's put into a shielded transfer cask which is especially designed to allow us to do the opening process and to immerse it into the pool.

So, once it's loaded into the shielded transfer cask, it's put to this area. This is the DPC cutting area where we essentially reverse the process that the utilities

use to close the dual purpose canister. We essentially machine off the welds in the reverse order that they were installed. So, we'll take off the outer lid, uncover the vent and drain connections. At that point in time, the DPC is still inerted with helium. So, as necessary, we'll cool it, depending on the thermal load on it, so that we don't get, when we introduce water, we don't get a big steam bubble problem. We will cool it.

And, then, once it's cooled, we'll flood the DPC canister with borated water from the pool, and at that point in time, we can complete the--or we can do the removal of the weld that holds the shield plug in. And, once that's done, we put the lid back on the shielded transfer cask, which has its own lid bolted on, and then we transfer it from there into an area of the pool specifically set aside for DPCs, dual purpose canisters.

There, once the pool water chemistry is okay, or we've got it to the point where we can unload it, we do the same process. We open the DPC, remove the lid, and then use a spent fuel transfer machine similar to commercial utilities to transfer the fuel assemblies from the open DPC into either the staging rack or to the TAD.

Once the TAD is full, it's brought out of the pool. It also is in a shielded transfer cask, because the TAD only had shielding on the top. It's brought out of the pool into

this area, which is the TAD closure area, where initially the lid is welded on. Then, the water is evacuated and then we do the drying process, vacuum drying or a closed lid helium drying system, to get it to the portion where the moisture is removed and the oxidizers are removed. And, then, at that point, it's backfilled with helium, and then we do the process all over again so we assure that we have the appropriate amount of dryness and minimal amount of oxidants in the can.

At that point in time, it's then the lids are welded on. The vent and drains are closed and the lids are welded on. And this is very similar to the technology and the methods that utilities are using now for dual purpose canisters. We don't intend to have to invent anything to do this. As Jack Bailey says, we don't have to invent Velcro to make this work. So, we have that.

So, once it's loaded, it's in the shielded transfer cask, the shielded transfer cask is transferred behind this wall to the canister transfer machine. And, so, the loaded and completed TAD is pulled out of the shielded transfer cask and put into an aging overpack either to go to aging pad or to go to one of the canister receipt and closure facilities for disposal.

Next is essentially the same. It's just a little clearer picture of the pool. DPC area is over here isolated

from the rest of the pool. We anticipate that some of the DPCs may have a significant amount of contamination, loose contamination in them when we open them. And, also, we've got the aspect of BWR fuel in borated water. So, we're anticipating that we may have to keep this isolated so we don't contaminate the rest of the pool until we get this area under control. Staging racks are here, 120 BWR assemblies, 80 PWR assemblies, and then we have loading positions for the TADs and the unloading positions for the transportation cask.

The next slide is essentially the same thing, just a section of it. He didn't do a very good job hiding the walls. These are actually tanks behind the wall. They're not in the pool. But, you can see the same thing. The pool is 52 feet deep. It's about 60 by 70. The operations are similar to what the utilities do, but it's a lot smaller because we have a much smaller--we're sort of reversed. They have a small operations area and a large storage area, and we're reversed on here because we don't intend to stage a lot of fuel in here. We're just using it for our convenience in blending to load TADs.

So, that's pretty much it on the designs. We have the receipt facility is just the front end of the canister receipt and closure facility. It just receives casks and does transfers. And, the IHF is half of a canister receipt and closure facility. We have tried to provide commonality

of equipment between the facilities to the extent possible. We're using industry standard ASME NOG-1, Type 1 cask handling cranes, different capacities, different bridge lengths, but essentially the same thing.

These ones in yellow are equipment that, unique is the wrong word, but it's some non-standard applications of this technology. The canister transfer machine is essentially a crane with a shielded bell. There are other people that have used similar things.

The waste package transfer trolley concept is not new. They have tilt tables, and things like that, that use this type of worm gear technology and pivots to handle things. The use of this allowed us to eliminate a pick at the waste package in another event.

Transport and emplacement vehicle is, you recall from the previous days, it was a rail car and a locomotive combined together that did the work. So, they combined it into a single piece of equipment because it eliminated transfers, and things like that. So, we've done our best to make it as simple as possible while maintaining enough flexibility to handle variations in the waste forms that we have.

So, the site transporter is designed for vertical handling, or handling of aging overpacks with either TADs or DPCs in it. Spent fuel transfer machine is just in the wet

handling facility. TAD closure and DPC cutting are in the wet handling facility.

Just a couple more slides. The next is a concept of the cask transfer trolley. Again, it's a seismic frame because we want to, when we've got it in here, the waste form is still shielded, but once we have the lid unbolted, if it were to tip over, we could potentially have the waste form being ejected onto the floor, which would be an undesirable event and very difficult to analyze. So, the requirement has been placed that this not tip over in our design basis seismic events.

Next is the canister transfer machine. Again, it's essentially a 450 ton crane. It has two trolleys, one that handles and supports the shielded bell with its slide gates, and everything else, and a second trolley, a 70 ton hoist that actually handles the canisters that it's doing.

Next is a waste package trolley. Again, it's a tilting mechanism. It's a rail based, has a worm gear to hold it. There's very little likelihood--we're anticipating we'll be able to demonstrate that we won't get a slap-down event. There's no failure mode that will cause the thing to tip over and slap-down. That's our goal.

This is not quite accurate. Actually, the top of the waste package extends out about three inches above this shield. This is not drawn correctly, so that the waste

package closure system has access to the top of the waste package when it's closing.

KADAK: No cables on the top to hold it?

SLOVIC: Pardon?

KADAK: No cables?

SLOVIC: For what, sir?

KADAK: For upending or down-ending, I guess?

SLOVIC: There's no cables. There's a worm gear and a motor to drive it, so that again we're trying to--I don't know how familiar you were with the old handling facilities, but the dry transfer facility had essentially ten lifts for every waste form as it went through. We have two, one in the cask and one here, so we've eliminated a vast number of the lifts in the handling by this type of thing.

The next slide is in the down position. So, here is the cart that's inside the waste package trolley. Here is the emplacement pallet, and here's the waste package. And, this is the device that engages the drive in the floor that pulls it out. And, at this point, if you back up one, at this point, here is the plug on the top that provides shielding that's removed, and, while it's in this configuration, it's accessible and we take the plug off, it's not. When it's in the next slide, this is then--personnel is prohibited from this area, and it's done remotely.

And, the last picture is the transport and

emplacement vehicle. It's a rail based device. It's on eleven foot gauge rail. It has--does it have four or six, I forget--it has six motors, I believe. Eight? Thank you. It has eight motors, all gear reduction driven so that it can't run away. The wheels can't drive the motors. It's designed so that if two motors fail, the other six still have enough capacity to move the TEV. It's approximately nine inches of shielding. This portion raises and lowers on jack screws. It has four normal and two backups.

These are shield doors on this end, and then there's a bed plate that backs out. And, there is a--you can't see it in here, but there is essentially the bottom of the shield that raises up and down engages a notch in the emplacement pallet. So, it only touches the emplacement pallet. It doesn't touch the waste package.

Okay, again, other than Part 63, which is the difficult part, we're trying to use cask handling cranes, side transporters, transfer machines, TAD closure equipment, DPC cutting, using existing equipment in current nuclear power plants with what their consensus codes and standards are. So, the handling cranes, transfer machines, ASME NOG-1, Type 1.

Next is cask transfer trolley and the waste package transfer trolley don't have consensive codes. But, we're going to use the elements of ASME NOG-1 that we can and AISC

manual of steel construction to demonstrate the strength. Again, the canister transfer machine is essentially a crane, ASME NOG-1. And, again, the transport and emplacement vehicle does not have a consensus design code. It will be designed to the applicable portions of NOG-1 and manual of steel construction.

And, the last slide, surface facility structures are designed in accordance with the principal codes. They're ACI 349-01, and for the concrete portion, ANSI/AISC N690-1994 for the steel.

So, that's all I had, unless there's--I know that you have some specific questions that I can address, but that's all the presentation material I had.

ARNOLD: John?

GARRICK: A couple of simple questions.

SLOVIC: Yes, sir.

GARRICK: You mentioned at the outset that this design changes continuously pretty much, and that it's hard to keep up with it in your viewgraphs, I take it. What can you say about the stabilizing of a design? What progress are we making?

SLOVIC: Well, glad you asked. We had, when we had the CD-1 effort last June, the critical decision one that said we're going with the TAD canister and we're going with--go back to the site plan, please. We're going with the 3CRCFs

and the wet handling facility and the receipt facility.

We then set out a plan, both schedule and products, to produce approximately 1,300 products between the three engineering projects and the preclosure safety analysis that would be either direct references in the license application, or, for instance, if we had a drawing and we needed to do a calc to support it, then we considered that a licensing application support product. So, we identified all those products in conjunction with licensing and preclosure safety analysis, and we've been proceeding to issue those documents, some of them in parallel with other activities. So, we've issued more than a thousand, and we have about--well, we can do the math--a little less than 300 to go.

We've also identified about 100 of them that even though they're issued, that because of changes, the decision to borate the wet handling facility pool, some other changes about not using programmable logic controllers for certain functions, required us to change about a hundred of those drawings. So, we're in the process now of meeting on essentially a daily basis with Preclosure Safety Analysis to make sure that our design syncs up with their preclosure safety analysis, that syncs up with the license application.

So, we're into configuration control at this point, and we're coming up with a design that meets the license application requirements.

GARRICK: Okay. One other question. In the conventional engineering world, they have metrics for indicating where the design is from the standpoint of nearness to completeness, metrics like preliminary design, Title 1, Title 2, Title 3, whatever metric you want to use. Can you tell us where we are now with respect to the design and where you expect to be, say, at the time of the filing of the license application?

SLOVIC: At the time of the completion of the license application, we expect to be, and don't quote me these numbers, 35 to 40 percent done on important to safety system structures and components, and probably in the 25 to 30 percent on the supporting systems. So, we will have a structural design. We will have designs of the important to safety systems. We will have designs of the electrical systems that we need. We will have designs for things like hot water cooling systems for the buildings, but they won't be to the level of detail that they will for the important to safety structure systems and components.

ARNOLD: Henry?

PETROSKI: Petroski, Board.

So, in all these guidelines and drawings that you're showing us, are these just conceptual, or have any calculations gone into--

SLOVIC: No, these are reflective of the design as it's

being completed. In other words, the picture of the crane in there was based on an issued mechanical equipment envelope drawing that says the crane is this big, has this capacity, these dimensions, and these locations. The thicknesses of the walls are based on the structural analysis that's been completed to date. The configuration of the building has been frozen for about a year so that we could do the structural analysis and get it to this point. So, these are beyond conceptual designs. These are preliminary designs.

PETROSKI: What about some of these cases where you've looked at the possibility of something tipping over and you wanted to exclude that by design? Have there been any calculations made on that?

SLOVIC: We are doing, for those pieces of equipment--you guys are great--we're doing design reports for these new pieces of equipment. We need to demonstrate to everyone's satisfaction that we can build--I don't have a specific finalized ready to go build design for any of this equipment, but we will have done enough analysis work to demonstrate that if he needs a particular reliability with our design in the margins, we can meet that reliability for this particular device. So, we will have those done in time, at the time of license application submittal.

PETROSKI: How much interaction is going on between your group and industry, Idaho, various other places that have

some experience?

SLOVIC: It's an interesting question. We interface with Idaho. They're a subcontractor of ours to do the waste package closure system. So, we mine that resource as we can for material handling and things like that. We do have contacts with the commercial vendors, limited, to get their experience and their input on these pieces of equipment that we're doing. We have access to operating procedures and information on commercial nuclear power plants, but we don't have a formal "ask a utility" a question type of process. We do tend to--we go through NEI on occasion, and do those types of things to get their feedback and solicit their input.

PETROSKI: Do you think there could be improved interaction?

SLOVIC: You know, it's always better to make a decision in an information-rich environment.

PETROSKI: What about--have you considered that in much detail yet? For example, what would be the implications of some upset conditions on your group--would have implications for all sorts of other things?

SLOVIC: Give me an example. If I get more than 10 percent fuel?

PETROSKI: Excuse me?

SLOVIC: If I get more than 10 percent uncanistered fuel, is that--

PETROSKI: No, no, I'm thinking about situations like something is not supposed to tip over.

SLOVIC: It tips over?

PETROSKI: It tips over.

SLOVIC: Yeah, that's a major impact on the throughput. We have to recover from that event, and we're planning on recovery actions for those postulated events. But, that recovery in this case means termination of the event sequence, not necessarily how we're going to pick everything up and decide what went wrong and what we have to fix and what we have to change. So, we're not into that level of detail at this point. If one of these events occurs, that particular facility is probably shut down for a while.

ARNOLD: Okay, Mark?

ABKOWITZ: Abkowitz, Board.

I'd like to follow up on Henry's last comment about throughput.

SLOVIC: Yes, sir.

ABKOWITZ: Take it from a slightly water perspective. You made the comment earlier that you're planning from the standpoint of a 25 year receipt period, I believe you said.

SLOVIC: Correct.

ABKOWITZ: And, a 50 year emplacement period.

SLOVIC: Correct.

ABKOWITZ: So, on average, how many canisters are you

anticipating coming into the facility each year, and how many do you actually see being emplaced?

SLOVIC: The emplacement is set by the number of canister receipt and closure facilities that we have. If we have all three in operation, we can match. Round numbers, we get about 500 casks a year to get the 3,000 metric ton commercial fuel requirement. Approximately 340 containing TADs, and the balance containing Naval SNF, DOE SNF, or HLW. And, we have a requirement now, we have to match an emplacement. For every five waste packages of commercial fuel we emplace, we emplace two of DOE or other. So, we're anticipating that while we will receive--the requirement is for receipt of commercial fuel. So, we'll receive that 3,000 tons into 63,000 is 21 years we can receive it all with that full capability. And, we have that capability with the WHF, CRCF one, and receipt facility. But, we don't have a matching emplacement capability until we build the second and third CRCFs.

ABKOWITZ: So, right now, you have 500, just in ballpark numbers, you have 500--

SLOVIC: Casks.

ABKOWITZ: Canisters coming in and--

SLOVIC: 500 casks. Some of them are multiple canisters.

ABKOWITZ: And, roughly, until the other facilities are

built, roughly the ability to put 200 in the mountain at any given year?

SLOVIC: 160, that order.

ABKOWITZ: 160?

SLOVIC: Well, counting IHF and WHF, 200 a year; right.

ABKOWITZ: So, throughput is really governing the design of the aging pad? You basically have an extremely large aging pad to accommodate the shipments coming in at a much faster rate than you can emplace them.

SLOVIC: There's only about a two year difference in the current schedule between completion of the receipt facility and completion of canister receipt and closure facility two.

ABKOWITZ: So, once you get two up on line, then the differential--

SLOVIC: Then we go to 320, and then we can--we're getting close.

ABKOWITZ: Well, 320 is still a long ways away from 500.

SLOVIC: Correct.

ABKOWITZ: So, a very critical element to the surface design, surface facility design, is to have a fairly extensive aging pad for the purpose, not so much of aging as it is that you can't manage the throughput relative to what's coming into the system. And, that's being purposely designed that way as opposed to expanding the capacity of the throughput of the facilities?

SLOVIC: It's just a question of how fast we can put the building on line. We're talking full capability in, I forget, is it 2022, so it's essentially seven years after we start, or 2023, somewhere in there. We'll have three CRCFs, and we could match emplacement. But, at that point, it's not--it's the thermal--his favorite topic--it's the thermal requirements. If we're receiving fuel that they're shipping to us at 25 kilowatts, we have to wait until it's 11.8 under current conditions before we can emplace it. So, we probably, and if you look at emplacing all of this 11,000 waste packages in 50 years, you're about 220 waste packages a year, so you need two CRCFs to meet your emplacement requirements.

ABKOWITZ: And, then, if you encounter an upset condition along the lines of what Dr. Petroski mentioned, that could take a facility out of commission for an extended period of time, which would essentially shut down its throughput capacity.

SLOVIC: For that particular facility, yes.

ABKOWITZ: Okay. And, you're comfortable with the margin for error that you have in this system? Because it seems to me that you've got a very significant bottleneck already built into the design, and if you have any other upset conditions, you've got a large quantity of material coming in that's just going to be going out to pads where you

may be capacity constrained, and you also have faults out there that you've got to be worried about. Am I on target with the logic here?

SLOVIC: I don't think that's--I don't know if that's a question that I--if I gave you an answer, it would just be my personal opinion. I think that's better directed at DOE than I.

ABKOWITZ: And, all of those considerations would theoretically go into a comprehensive preclosure safety analysis, I would assume?

SLOVIC: Yes.

ABKOWITZ: Thank you.

ARNOLD: Ali?

MOSLEH: Mosleh, Board.

So, that's actually very close to what Dr. Abkowitz just asked. I understand, obviously, the safety analysis would have to rely on the design. But, do you get any formal routine feedback from the safety analysis, operational and safety?

SLOVIC: The preclosure safety analysis?

MOSLEH: Right.

SLOVIC: Yes, we sit with each other and we interface all the time, and it is formal, informal. To set aside our deterministic hats for this particular job, under the Rules of Part 63, it's not prescriptive of how we do anything. So,

we've chosen to use industry standards where appropriate, because it's familiar to the NRC and we've done it in the past, and these are acceptance standards. But, we've done-- Dr. Frank, did you want to answer this?

FRANK: All of these questions are good, and it is the case that a thorough final throughput ought to be established, including off-normal accident events. But, I want to put this in perspective. The real events that will shut down the facility for a while are those that breach a canister. And, we're progressed well enough along with our risk analysis, which we're terming preclosure safety analysis here, to know that those are rare events, well below the threshold of considering them expected during the lifetime of the facility.

So, I think at the end of the day when you add up the--if you were to add up the frequency of all such events, you'd find a very small impact on throughput, just because it's a low probability, and the sum of the event sequences would be relatively low.

ARNOLD: Andy?

KADAK: Yes, I'd like to follow up on the throughput question. But, more with the DPC handling facility, the wet facility. I think, as I remember the numbers, they were like 2,000 or so potentially DPC type casks available, or will be available by 2017, or so.

SLOVIC: 17,000 metric tons, or something.

KADAK: Yes. 2,000 canisters, that's probably easier to deal with than a ton.

SLOVIC: Okay.

KADAK: What's your processing rate for those, assuming you're going to accept them through that wet handling facility?

SLOVIC: Without having truck casks in the mix, we can do, we estimate we can do 40 to 45 a year. One a week basically.

KADAK: One a week, okay.

SLOVIC: Because we assume 75 percent availability, so 25 percent down time for maintenance and other operations.

KADAK: Okay, thank you.

SLOVIC: So, that's, technically that's 2,000 in 50 years if we operate the facility for that long.

ARNOLD: I have a little question resulting from our visit to INEL, where we saw that operation you talked about.

SLOVIC: Yes, sir.

ARNOLD: There was some discussion as to whether the helium was actually necessary at all. Do you have any insight on that?

SLOVIC: I know that the postclosure people are investigating that. I don't think they have come to a final conclusion as to whether or not that's needed or not.

Remember, when we originally envisioned the system, we were loading individual fuel assemblies into a basket inside of a waste package. So, it was a different scenario. But, now with the TAD inerted with helium, it's just a small volume between the TAD canister and the waste package inner vessel. But, I don't have a specific answer for you on that.

ARNOLD: that will be resolved?

SLOVIC: It will be resolved; right.

ARNOLD: Question for Dave Diodato.

DIODATO: Diodato, Staff.

Thanks for your presentation. Just for a point of clarification, you mentioned that your aging pads would have a capacity for about 2,500 spaces, for 2,500 TADs each. So, how many aging pads are you going to have all together in your design right now?

SLOVIC: Right now, there are two different designs, but each one is made up of multiple smaller pads, so that if the situation changed in the future and we didn't need to build them all, and we intend to build them in series so that we don't build ones we don't need.

DIODATO: Okay. So, you're going to then in either design, you have 2,500 spaces total of aging pads?

SLOVIC: Correct, between the two pads.

DIODATO: Okay. So, you have two pads that can each hold about 10,000 metric tons for storage?

SLOVIC: They're a slightly different size. I'd have to go look at the numbers, but they're not quite equal in size.

DIODATO: But, your total capacity is still going to be about 21,000 metric tons?

SLOVIC: Right, we assume that on average, a TAD would have about 8 ½ metric tons in it. So, 2,500 tons times 8 ½, obviously, it would be licensed for 21. So, if we had a significant number of DPCs, which have more metric tons in them, then we would have to limit it to the metric tons, and not necessarily the actual numbers.

DIODATO: Are those aging pads shown on your--

SLOVIC: They are not on this particular model. They're actually--and, I didn't show them because the mechanical model has been updated to reflect the revised aging pad, but the structural hasn't, so you looked at them, it was very confusing as to what it is. But, they're approximately a mile to the north of--

DIODATO: Joyce Dory is sitting by an aging pad right now.

SLOVIC: Not quite over there, but they're about a mile north of CRCF three.

DIODATO: All right, thank you.

ARNOLD: Thank you very much, Bob. John, do you want to stay to the original schedule for coming back from lunch, or do you want to advance it?

GARRICK: Well, I've been thinking about that, and I think that we'd run into a problem in changing the schedule because some people don't attend the morning session, and attend the afternoon session, and I think that we're probably obligated to stick to the schedule that was announced. So, I think we will stick to it. So, we'll have an extended lunch time. 1:45 is what the agenda says. So, we will, unless there's further questions, we will adjourn until that time.

(Whereupon, the lunch recess was taken.)

AFTERNOON SESSION

GARRICK: Okay, can we come to order, please?

One of the things that's difficult about understanding the safety of a nuclear facility is the plethora of approaches that are used to do the analysis. There's a whole spectrum of probabilistic, probability based approaches. There's a whole spectrum of margin analysis basis, and we see that not only with respect to issues having to do with radiation, but also issues having to do with seismic, the debate between margin analysis and a probabilistic based analysis. So, it makes it very difficult sometimes to establish, I would think, establish, I would think, establish a consistent policy for--criteria for doing safety analysis.

The most important achievement, in my judgment, in the last few decades has been the movement towards probabilistic based analyses, because they come closer to kind of telling you the truth of what really happens than most other approaches, and they also get us away from the masking that something like a worst case analysis can do, because experience has pretty well confirmed the fact that in general, the worst case scenario is not a significant contributor to risk. A rather interesting and important finding.

We're going to hear about what's going on here with

respect to the surface facilities. And, when I talk about different approaches, even within the agencies, there's different approaches. The NRC, for example, is a risk informed oriented agency, but there, there's variation in where and when they use probabilistic based analyses, and they've developed other types of approaches, such as the integrated safety analysis approach, the margin analysis that I referred to earlier, and then, of course, the PRA based.

We're going to have somebody tell us a little bit about what's going on for this facility, and I understand it's kind of a mix of what has come out of the integrated safety analysis, the thought processes, and what's come out of the PRA processes. So, we'd like to have Mike Frank tell us a little bit about the general framework of the PCSA, preclosure safety analysis, how they structure and aggregate the associated scenarios, and implement the kind of scenario based approach to safety analysis, the approach that they're taking to importance rank scenarios, and to draw a very sharp distinction between what the risk assessments say is important to safety and what the regulations tend to say are things that are important to safety. And, then, finally, I hope Mike tells us a little bit about the actual nuclear design basis for safety.

Mike Frank is a consultant. He's with BSC now, I guess, and I have good knowledge of some of his background,

as he was part of a team that I worked with for many, many years, as was Ali Mosleh. So, I'm looking forward to hearing what he has to say. Mike?

FRANK: Thank you, John.

Sometimes there are technological solutions that require sophisticated digital controllers, and of course then there's the shoe-leather solution, and in this case, the shoe-leather solution is going to work for this presentation.

Next slide? As John alluded to, this is a presentation in four parts. One is going to talk about sort of the conceptual framework for the preclosure safety analysis, which uses probabilistic risk assessment technology, the scenario based approach, in fact. Then, I want to talk about what the appropriate level of aggregation is for event sequences in the PCSA. And, that's a topic that is derived directly from the way the regulation is written. Then, I'll talk about our approach to identifying what is important to safety. And, again, it's derived directly from the words in the regulation for important to safety. And, then, I'll talk about nuclear safety design basis, and that may not be a phrase that most people are familiar with. Basically, what that means is a quantitative probabilistic set of numbers, such as the reliability of an ITS piece of equipment, that we need to meet in the design in order to make our compliance case to the nuclear regulatory

commission.

Next? Quite a few years ago, 1991, a colleague by the name of John Garrick and another one by the name of Stan Kappen, introduced this concept of the risk triplet as a basis for a scenario based risk assessment. And, they set it out on the basis of three questions. What can go wrong? And, you answer that question by developing a set of scenarios of things that can go wrong. And, these are detailed scenarios that actually get down to the equipment level, what can go wrong with pieces of equipment, hardware, and what can go wrong with the people who operate them, what errors the people might make in operating equipment. So, it is very much an engineering based approach to safety analysis.

How likely is it? And, the answer to that is determined in several ways. One by historical records, compilations of available evidence, including historical records, probabilistic engineering analysis, like our seismic fragility work, or our structural reliability work, and also the judgment of experts. You answer how likely is it in another way, too. In some cases, the data one has, or the information one has from historical records doesn’t necessarily match directly with the large pieces of equipment or processes you have, and, so, there’s a breakdown process or a disaggregation process usually using false reason in

risk assessment, in which one maps the thing that can go wrong, down to disaggregating that into sublevels and components to the place where you actually have historical records. And, to be part of a real risk assessment, we all recognize that these are event sequences that may or may not happen in the future, and since we're not good at determining what is going to happen in the future, few of us have crystal balls, uncertainties are an established and essential part of a risk analysis.

The last part of that triplet is the question what are the consequences. And, you first have to ask the question what are consequences--which consequences are important? What do we need to know in order to make our case to the Nuclear Regulatory Commission? And, in this case, it is such things as dose to off-site public, dose to on-site workers and public, and criticality. So, in a non-regulatory environment, the consequences of interest are defined by the decision-maker, the one who has to make a decision about whether or not it's safe enough or good enough or practical enough to go forward. In this case, the regulatory agency has to make a regulatory decision about compliance. So, in effect, they are the decision maker. So, our analysis is geared toward regulatory compliance.

This last point is that this definition of risk, or the risk triplet, is a good operational definition, in that

it is a synopsis of how we actually are doing the PCSA.

Next slide? This is quick for review. I think most of you are familiar with event sequences, and for those who are not, I'm going to do this quickly. They're composed of something that can go wrong initially, a perturbation from normal operation called an initiating event. The facilities and equipment and people respond to that initiating event in a certain way, and, so, there's a set of events that represent the system, facility and human response. And, then, there's the end states of interest, which are--it's another term for consequence of interest, in this case.

Next? This one chart is actually a summary of the event sequence development that we're doing for the preclosure safety analysis. You start with detailed knowledge, and that obtaining knowledge about the design continues in this process, in the YMP, throughout the design effort. And, the reason is that we are actually conducting a risk informed design process, where information about the design as it evolves is fed back via our risk models into the design, so that at the end, there's convergence. We know that there is a design that in fact meets the requirements we're setting.

The next step in developing event sequences, one starts then with this detailed knowledge of everything you can about the facility, structures, operations. One develops

a top down logic called the master logic diagram, which starts with, at the top, the end state of interest, say release of radionuclides, and breaks down into ever decreasing levels of--I'm sorry--increasing levels of detail, breaks down to a point where one might start identifying appropriate initiating events at the level of equipment, which is the level that we want to get to, equipment that goes wrong.

In this study, we're supplementing this top down approach with what's called a hazard and operability study, which is derived from the chemical process industry, this is a process that's been around since the 1960's, in looking at in a very detailed way line by line through drawings, specific ways in which the process depicted in the drawing can go wrong. And, this is, one can call that a bottom bottom, or a bottom up. It's really a bottom level analysis, and it feeds, since it deals directly with pieces of equipment, it feeds directly to the levels associated with initiating events.

We're also looking at external events, that is, things that happen outside by nature, earthquakes and lightening strikes and windstorms and floods, and we go through an analysis process on that. I'm not going to emphasize that in this talk.

The scenario approach is depicted here by taking

the initiating event, which is this bubble, and these boxes here represent pivotal events, which is how the system responds, and the diamonds represent end states. And, so we have--and, in this study, we're going to have probably a couple hundred of these types of diagrams in order to capture the array of initiating events, and system responses.

As I mentioned in the previous slide, we support the quantification of these events, that is, the probability of an event, by fault tree analysis, and that itself is supported by historical records. And, we're using in this study industry-wide, multiple industry-wide records of actual equipment failures, field failures, and these are readily available in actually published compilations.

At the end of this analysis, and all this stuff is done using uncertainties and these little squiggly lines here are supposed to represent probability distributions, which represent uncertainties in the estimates of equipment failures, failure probabilities. And, at the end, you get results that are expressed also in uncertainties. In this slide, for ease of, just ease of drawing, I depicted uncertainties as a band. Mathematically, that's the probability distribution as well.

Next slide? Okay, now a discussion about what the appropriate level is at which one takes a look at event sequences.

Next slide? In nuclear power plant probabilistic risk assessments, the first end state of interest is called core damage. And, one obtains a frequency of core damage, which is the sum of all the event sequences, probabilities, that--all the event sequence frequencies leading to core damage. So, you have one metric, and it's core damage, and one core damage for that kind of PRA, and you have a summation of all event sequences that lead to core damage, and that is one measure of risk.

We have a slightly different situation here, because the regulation delineates different categories of event sequences. And, I want to go through that. Category 1, which is expected during the preclosure period, which is nominally 100 years, and that is, therefore, it will occur one or more times over the preclosure period, that's Category 1 event sequence. Such event sequences are aggregated, on-site dose is aggregated as a yearly dose and compared to 10 CFR 20 limits. So, that's one metric for acceptability and compliance for Category 1 event sequences.

Category 1 event sequences for off-site dose at the site boundary are also aggregated as a yearly dose, and compared to 15 millirem per year.

Category 2, which is not expected to occur over the preclosure period, but has a frequency of occurrence greater than 10 to the minus 4 over that period, those event

sequences are categorized one at a time on the basis of probability only, not on the basis of risk, which would be the cumulative expected consequence of all scenarios. Off-site dose for each Category 2 event sequence is to be calculated and compared to the dose performance goal at the site boundary of 5 rem. On-site dose is not required to be calculated, again, for this compliance oriented analysis.

The regulation also states that there has to be provision to prevent and control criticality. We're interpreting that as meaning that for all Category 1 and 2 event sequences, there should be no criticality, nothing greater than the K effective defined by the upper safety limit.

If we find event sequences that are beyond Category 2, that is, less than 10 to the minus 4 over the hundred year preclosure period, then there is no consequences need be evaluated, in accordance with our interpretation of the regulation.

Next slide? Now, here's the dilemma. The more detailed I define an event sequence, the lower I can force the probability of that event sequence. If I aggregate to the higher level of, that is, if I take and aggregate very high, then I can--the probability of that event sequence will raise. We don't have that problem if you sum all the event sequences. It's not an issue because it doesn't matter at

which level one divides things out. You add them all up anyway. But, here, you have that issue.

So, what do you do? There is no guidance in any of the literature that we've seen on this. So, here is an example of what I mean on level of aggregation. Should a single event sequence include all drops from cranes of all canisters from all possible sources in the facility, all cranes in the facility? I can certainly define a perturbation on the system that says my perturbation is any drop anywhere, and add up the contribution from all potential locations. Or, should there be more resolution with respect to sources of the drop, the facilities, and the canister types?

Again, I said before if I were performing a risk informed analysis approach, and the decision you make here is very important, because it governs the reliability requirements of the ITS, important to safety, systems, structures and components that are derived from the event sequences.

Next? So, we thought about this quite long and hard, and we came down to the conclusion that the overriding criterion for making this decision would be accuracy of our representation. We want a PCSA that is at the level that we believe best represents the operation facility and the variation in operations across buildings and from one room to

another in the facility. That was our governing criterion.

And, so, here's an example of what that governing criterion led us to do. We divide things up into different event sequences because of variations in the facility configuration and operations. This would lead to different challenges, that is, how high one lifts a canister, for example, the number of lifts one has, and the residence time within the facility of having a canister in a particular location in a facility. That latter one is important for, dare I say it, earthquake events, earthquake event sequences. There's different kinds of seismic restraints associated with different times or different locations in the building.

There are also variations warranted in event sequences, that is disaggregation of event sequence warranted because equipment is different over different facilities. Some equipment is similar across buildings, but ultimately, the complement of equipment for each facility is different.

There is also ramifications with respect to the waste form, PWR, BWRs, DOE spent nuclear fuel, et cetera, and the containers that they're in. There's variations in robustness over different casks and canisters, and there are variations in source terms because of the different fuel forms. So, we need to account for those differences in our event sequences.

So, a drop in the transfer cell is not the same

event sequence as a drop of a canister in the receipt and preparation area. And, it's not the same as a possible tilt-down when the waste form is in a waste package at the other end of the facility. These are all different event sequences.

So, we concluded that event sequences should be disaggregated to represent different waste processing functions, different waste forms and containers, and different facilities. And, what I mean by processing functions, this is the processing functions that Bob Slovic walked you through earlier.

Next? Here's an example of what an event sequence might look like when our study is done. And, those of you who are familiar with risk assessment may see a portion of this that is slightly unfamiliar to you, and I'm going to explain that. This is our initiating event. These are our sub-initiating events, which are major contributors to this initiating event here. And, this represents what we think is the appropriate level of aggregation to proceed through the event sequence and perform and develop our frequencies of event sequences at this level.

Fault trees are typically developed for initiating events in our analysis, because these represent actual pieces of equipment failing, and in this analysis, instead of one fault tree, we decided to illuminate the major contributors,

the next level down, of aggregation, I should say, to this level, just by putting it on the event sequence diagram. And, this is strictly for elucidation purposes. I think it just helps to follow the analysis.

You're going to see these numbers here. These set of numbers refer to this particular circle, transportation cask dropped, and those relate back to the master logic diagram. So, we can trace the flow of information from the master logic diagram into the initiating event sequence diagram.

Proceeding along, after the initiating event, this set of pivotal events here in the square boxes is the system response, and we categorize that in this way. If there is an impact on the transportation cask, we want to know if the transportation cask remains intact. If it does, then there's a possibility that its shielding function might be compromised. If not, we want to know if the--if the cask does not stay intact, the next level of question is whether or not the canister inside stays intact.

Why is this important? Well, when the waste form arrives in our facility, in the YMP facility, then there are two levels of containment. One is a welded steel canister, and one is a transportation cask, which is bolted on the top. These are two levels of containment, and, so, in order to get a release, you have to violate both levels of containment.

If you do, in fact, get a release, then we ask about the confinement function of the important to safety HVAC system surrounded by the building, and we also further ask questions that relate to whether or not, for commercial spent nuclear fuel in this case, there is moderator present. Our preliminary criticality work is indicating that without introduction of moderator in these canisters, into the canister, there cannot be a criticality, so that's an important question.

Next? Okay, so that's a summary of where we are with respect to the approach we're taking for the actual analysis. Now, I'm going to spend a little bit of time talking about important to safety, what constitutes important to safety for this regulation.

This is right out of the regulation, important to safety, with reference to structures, systems, and components, means those engineered features of the repository whose function is to provide reasonable assurance that high-level waste can be received, handled, packaged, stored, emplaced, and retrieved without exceeding the requirements of 63.111(b), which is for Category 1 event sequences. And, I pretty much went over what that is in the previous slide.

And, ITS function is also to prevent or mitigate Category 2 event sequences that could result in exceeding the values of 5 rem at the site boundary.

Next? So, we deduce from this that an SSC is classified as ITS if it appears in an event sequence, that definition in the regulation only refers to event sequences, and at least one of the following criteria apply. The SSC is relied upon to reduce the frequency of an event sequence from one category to the next. So, for example, we could apply reliability improvement measures to the HVAC and to the cranes to reduce a coincident breach and loss of HVAC to beyond Category 2. We can work to that design requirement. And, in fact, that's what we do.

Next? The next criteria that defines what's ITS is that an SSC is relied upon to reduce the aggregated dose of Category 1 event sequences by reducing the event sequence frequency. So, when we identify places in which people can have a direct exposure within the facility, we put in design features, like interlocks on shield doors and on crane or canister transfer machine slide gates, on the TEV, which takes the waste packages from the buildings down to emplacement.

An SSC is ITS if it's relied upon to perform a dose mitigation or criticality prevention function. Canisters and casks are ITS because they serve as a containment, which is clearly dose mitigation. HVAC is ITS because it is part of confinement. And, the staging racks in the WHF pool are ITS because they are required to ensure adequate separation of

fuel assemblies within the pool.

Next? So, having talked about what are criterias for important to safety components, let me talk a little about how we derive the requirements for them, the nuclear safety design basis. These requirements, unlike normal engineered--in addition to the normal engineering requirements one usually sees in developing a design such as thou shalt meet ASME boil and pressure, section such and such, or in designing structures, thou shalt perform your analysis in accordance with ASC 4503, there is also an additional set which pushes a design toward being compliant with the regulations that are in 10 CFR 63. And, those are called the nuclear safety design bases. And, these are derived in part from the PCSA. They're derived in whole from insights from the PCSA, and they have the--and, these nuclear safety design bases have the form as follows.

We define the safety function of the particular ITS piece of equipment. It's not just the crane is ITS. What's ITS about the crane is preventing it or reducing the probability of drops. So, that function of the crane is ITS. And, so, those portions of the crane that deal with that function are provided a reliability. You've got the probability of violating that function should be less than a number that we specify. Nuclear safety design bases are specified for each ITS SSC to ensure that they perform that

function in compliance with the regulation.

Next? So, we have nuclear safety design bases of the--that reads kind of like this. The mean frequency of some ITS SSC failure on demand is, and you state a number. For normal running equipment, like HVAC, heating and ventilation, the reliability usually depends on inspection and maintenance intervals, so we specify an inspection and maintenance interval that is part and parcel of the calculated reliability.

Another one may read such as the mean unavailability of some ITS SSC over some time period “Y” is, and you give a number. Or, we could say the mean frequency of some earthquake-induced event sequence is, and you give a number, probability number.

So, that’s the nature of a nuclear safety design bases, how we’re working backwards back to the presentation, how we look and how we define what is ITS, how we, at what we think is the appropriate level of aggregation or disaggregation of event sequences, and the general PCSA approach.

And, that’s my prepared remarks.

GARRICK: Okay. Yes, questions from the Board? Mark?

ABKOWITZ: Abkowitz, Board.

First of all, I appreciated the presentation, and I do think that the overall approach that you’re proposing is a

sensible one. That's the easy part, however. The hard part is populating it. And, there are a few things that I wanted to bring out. Some have to do with the time frame and process for doing that, some of it has to do with the actual technicality of doing that.

The first thing I wanted to ask is the scope of this analysis, because I think it's been made clear in the past, and it still appears to be the case, that the preclosure safety analysis from the standpoint of the Department of Energy is that it starts at the fence line of the surface facility design. Is that still the case?

FRANK: Yes.

ABKOWITZ: So, any risk that may be taking place during the waste acceptance and transportation phases, are basically considered to be a wash amongst all the different scenarios, design scenarios and operating scenarios that are being considered for the surface facility and for emplacement operations; is that correct?

FRANK: We're taking the approach that is consistent with all of the nuclear power plant risk assessments that I think that's ever been done, is that our initiating events begin within the fence line of the YMP. We are not considering at this time initiating events that begin outside the boundary.

ABKOWITZ: But, do you not agree that this is a

different type of problem. In those other scenarios, everything occurs within the fence line of the nuclear facility. In this case, it's an integrated waste management system. That's a message that's being delivered to us more often lately, and the integrated waste management system for preclosure operations, as I would understand it, starts at waste acceptance and ends at emplacement. Is that not the case?

FRANK: Well, I told you what we were doing. The premise in your question is that this is a different situation, and I think I'm going to differ with that a little bit. In all the risk assessments I've been associated with or know about, and that's both at NASA and in the nuclear power business, there is always this lingering doubt that one has about the perfection of equipment that's delivered. So, a reactor vessel in a nuclear power plant is analyzed in the risk assessment as if it were delivered per its codes and standards, and it performs as it's supposed to perform. That's pretty much always an initial condition, and we haven't departed from that.

ABKOWITZ: Okay. So, I'm to believe then that following this line of thinking, if there's two or three different design and operating strategies for handling materials at the surface facility and emplacement, and one of those scenarios triples the exposure of handling to workers at a utility site

compared to another one, in the preclosure safety analysis, they will both come out as being of equivalent safety; is that correct?

FRANK: We're just not going there. We're not handling that.

ABKOWITZ: Right. But, you are agreeing with what I'm saying; correct?

FRANK: That's correct.

ABKOWITZ: Those two scenarios would be considered equally safe from the standpoint of the preclosure safety analysis?

FRANK: That's a hypothetical, because--

ABKOWITZ: No, it's not a hypothetical.

FRANK: No, it's a hypothetical because we were given a specific set of boundary conditions associated with processing up to the site, and we worked the PCSA with that specific set of boundary initial conditions. So, then, you asked a question if there was a second one, would the PCSA be the same, would the results be the same. If there were a second one, and we were given the second set of boundary conditions to consider, then we would consider the differences associated with the boundary conditions. That isn't the scope we were given.

ABKOWITZ: Your boundary conditions start at the boundary of the fence line of the surface facilities; is that

right?

FRANK: That's a true statement.

ABKOWITZ: Okay, thank you.

GARRICK: Ali?

MOSLEH: Mosleh, Board.

Mike, let's follow up on this issue of what's included and what's not, and particularly initiating events. And, I know that you've had discussions in the context of nuclear, and also space station work that you have done. That one needs a method basically to ensure that your coverage is adequate for initiating it. So, for, say, a nuclear power plant, the top event of the master logic diagram is a heat balance basically?

FRANK: That's one way of doing it, yes.

MOSLEH: Yes, as a method. And, now, here you have proposed, or you're actually doing this based on a hazard and operability, a list. How do we know that that list includes, it's comprehensive?

FRANK: First of all, we can retrieve that viewgraph, but we're using two methods and merging them. The first method is a master logic diagram, where we start with the end state, like radionuclide release. And, we work our way functionally through the system design to determine what failure, ultimately, failure modes of major pieces of equipment contribute to that.

There's a second method one can go about doing it, and the second method, HazOp, does not rely on a list. We actually take what you would call PNIDs in nuclear jargon, and work through the PNID process by process, asking the typical guide words, HazOp questions, answering them, writing down the deviations, writing down causes, writing down consequences, and seeing if that other method of doing it matches up well with our top down master logic diagram. And, where it doesn't match up well, we reconcile the two. We add from the HazOp to the MLD.

MOSLEH: Okay. I thought that you were replacing it by the hazard, but it's a complement.

FRANK: Yes.

MOSLEH: Now, then, this list includes external initiating events that--

FRANK: Oh, yes.

MOSLEH: --that could initiate external to the boundaries of the facility?

FRANK: Yes.

MOSLEH: I don't know what, a flood would be--

FRANK: Or a tornado, for example, might initiate, start outside and come into the boundary.

MOSLEH: Yes. All right, now, the part that I'm a little bit actually confused about, and I think there is a logical disconnect between the statement you make on Slide 8

as a basis or justification or reason to go to 9, namely just aggregation or level of decomposition. And, it's a frequency based argument here that if I disaggregate, if I decompose further, the frequency of those events becomes smaller and smaller, until they become zero effectively, because they become such a unique event for which the probability is very, very small. But, then, you go on and say like, you know, because of this, I need to think about how I want to--where do I draw the line for disaggregation or decomposition, and you base it on what you call representational accuracy.

I thought that the basic kind of approach to deciding where you would draw the line, in terms of level of detail, kind of based on, to a very large extent, driven by the end state, or the consequence of interest. And, that's the one that basically gives you the anchor point, kind of defining how far back--for kind of a reference point for your frequency. And, then, the aggregation, decomposition is mostly driven by how far do you want to take it in order to be able to identify causes, and for risk management to see where you would actually want to focus defenses against this, not that the frequency will go down. The frequency is anchored by the consequence.

And, the other thing is the data availability. So, I don't see why this argument of, you know, worrying about driving the frequencies too low, is a case for maybe actually

a better argument that you have, which is the representation on accuracy.

FRANK: Okay. Representation of accuracy is, to my mind, the overriding argument for selecting a particular level of aggregation, disaggregation. But, I want to give you an example of where I think there's a problem if one disaggregates too low a level.

So, I have, for example, a crane and I want to represent this crane as being composed of multiple components, all of which contribute to the success of a lift, and therefore, in the reverse, potential failure modes for a drop.

If I take each individual component and call such that that component in a crane, the hoist, the support wires, and I say that becomes the initiating event, I'm at a very low level, I have extremely small probabilities of frequencies of failure for hoist, for example. And, that would lead I think to an erroneous notion of what would be screened out.

If I take failure mode by failure mode of a crane, its frequencies, I will have, in effect, I think I would be able to screen out nearly all event sequences such that I would never have to do a dose calculation, in accordance with the regulation, because if the probability of an event sequence is less than 10 to the minus 4 over the preclosure

period, I no longer have to do a dose calculation.

MOSLEH: Not if your pinch point is the crane failure; right?

FRANK: That is an initiating event, a successful crane doesn't produce a drop, so I go off to the next initiating event, yeah.

MOSLEH: So, if you base it on what matters, basically the event of concern, you know, a malfunction that has a consequence, then your choice of how far you go down in terms of detail is a matter of, you know, a number of things, including resources and modeling and things that are--you know, data availability and other things, but not that frequencies become smaller. I mean, you don't screen at that level. You screen it at the level where the event has some consequence; right?

FRANK: Agreed.

GARRICK: Okay, I have some questions, but I want to get the whole Board in, so we're going to have to be reasonably efficient here. I have Andy, Howard, David and Bill. Andy?

KADAK: Yes, thank you.

What you've described here is probably a four or five year process. Now, is this going to be part of a license application?

FRANK: Yes.

KADAK: Do you want to amplify?

FRANK: Do you want me to amplify?

KADAK: Yes. I mean, the analysis to support all of the failures is not going to be insignificant. And, then, assigning probabilities to the events is also quite a challenge. And, even if you get a decent set of event sequences, then you have all the fault trees to kind of build up.

FRANK: You bet. So, tell that message to DOE and point out that the BSC is performing a miracle here, because we have really compressed the normal time period. In doing so, there are great management challenges to keep everybody together on the same page within the PCSA as well as working with engineering. We have a very, very large team. This is far and away the largest team, by maybe a factor of five or six or seven, that I've ever had to assemble for a risk assessment. We have about 60 people just in my area, and with all of the, including criticality and dose, it's on the order of 75 people doing this work. So, it is a very, very large effort with a compressed schedule.

KADAK: And, Norm Rasmussen once said you can get 90 percent of the information with 10 percent of the effort. Have you tried looking at it from that perspective to identify what Ali was talking about? Where are the risk significant issues that you should maybe focus in on with much more detail than trying to cover everything in the

detail that you're worried about?

FRANK: Okay, first of all, I did not say that we're covering everything in equal detail. I do believe in a risk informed approach to a PRA. And, so, yes, things that are much less important, I'm not, for example, in comparison to a 23 foot drop from a crane, I'm not going to worry too much about. A collision of a canister into a wall, I'm not going to put in the same level of effort at all.

KADAK: Okay, thank you.

GARRICK: Speaking of failures, the hotel warned us that they're going to do a test of their emergency power generator, and that we may be in darkness for a few moments any time now, between 2:00 and 3:00. So, if that happens, just relax. Wait until the lights come back on.

All right, Howard?

ARNOLD: My comment is related to Andy's. You told us how you're going to do it, but we haven't seen any actual results from your doing it, which raises a question. The design is proceeding, and if you say well, you know, the schedule of this is thus and so, but the design gets done, then you're kind of saying the design--or this is irrelevant to the actual performance of the design. I think that, in fact, you've got to present some information to the designers on a current basis, and I presume that's all paced so they all come together at the L.A. point, huh, both the design and

the safety analysis?

FRANK: Let me reorient your paradigm here, because I think we're doing something a bit different in this process.

It's really, the traditional way of thinking about it is that you have a design and you evaluate the design. Then, the next level of thinking about it is that you have a design that takes you to--preliminary, evaluate that, you give some feedback to the designers, and then you go to the next level, tier two, or whatever it is, in design, and you do that again. We're doing this almost continuously, where at first, insights were given back to the design team based on judgment. And, then, as the models developed a little more, we could give them crude order of magnitude estimates, and then as the models continued to evolve, those estimates we hope get more accurate, or at least more down to the level of detail that the design is at. And, yes, we hope at the end, that it matches up right.

ARNOLD: And, the assumption is that when you find something, it can be fixed by some tweaking of the design?

FRANK: Well, I think that's a big advantage of having a risk assessment, going along right in parallel, in fact, interwoven with the design. In the surface facilities, we have that ability, it's just brick and mortar and steel and we can change that. We know how to design things. So, it is really just a question of time before it really does all come

together.

ARNOLD: Any idea of when that comes?

FRANK: Well, our stated due date for BSC delivery of a licensing application, with all supporting analyses done, is end of February 2008.

ARNOLD: Design and a supporting--

FRANK: Yes, Bob Slovic said roughly 35 percent of the design for ITS components, that when the associated PCSA, at that time.

GARRICK: David?

DUQUETTE: Duquette, Board.

I'm not sure I want to flog a dead horse, or a dying one, but I'm going to do it anyway. I'm a little bit concerned about the safety case itself. I'm going to follow up on what my colleague, Mark Abkowitz, said. We heard this morning that there would be a time when the facility is being constructed that there could be almost an excess of material arriving at the site before it can be properly handled as far as disposal is concerned, probably would have to be put on some kind of pads, and so on and so forth. It's during that period that if anything goes wrong at the site, a crane failing, some delivery problem, or something like that after a year or two, that would expose workers at the utility who may be loading casks for delivery, will all of a sudden, all the systems will have to be stopped, including trains perhaps

on the tracks between the two places, which exposes the public to a greater risk and exposes the workers at the utility to a greater risk. You've told us what you were asked to do, which is keep inside the fence. I'm going to ask your personal opinion, and ask you if you think that's reasonable.

FRANK: Yeah, in developing an overall safety case for an integrated process of utility to YMP via interim storage or not, if one were interested in the overall, as one should be interested in the overall safety associated with the entire disposal process, one should look at it all. I agree, yeah.

DUQUETTE: Thank you.

HELLSTROM: George Hellstrom, DOE.

I just want to make a comment that there is a separate issue or process that also is going on, that was also spoke of this morning, in the Environmental Impact Statement, in the Supplemental Environment Impact Statement.

GARRICK: Okay. Bill?

MURPHY: Bill Murphy, Board.

Are you aware of this event sequence and fault tree analysis approach being applied to postclosure safety assessments, or performance assessments for nuclear waste disposal?

FRANK: I am not well-versed in what's going on in

postclosure. I wouldn't be the right person to ask.

MURPHY: Okay. So, you're not aware of any--

FRANK: Oh, I didn't say that. There is, in fact--there is a--the way I understand it, and, again, I'm not the right person, but the way I understand it, there's a FEPs analysis, which is sort of a screening analysis. If it screens through FEPs, it goes through the complete TSPA. And, my understanding is that they're, in the FEPs analysis, using the same tool, sapphire, for event tree, fault tree work, that we're using.

MURPHY: Okay, thank you.

GARRICK: Okay, Mike, it strikes me that one of the things that's going on here is that the team that's doing the PCSA is trying to please all the schools of safety analysis, the risk assessment school, the two approaches that the NRC tends to implement on nuclear facilities, and then, of course, the DOE approach, and the DOE regulations, and it's very difficult to do. You know, one of the things that would be very useful, and it's not clear to me that we'll ever have an answer to this, is to be able to compare on a common basis the preclosure risk with the postclosure risk. There's many people, including myself, that believe that the preclosure dose risk is probably greater than the postclosure dose risk. And, it's going to be very difficult to get an adequate resolution to be able to show where the risk is coming from.

I would think that the way the bottom lines would be, if you could do it, in other words, if you ended up with a CCDF, complementary cumulative distribution function, on the preclosure, and compared it with the postclosure, that the numbers would probably be smaller in the preclosure, but the uncertainties would probably be much greater in the postclosure. That kind of information would be very useful, it seems to me. But, the truth is your scopes are different, your approaches are different--

FRANK: And, the regulation that we're meeting is different.

GARRICK: --and, trying to meet all these regulations are different as well. One of the things that they're doing, of course, in the postclosure is assembling all of the results into integrated and totally aggregated CCDFs. You're not doing that. You're doing it by categories.

FRANK: Yes, that's not part of the compliance case.

GARRICK: Right. Right. So, it makes it further--it further masks what is really going on here in terms of being able to make comparisons and in terms of being able to put the puzzle together that characterizes the total waste management system risk.

And, that brings me to a few specific questions. The NRC has some interim staff guidance now on things like seismic, and that interim staff guidance calls for a

probabilistic based assessment of seismic events, where you combine a seismic risk curve with the fragility information, and get a true risk presentation. Are you going to do that in this?

FRANK: Yes.

GARRICK: You're going to follow the NRC's--now, of course, this is a guidance document, and it's not a rule. It's just guidance.

FRANK: Well, we've elected to perform what amounts to a seismic PRA, as I am familiar with them from the 1990's to this day, on nuclear power plants. It's a back ilk (phonetic) where we're developing a set of fragilities for key components, and we're convoluting that within event sequences with a hazard curve, and getting a mean probability of earthquake initiated event sequences.

GARRICK: So, you're not going to do it on a margin analysis basis? You're really going to do it--okay.

FRANK: Yes.

GARRICK: This slide that's up there, where it says, "Should a single event sequence include all drops of all types of canisters from all possible sources in all facilities," now, you know, in the PRAs for nuclear power plants, we don't have that problem, because we take all of the drops and we categorize the drops. We categorize loss of coolant accidents. You have a small loss of coolant accident

with very specific dimensions and release rates. You have a medium and you have a large. So, it's a very logical process that you could apply to that kind of a problem. You categorize these into manageable initiators in a probability of frequency format. It just seems to me that trying to force some probabilistic concepts into the licensing requirement really compromises the complexity of the analysis.

FRANK: It increases the complexity of the analysis.

GARRICK: Yes. That's what I mean. And, one of the things that was done in some of the early large-scope PRAs, and you're very aware of that, was a so-called phased approach, where rather than having 50 initiating events, you had five or six. But, you make sure those five or six contain in them the equivalent of the 50. And, you, in a very short period of time, get a--bouncing off of Andy's comment, in a very short period time, you'd get a first order indication of what the risk is. I would think you could do something like that here. It doesn't sound like that's the direction you're going.

FRANK: Well, I think that was done. I think that sort of top level risk analysis was done back two years ago in what was called the CD-1 study. We got those insights, and it was time to break it down in more detail for this go around.

GARRICK: Okay. Yes, Ali?

MOSLEH: What worried me was applying the screening at almost an arbitrary level, which is controlled by other guidance other than really a solid PRA. And, I was wondering, you know, do you really need to screen events out before you do any analysis?

FRANK: I'm sorry. Let me define what screen out means. In the jargon that we're using, and I apologize if that wasn't clear, we're calling something that is screened out as that which an event sequence quantification shows is beyond Category 2, that is less than 10 to the minus 4, over the 100 year preclosure period.

MOSLEH: At the initiator level.

FRANK: The whole event sequence, if the initiating event happens to be there, that low already, then you don't--one need not quantify in much detail the rest of it, nor does one need to calculate a dose.

I believe the point of that categorization is--well, actually, I don't know what the point of the categorization is derived from the NRC, but the way we're using it is to define our level of effort associated with the amount of dose and criticality calculations that we do. And, for that purpose, it screens out part of the work we have to do.

GARRICK: Any other questions? Yes, Andy?

KADAK: Has DOE finished their, I think it was called their risk margins, or margin safety analysis, and has that been factored into your modeling?

FRANK: I have no knowledge of that. Do you know that, the performance margin analysis?

GARRICK: For the TSPA.

NEWBURY: I'm sorry, can you repeat the question?

KADAK: I thought the last time Ward mentioned that they were going to do some kind of a safety margins analysis to support the TSPA.

BUDNITZ: That's postclosure.

NEWBURY: I know that, Bob. Claudia Newbury, DOE. Thank you, Bob Budnitz.

Yes, we are in the process of doing what's called a performance margin analysis, where we will take some of the conservatisms out of the TSPA, and then use as a comparison to our compliance case TSPA, which will be in the license to show that we have margin.

KADAK: Okay. Now, back to this question. Claudia suggested that you might know something about the seismic design criteria relative to the basis for establishing--we talked about this morning--a relatively high seismic loading. Is that correct?

FRANK: That's correct.

KADAK: Okay, could you share with us how we got those

big--

FRANK: Are you referring to the TAD spec?

KADAK: Well, I'm assuming that the TAD spec, the seismic input to the TAD storage pad is the same as that associated with the facilities.

FRANK: Yes.

KADAK: So, can you describe how that number was established, or that risk was established, establishing a certain ground motion?

FRANK: Not in detail. I can tell you that there was recently an effort completed earlier in the year, an effort completed by the project seismic geologic team that developed a seismic hazard curve, and that seismic hazard curve has a roughly the 1 in 500,000 year frequency, approximately 3G PGA.

KADAK: One in 500,000 years? Now, that's going to be designed for surface facilities?

FRANK: Well, that is not the design point for the surface facilities. That just happens to be what the hazard curve ends up at at that very low frequency.

KADAK: Okay. So, why are we talking about then designing for a 3G event on the surface pad that may last, at most, maybe for 150 or so years?

FRANK: I think what you're referring to now is the requirement associated with the AO with a TAD inside to not

tip over and withstand motions at that level.

KADAK: Yes.

FRANK: We are, as a project, as I mentioned before, we took the commitment to do a seismic risk assessment, which convolutes the entire hazard curve with fragility curve. So, one needs to understand responses, even at the high earthquake levels, in order to include that in the integration.

KADAK: Meaning?

FRANK: Meaning that I'd like to be able to--that what I would hope to show, and I don't know how it's going to come out, it's a little early for that, but when we do take the hazard curve with the seismic event sequence associated with the full range of those earthquakes, and we convolute them at the P, that the mean probability of that process will be less than 10 to the minus 4 over the preclosure period. For that to occur, there needs to be some strength, or we need to be able to understand, and in a certain sense, show that at about 3G, at a level somewhat greater than 3G--I'm going to back off on that and say it a different way. In lieu of that calculation being performed by the vendors, we need to be able to tell the vendors a particular design point, worse case design point. And, we were not given the guidance to--do you want to say something?

KADAK: I'm just wondering who picked the 3G as the

design point?

FRANK: It's not a design point. It's part of the hazard curve.

KADAK: But, from what I was told this morning, they're designing to a 3G event for these TADs. But, let me work it backwards, and use what I know of the reactor storage pad designs. One in 10,000 years is an acceptable return period for structures and storage pads.

FRANK: Okay.

KADAK: For roughly 100 years, 40, 60, you can stretch it to 100. Now, why did somebody decide--and, you can go and find out what the earthquake return, what earthquake at Yucca Mountain would be for that return period, which I don't believe is 3Gs. Maybe it is.

FRANK: It's one in a thousand year, it's less than 3G.

KADAK: All right. Now, what is wrong with using that as the design basis to show that in the hundred or so years that you might be operating this storage pad, that it's acceptable as opposed to going to 10 to the minus, pick a number, that maybe drives you to 3G for your design? That's what I'm trying to understand.

FRANK: First of all, let's get the--the design point is different from the analysis point or the margin point. The design point means that the vendors go to a level less than 3G, and I don't remember what the TAD spec says on that,

whether it's .4 or .5 or .6, I just don't remember. And at that point, all of the structural codes and standards with all their allowables kick in, and vendors need to meet that.

Beyond that design point, there is margin to be demonstrated, and that margin, given the hazard curve, leads us down to a one in 500,000 year level. Why one in 500,000 year? 50 years of lifetime times one in 500,000 years, gives us a 10 to the minus 4 over the preclosure period, so that we'd like to demonstrate that there's adequacy down to our screen-out point, the Category 2, Category 3 boundary.

WISENBURG: My name is Mark Wisenburg. I'm the Bechtel SAIC manager for preclosure safety analysis. I want to remind you that Dr. Frank said he knew a little bit about the seismic design criteria. You're quizzing him as if he were the expert and knew all the answers. I know a little bit more. I need to put some perspective on Dr. Kadak's question.

Dr. Kadak is proposing exactly what the Department of Energy originally proposed by way of a seismic margins analysis with a 10,000 year earthquake as the radio-level earthquake. That was our original proposal. We made that submittal to the Nuclear Regulatory Commission. The staff struggled long and hard to determine whether that would be an acceptable approach. They ruled that inasmuch as a seismic margins analysis did not provide you with the appropriate

probabilistic framework to make a judgment as to whether you are Category 1, Category 2, or beyond Category 2, that's helpful, and providing insight into the design, the seismic margins analysis by itself would not demonstrate compliance with the regulation.

Then, the decision was made to follow, in general, the guidance in ISG-1. We aren't slave to it. We are taking some exceptions, but, in general, that is a definition of a seismic hazards curve, and convolution against that curve of the structural fragility of the piece of equipment or structure of concern. The seismic hazards curve gives you the G levels you are talking about. They are points on the curve.

GARRICK: Thank you. Thank you very much.

Okay, well, are there--okay, question from--excuse me.

NEVERGOL: If you could just give me two minutes, I need to clarify one thing to make sure everybody understands. This is Debbie Nevergol from BSC.

What we've been discussing just now relative to the 3G is only applicable to the aging overpacks. I wanted to make it clear that from a design perspective on the buildings themselves, we're designing those for the 2,000 year earthquake return period, which would put us about at .58 to .52 Gs, vertical and horizontal PGA. So, much less than the

3Gs.

GARRICK: Oh, that's a very important observation.

KADAK: Why is it that the NRC or somebody thinks the overpack needs to fly to be good?

NEVERGOL: I think it's a different perspective of looking at the probabilistic analysis. What they're looking at is at the 500 year return period, which is equivalent to two times 10 to the minus 6. If we design for that overturning, and show that it does not overturn at that earthquake, then we've met our probabilistic requirements. Different than the approach being taken on the buildings. Correct me if I didn't say that right.

KADAK: It sounds like it's your design decision to pick the number, not NRC's.

NEVERGOL: DOE's decision on how to approach this for the aging overpacks.

KADAK: Ah, ahhh, so we shouldn't be blaming the NRC, should we?

NEVERGOL: I don't blame the NRC for anything.

KADAK: Just to clarify. The building are designed to what standard? What floating?

NEVERGOL: The 2,000 year return period earthquake.

KADAK: 2,000 year return period, which is what?

NEVERGOL: It is .52 Gs vertical, and .58G horizontal PGA.

KADAK: Okay. And, the only thing that's designed to this 3G is the overpack?

NEVERGOL: Design is not--they will be evaluated for overturning, showing that they will not overturn with the 3G.

KADAK: And, I'm still trying to understand how you get the 3G?

NEVERGOL: The 3G is coming off of the 500,000 year return period earthquake.

KADAK: And, why did you pick that?

NEVERGOL: Because that's equivalent to 2 times 10 to the minus 6 annual probability of occurrence.

GARRICK: Which isn't NRC?

NEVERGOL: Which is the 1 in 10,000 over the preclosure period.

KADAK: Okay, thank you.

GARRICK: All right, let's see, we had a question over here? Yes, go ahead, David.

DIODATO: Dave Diodato, NWTRB staff risking universal enmity here.

I was impressed by the challenge of your undertaking here, and also the significance of it in terms of evaluating the safety of preclosure operations. And, I was encouraged by your response to Howard Arnold in terms of yes, you had feedbacks to design, and how that works. Well, as an aside for a second, you know, Dr. Abkowitz asked about

outside the fence, no, you're inside the fence, but you also include underground; is that correct?

FRANK: That includes underground operations during the preclosure period, yes.

DIODATO: Okay. I just wanted to get that clarified. So, in terms of your feedbacks to design, it seems like there's a lot of opportunities there for reducing the risk, you know, enhancing safety through design decisions. So, my question is can you name two or three top scenarios, contributors to the risk that you've identified, and have there been any design modifications, you know, feeding back as a result of those risks that you identified, those major scenarios that contribute to the risks?

FRANK: You used the word major, and I just decided to ignore that, and I'll give you two examples, because it's hard to know at this point in my analysis, you know, what's major and what isn't. So, I'll just give you two examples.

We are sensitive to, of course, the height of the drop, and one could, you know, push the button and have a crane arise rather high, in fact, all the way up to where it's called two blocked. So, what we wanted to do was limit the drop heights to reduce the probability of a breach, and we did this by design in a couple of ways. Easy ways like safety limit switches. More sophisticated ways by sensing when the lifted canister has actually gone through a second

floor, and then closing the gates on it so it can't fall any further than that.

Another example would be associated with the TEV. It is a semi-autonomous design, which electrically actuates its own doors to open. The waste package itself is not a--doesn't provide much shielding. The TEV itself is what provides the shielding to workers. And, so, when we saw that it is possible to have a spurious opening of that door, we put in interlocks to reduce the probabilities, to reduce the exposure to workers.

DIODATO: Can we have a picture of the TEV that was actually in a different--that was in Slovic's presentation.

FRANK: That's right. And, unfortunately--yeah, I don't think that picture showed the doors.

DIODATO: Well, no, this shows the doors in the front. I was looking at this because I don't know if you've ever seen a transformer. This thing kind of reminds me of a transformer. It's interesting. I was wondering because you're struggling with the issue of reductionism or, you know, joint probabilities are getting to be so small, you don't want to overdo that. So, when you put the transporter in your placement vehicle--that's it right there--into your analysis, what failure points do you see here that you include in your analysis? You talked about the doors?

FRANK: Yes, with respect--that's one thing, respect to

the doors. This thing is built like a tank. It's something on the order of 10 inches of steel around it, and, so, it is an extraordinarily rugged vehicle. What we're really concerned about is not damage to the vehicle from a safety perspective, it's an operational nightmare, but the waste package, we don't want the waste package to breach. So, we look at derailments, control commands that cause the TEV to increase speed, and we counteract that by simply putting motors in that don't have the capacity to increase speed.

There is a downhill slope at one point, and, so, we want to avoid a runaway, and, so, what we do is put in 100 to 1 gear box--gear ratio gear boxes, so that there can be no back driving, and that reduces the--dramatically reduces the likelihood of runaway.

DIODATO: If this thing breaks down in the repository, do you have a plan for how you get it out?

FRANK: There is a concept for how to get it out, yes. There will be, the way I understand the concept, is that there will be a similar--well, think about it as a train. When a locomotive breaks down, you bring another little one up with a coupling device, you couple it and you haul it out of there.

DIODATO: Thank you. I appreciate that.

SLOVIC: Just--this is Bob Slovic. The transport and emplacement vehicle, as I said earlier, has about eight

motors in it. It will operate with six, and two of them stalled. Also, with the doors closed and the bed plate in, it's shielded, or the operators or anybody coming up to it would be shielded so if it was located on the surface, you could walk up to it and repair what you needed to do. We haven't gotten yet to a tractor to pull it out, but that's another option for recovery type of thing, if it were stalled in a drift somewhere and we couldn't send humans in.

DIODATO: I appreciate the clarification. The thing that strikes me about this is the whole risk triplet approach. You talked about how to assess risk based on past historical experience, and here we have a novel design for something that's never been--

SLOVIC: It is, but we're essentially not handling--the waste package is designed for, well, it's I think a two meter drop, or it's been analyzed for a two meter drop. We pick it up a food.

FRANK: Let me respond to that, though, the novel design aspect. The assembly of it is novel, but it is still composed of motors and gear boxes and contactors and programmable logic controllers, all of which we know a lot about.

DIODATO: That makes sense. Thank you.

WISENBURG: This is Mark Wisenburg. I wanted to go back to your basic question, which you--by have you identified

major contributors to risk. A fundamental major contributor of risk is cask handling, and mishaps associated with it. What we have done in the course of interface and cooperation with design, as the design of the canister base repository proceeded, we took every opportunity we could to eliminate lifts, and limit the height of lifts. That is one of the principal contributors of the risk insight and--to the engineering design, and a very basic and high level.

GARRICK: All right. I think we have exhausted our time. Mike, obviously, you have a big job ahead of you, and we wish you well. It's a major task, what you're trying to do, and we appreciate your spending the time with us and telling us where you are.

We're only 12 minutes, 11 minutes behind schedule if you don't count the break. And, I think rather than having a break, we will move on. And, that brings us to the public comment period, and I guess I have at least one public comment that wants to be made by Judy Treichel.

So, Judy, you have the floor.

TREICHEL: Judy Treichel, Nevada Nuclear Waste Task Force.

First, I want to thank you for asking the question about the EIS and having the answer given by Mr. Sproat that they were going to bail out before they had a record of decision, which EISs are one of the most important things as

far as the public is concerned, because we understand it, and we've dealt with EISs for a very long time, and we know what happens when, you know, the various processes that go along and that you respond to the draft and then a final comes out, and if there is no record of decision, you miss out on a very important part of the process. But, that's the way it's going to go, and I wanted to find out that that was what was happening.

There is, I guess for decades, I've been standing here and you've been sitting there, and you hear me talk about this idea that the sense of urgency is not a good thing, even though you heard from the industry that they're delighted that there suddenly is this new sense of urgency with DOE. And, the idea of keeping to the schedule and trying to rush through this thing has been the worst thing that they have done all the way along. Trying to rush something that's a million year project, or even a 10,000 year project, is a terrible mistake.

And, if you'll remember in the year 2004, they were at about this same situation. They tried to certify their LSN, they were all set to go to licensing, and the certification came off of the LSN, and they didn't go to licensing, and look at all that you've heard since 2004. Isn't it a good thing that the rush came to a screeching halt. And, it's my assumption that that probably will happen

again, and it's not a disaster. It's very good for the people of Nevada, those along the transportation routes, and probably those in reactor communities, too.

The idea that there's a Yucca Mountain address label on a cask that's sitting at a reactor site and, therefore, gives confidence to people is not necessarily true. There are a lot of groups out there across the nation that oppose Yucca Mountain, and many of them are in reactor communities, and they're far more interested in whether or not that on-site storage is being done as safely as possible, rather than what the address label on the thing says. So, there's very different points of view here, and I think you need to hear those along with the industry.

I also think there's phrases that went on today that are troubling. When, I think it was during a discussion of the opening of--possible opening of dual purpose casks at a repository, and that decision would be made after licensing. So, it's like you go down and you get yourself a driver's license, and then you feel you're good to go for street racing. That's just not what's going on here, and we hear all sorts of things like that, and the idea that what we're looking--or what we're working toward is something that will work for licensing. Well, I don't care about something that works for licensing. I care about a waste disposal that works.

The idea that, I think it was Chris Kouts who said we assume that the utilities will want us to take the waste right from the pools. Well, if you follow that through, then what you have here is the TAD going to Yucca Mountain with waste that's just barely cool enough to qualify for being transported, and Yucca Mountain turns into, along with its aging facility, an MRS, because it's going to have to sit out there for a long time if it arrives that hot.

It also seems very strange that everything is propped up against a rail line, which isn't there, and it's likely that it may never be there. So, there are a lot of things that are kind of propped against something that just doesn't exist yet. And, Ward Sproat and the Department of Energy and the repository project seem to be trying to outrun the opposition.

So, what I see is a license application that's going to go in, and a licensing process that will take place in order to license specifications and assumptions and pictures and partially done designs, and I don't think that's why the TRB is here and that's what you were set up to evaluate.

So, thank you.

GARRICK: Thank you. Yes.

TREICHEL: I'd be disappointed if you didn't.

KADAK: Kadak. Judy, what can we do to bring more of

the public into these meetings? Because it's just very disappointing not to see more of the people from Nevada listening to some of this stuff.

TREICHEL: I guess you could do what Canada and Sweden and some of the other places do, and replace their paycheck for their participation so that you don't take a day off of work, and you don't--I mean, after all, we've been at this for 20 years. How many people out there are capable of going back and finding out what even the acronyms mean. It's very hard, and that train left the station. Once this thing was recommended, the site was recommended and Congress acted and we're off toward licensing, what difference does it make what the public says?

The one thing the public does do is they comment on EISs, but whether or not that's worth doing in this case or not, when you're never even going to get a record of decision, that gets thrown over the wall along with the LA, and that's NRC's problem and the public isn't there. NRC has all different rules for the way they treat EISs. So, there should have been a public participation program when it started.

KADAK: Not that I'm recommending this to the other Board members, but you're saying the evening meetings may be better?

TREICHEL: No.

KADAK: No?

TREICHEL: Stop and start over again. Get yourself a good program.

FITZPATRICK: Am I too late, Dr. Garrick?

GARRICK: Yes.

FITZPATRICK: For a quick one? Is it too late for a quick one?

GARRICK: Sure.

FITZPATRICK: Okay, this will be for Dr. Frank, I guess. This is an acronym question. The column in your Slide 10, the sequence of analysis of event sequence, there's a lot of CRC- and then a number. What is the acronym?

First off, I'm Charlie Fitzpatrick, State of Nevada, and I'm sorry, I asked Dr. Frank to identify the acronym CRC in his slide.

FRANK: CRC is short for CRCF in our jargon, which is the canister receipt and closure facility, and what that actual--those sequence of numbers refer to is a box in the master. Each one represents a box in the master logic diagram. So, you can trace the analysis from the master logic diagram and see where that information is used in the event sequences.

FITZPATRICK: Okay. And, the second part of the question, just to sort of try to gauge the enormity of what you have ahead of you, I think I heard that there could be as

many as a couple hundred event sequences. But even if there were 100 of significance, if they each had to go through this step by step analysis with these data packages at the base of them, is what you're going to have to submit in February '08 to DOE as the final package? Can you give me a guess of the enormity of that?

FRANK: Well, I don't think that what we are going to submit is at all out of balance with, in fact, complete consistent with a typical submittal of a risk assessment for our nuclear power plant. I think it's a similar number of significant event sequences.

FITZPATRICK: Are we talking hundreds of pages?

FRANK: For all the documentation, we're probably talking--well, what we will provide the NRC will be, for our analysis, on that order, about 100 or so pages. And, then, of course, there's other documents that have the details of the calculations.

FITZPATRICK: Thank you.

GARRICK: Go ahead, Steve?

FRISHMAN: Thank you, John.

Steve Frishman, State of Nevada. I think I have to repeat something to the Board that I said I think two or three times over the years, but there are enough that probably haven't heard me, and I heard the misconception again this morning on the subject. And, that's the Part 63

licensing is not the same procedure as reactor licensing. There's a major difference, and DOE is trying to make them look alike.

There appears to have been at least some misconception that they are alike by other people, and that's--the major difference is that the safety analysis report that goes with the repository license application under Part 63 is the safety analysis report, and reactor licensing, you start with a PSAR, preliminary safety analysis report. And, that's a very large distinction, and a very large difference, and DOE seems to over the years have continued to believe that what they submit as a license application will contain what is the equivalent of a PSAR that will then be elevated up when they go for the amendment for possession. That's not the way the rule goes. The SAR is the SAR.

Now, that is not an esoteric thing to be thinking about, especially when you hear such things as 35 percent design at the time of--35 percent design for ITS at the time of license application, when you hear that there will not be a TAD design, they will try to license the TAD specification. These are important distinctions, and it's, I think, of a major concern, and it's a misconception that DOE has continued to foster. They believe it themselves. And, I think they possibly believe that the NRC will let them get

away with it only because the NRC has been silent all these years on DOE's misconception, and DOE, as it has done with almost everything else where there's a question that would have to do with someone else having any control over their program. If the issue is out there, the one responsible for the answer is silent, DOE takes it as consent.

So, in a situation where we are going to get an incomplete license application that DOE is going to try to insist is a complete license application, and they tell you in this room today, 35 percent ITS design, simply things, no TAD design, no TAD design because they haven't got time to do it if they're going to make June of 2008.

So, I just wanted to clear up that distinction. It's a very important distinction, and it should factor in your thinking about the level of technical credibility of the upcoming license application, because I think you need to worry about that. And, it should also at least temper your thoughts on the extent to which, whether it's complete or not, you think the work even meets the excellence bar that the NRC has given--has said for years and years is going to have to be not necessarily because they're great champions of excellence, but because they know if it's not excellent, it's going to take time to get it to the point where they can process it, and they've got the law hanging over their head.

I think these are places where your expert advice

could come to bear on the things even in the risk informed world that we have to live in, because NRC says it is, you can bring these things to bear in your thinking about what is it maybe that is important enough for DOE to have to take care of it before they subject the license application to not only the NRC, but to us who are going to have to spend extraordinary resources to deal with the fact that they have a license application that's not complete.

GARRICK: Okay, thank you. Thank you very much, Steve. Anyone else?

ARNOLD: John, let me say something to Steve. I'm the one who used the PSAR term, but the fact of the matter is whether it's a PSAR, an FSAR, or whatever, the final SAR will be the result of whatever they submit in the first place, and the answers to all the RAIs that the NRC will bombard DOE with over the years. So, I'm sorry for using the word PSAR, but I recognize that what's sent in originally will evolve considerably before it reaches the end.

FRISHMAN: I won't continue the discussion.

GARRICK: Any other comments or questions?

Very good. Well, the Board wants to thank all the presenters, and all of the questioners. It was a very comprehensive discussion, I believe, and a number of issues were raised that were not adequately addressed, which provides material for future meetings, which there will

surely be. And, we look forward to that.

But, we want to thank everybody for being here, and especially for the people that made the presentations, and especially the people who made the public comments. So, with that, we will, without further ado, we will adjourn.

Thank you.

(Whereupon, the meeting was adjourned.)

C E R T I F I C A T E

I certify that the foregoing is a correct transcript of the Nuclear Waste Technical Review Board meeting held on September 19, 2007 in Las Vegas, Nevada taken from the electronic recording of proceedings in the above-entitled matter.

September 26, 2007

s/Scott Ford

Federal Reporting Service, Inc.
17454 East Asbury Place
Aurora, Colorado 80013
(303) 751-2777